

The image features a large, abstract sculpture made of polished, reflective metal pieces, possibly stainless steel, arranged in a circular pattern on a concrete base. The sculpture is set on a bed of light-colored gravel. In the background, there are lush green trees under a clear blue sky. A banner with the text "Oregon TECH" is overlaid on the top of the image. The word "Oregon" is in white on a dark blue background, and "TECH" is in dark blue on a yellow background. The overall scene is bright and sunny, suggesting a campus environment.

**Oregon**

**TECH**

**General Catalog 2018-2019**

**Oregon Institute of Technology**

University Catalog

© 2018-2019

[www.oit.edu](http://www.oit.edu)

(541) 885-1000

3201 Campus Drive, Klamath Falls, OR 97601-8801

*Hands-on education for real-world achievement.*

# Welcome to Oregon Tech

## General Information

The Oregon Tech Admissions Office is located on the first floor of the College Union on the Klamath Falls campus. It is open weekdays from 8 a.m. to 5 p.m. to serve prospective students, applicants and their families, as well as high school guidance counselors, college-transfer advisors and teachers.

If you are interested in seeing the Klamath Falls campus, the Admissions Office's visit coordinator can arrange for you to meet with a faculty member and an admissions counselor, tour the residence halls and the rest of the campus, sit in on a class and/ or talk with one of our coaches. To set up a campus visit, call (800) 422-2017 or (541) 885-1150. Hearing-impaired persons may call the TTY number: (541) 885-1072. You also can request a campus visit at [www.oit.edu](http://www.oit.edu) or by emailing [oit@oit.edu](mailto:oit@oit.edu). If you wish to visit one of Oregon Tech's other campuses, the Admissions Office can provide you with a contact person who can make arrangements for you.

## Non-Discrimination Policy

Non-Discrimination Policy Oregon Institute of Technology does not discriminate on the basis of race, color, ethnicity, national origin, gender, disability, age, religion, marital status, sexual orientation or gender identity in its programs and activities. The following individuals are designated to handle inquiries and complaints regarding this non-discrimination policy: Civil Rights Officer, (541) 885-1108; email: [oitcr@oit.edu](mailto:oitcr@oit.edu) and Title IX Coordinator (sex-based and gender-based discrimination), (541) 885-1847, [nicole.briggs@oit.edu](mailto:nicole.briggs@oit.edu).

## Students with Disabilities

Oregon Institute of Technology is committed to accommodating the academic and programmatic needs of qualified students with disabilities. Students with disabilities who anticipate needing accommodations should contact Services for Students with Disabilities, LRC 223, as soon as possible in advance of enrollment, to ensure timely provision of services. Questions may be directed to: Services for Students with Disabilities, Oregon Tech, 3201 Campus Dr., Klamath Falls, OR 97601-8801. (541) 885-1129.

## Alternate Format

This publication is available in an alternate format for persons with disabilities. Please contact Services for Students with Disabilities at (541) 885-1129.

## Accreditation

Oregon Institute of Technology is accredited by the Northwest Commission on Colleges and Universities (NWCCU), 8060 165th Avenue, N.E., Suite 100, Redmond, WA 98052-3981. NWCCU is an institutional accrediting body recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education. Accreditation, licensure or approval of individual programs are listed in departmental sections. Copies of accreditation documents are available in the Office of the Vice President for Academic Affairs/Provost, Oregon Tech, 3201 Campus Dr., Klamath Falls, OR 97601-8801.

## General Catalog Production

The 2018-19 General Catalog was produced by the Registrar's Office, and the Marketing and Communication Department at Oregon Tech. Wendy Ivie, University Registrar; Allison Baker, Administrative Program Specialist; and Ashley Van Essen, Public Relations Representative. Information in this catalog was accurate at the time of publication, but is subject to change without notice and does not constitute a contract between Oregon Tech and the student or applicant. The general catalog is printed annually and available on the web at [www.oit.edu](http://www.oit.edu).

## History at a Glance

- 1947 – July 14, Under the direction of first president, Winston Purvine, the first classes at Oregon Vocational School were held in a deactivated World War II Marine Corps hospital three miles northeast of Klamath Falls.
- 1948 – In a vote by the State Board of Education, the University's name was changed to Oregon Technical Institute – also known as OTI or Oregon Tech.
- 1950 – KTEC radio went on the air.
- 1953 – Associate degree programs in the Surveying and Structural Engineering Technologies were first accredited by the Engineers' Council for Professional Development.
- 1956 – KOTI television opened on campus.
- 1957 – Oregon Tech was made a separate division of the State Board of Education and an engineering study was begun to determine whether to repair or rebuild the facilities.
- 1960 – Oregon Tech was transferred to the jurisdiction of the State Board of Higher Education.
- 1962 – Oregon Tech was accredited by the Northwest Association of Secondary and Higher Schools.
- 1964 – Oregon Tech moved to its newly constructed campus on a geothermal site overlooking Upper Klamath Lake.
- 1966 – Oregon Tech received authorization to grant bachelor's degrees.
- 1970 – Bachelor's degree programs first accredited by ABET.
- 1973 – OTI name changed to Oregon Institute of Technology or OIT; Oregon Tech continues in use as well.
- 1975 – Geo-Heat Center established.
- 1976 – Kenneth Light appointed 2<sup>nd</sup> President of Oregon Tech upon Purvine's retirement.
- 1983 – Larry Blake appointed 3<sup>rd</sup> President of Oregon Tech. Metro Center established in Portland to offer in-demand degrees.
- 1984 – Small Business Development Center established.
- 1988 – Portland Metro Center moved to its first permanent facilities on Southeast Harmony Road in Clackamas.
- 1989 – State Board of Higher Education authorized Oregon Tech to grant master's degrees.
- 1991 – Lawrence J. Wolf appointed 4<sup>th</sup> President of Oregon Tech.
- 1995 – First Master's degree offered.
- 1998 – Martha Anne Dow appointed 5<sup>th</sup> President of Oregon Tech.
- 2001 – Oregon Renewable Energy Center established in law by the Oregon legislature.
- 2005 – Oregon Center for Health Professions established.
- 2008 – Christopher G. Maples appointed 6<sup>th</sup> President of Oregon Tech. Martha Anne Dow Center for Health Professions opens.
- 2012 – Oregon Tech's Portland-Metro presence expands with the opening of the Portland-Metro Campus and broadening of degree options.
- 2015 – Oregon Institute of Technology became an independent public body governed by its own Board of Trustees.
- 2017 – Nagi G. Naganathan appointed 7<sup>th</sup> President of Oregon Tech.

## Welcome

Welcome to Oregon Tech! You have chosen a university that will challenge you, excite you, and provide many opportunities for you to learn, innovate and grow in a unique education environment. Oregon Tech graduates are known for their ability to excel immediately in their careers as well as in graduate and professional schools. This means that, on average, Oregon Tech graduates earn some of the highest starting salaries in the nation – an average of \$56,000.

The small class size and hands-on, applied approach to education at Oregon Tech is perfectly tailored to a learning environment that encourages communication, collaboration, and engaging in professional practice. Oregon Tech is focused on providing high value to students, and a high return on investment to our graduates who excel across many industries and in-demand fields. Our tag line, "Hands-on education for real-world achievement," is more than a slogan – it truly is the way we do business. Faculty members bring their real-world problem-solving experiences into the classroom, and Oregon Tech students have myriad opportunities to gain professional experience outside the classroom through externships, internships, field work, cooperative programs, and capstone projects.

By attending Oregon Tech, you have chosen rigor, quality, and relevance. You are now part of our focus on excellence, innovation, and professional preparation that have served Oregon Tech's graduates well and have continuously increased our reputation and rankings in Oregon, the Pacific Northwest, and nationally. Welcome to the Oregon Tech Family – we're glad you're here and we very much look forward to helping you achieve your own personal and professional success while you are here as students and after you graduate as alumni!

## Mission Statement and Core Themes

### Mission Statement

Oregon Institute of Technology offers innovative and rigorous applied degree programs in the areas of engineering, engineering technologies, health technologies, management, and the arts and sciences. To foster student and graduate success, the university provides an intimate, hands-on learning environment, focusing on application of theory to practice. Oregon Tech offers statewide educational opportunities for the emerging needs of Oregonians and provides information and technical expertise to state, national, and international constituents.

### Core Themes

Oregon Institute of Technology:

- Applied Degree Programs
- Student and Graduate Success
- Statewide Educational Opportunities
- Public Service

## Essential Learning Outcomes for Students

Oregon Tech's Essential Student Learning Outcomes (ESLOs) support Oregon Tech's institutional mission and core themes. The outcomes and associated criteria reflect the rigorous applied nature of Oregon Tech's degree programs.

The ESLOs reflect the common expectations about the knowledge, skills, and abilities that Oregon Tech students will acquire and are reflected in the General Education requirements that lay the foundation upon which the major curricula build. Engaging in these ESLOs will support Oregon Tech graduates in developing the habits of mind and behaviors of professionals and lifelong learners.

Oregon Tech students will:

- *communicate* effectively orally and in writing;
- engage in a process of *inquiry and analysis*;
- make and defend reasonable *ethical* judgments;
- collaborate effectively in *teams* or groups;
- demonstrate *quantitative literacy*;
- explore *diverse perspectives*.

## About Oregon Tech

For 70 years, Oregon Institute of Technology (Oregon Tech) has focused on changing the lives of Oregonians by preparing them to meet the technology, innovation and management needs of business, industry and health care. Oregon Tech is accredited by the Northwest Commission on Colleges and Universities, and individual programs are also accredited by the appropriate professional organizations. Today, Oregon Tech offers more than 40 Bachelor of Science and Master's degree programs in engineering, technology, health technologies, management, communication and the applied sciences. These include a growing number of bachelor degrees and degree-completion programs offered online, and 20 bachelor's and master's degree programs that can be entirely completed at Oregon Tech's Portland-Metro campus in Wilsonville.

With a mission to deliver technology education throughout the Pacific Northwest, we partner with business and industry leaders to ensure our programs adapt to new technologies and workforce demands. Oregon Tech's focus on professional practice gives our students a competitive edge: nearly 90 percent are employed or in graduate school within six months of graduation. Year after year, our graduates garner the highest starting salaries in Oregon and among the highest in the nation.

Our applied approach to teaching, which blends theory and practice, is the main reason our graduates and alumni are so avidly recruited. Oregon Tech students have amazing opportunities to apply what they learn in lab-based classes, clinics, externships and workplaces. Oregon Tech's faculty and staff, who come to Oregon Tech with relevant business, industrial, or clinical experience, reinforce this practical focus in the classroom. And in every program, a relevant interdisciplinary core underscores major studies, broadening students' understanding of the world and teaching them to communicate effectively, solve problems, and think for themselves. This student-focused approach to teaching and learning engages students in professional practice throughout their time at Oregon Tech.

### **One Oregon Tech, Three Primary Campuses, and Program-Specific Sites**

Oregon Tech is one institution with multiple locations. Established in 1947, Oregon Tech offers bachelor's and master's degree programs at locations throughout Oregon and beyond to meet the needs of students seeking a top quality, professionally-focused education.

Oregon Tech's main residential campus is located in **Klamath Falls** in beautiful Southern Oregon, and is nestled on the eastern slope of the Cascade Mountains. The 190-acre campus offers spectacular views of Upper Klamath Lake, pine-studded knolls and snow-capped peaks from nearly every building. Klamath Falls, a city of about 20,000 residents (45,000 in the urban growth area), is located in Klamath County in south-central Oregon, about 20 miles from the California border and in the same county that boasts Crater Lake National Park. Known as Oregon's "City of Sunshine," Klamath Falls enjoys about 300 days of blue skies each year.

Oregon Tech's **Portland-Metro** campus in Wilsonville, located just south of Portland, offers bachelor's and master's degree programs in a state-of-the-art facility designed to provide an industry-focused, urban university experience in the heart of Oregon's "Silicon Forest". The campus offers 20 high-demand degree programs, and is easily accessible to students of all ages and backgrounds, including business professionals, transfer students and new freshman just out of high school. Oregon Tech provides excellent opportunities for students seeking internships and employment while completing their degrees.

Oregon Tech also offers a growing number of **Online** programs for working professionals or returning students who are busy and ready to advance their education as quickly and conveniently as possible. Oregon Tech Online lets students finish certificate, associate's, or bachelor's degrees without leaving home or the office, and without the hassles of travel, childcare or giving up your current job. The primary mission of Oregon Tech Online is to offer convenient programs and courses to both students seeking a degree, and those wishing to skill-up by taking just a course or two.

Oregon Tech also offers a bachelor's program in dental hygiene in **Salem** through a partnership between Oregon Tech and Chemeketa Community College. The classrooms and dental hygiene clinic are located in Chemeketa's new, state-of-the-art Health & Sciences Building. The program requires one year of prerequisite (pre-dental hygiene) coursework prior to acceptance.

Oregon Tech **Seattle at Boeing** offers bachelor's and master's degrees in Manufacturing Engineering Technology, as well as a Bachelor of Science Degree in both Mechanical Engineering and Mechanical Engineering Technology to employees of The Boeing Company at sites in the Puget Sound area. Also offered are review classes for the Society of Manufacturing Engineers' CMfgT and CMfgE exams and three Certificates of Completion in Composites.

Oregon Tech is accredited by the Northwest Commission on Colleges and Universities. Additional accreditations, licensure and approvals of individual programs are listed in the appropriate program sections of this catalog. Copies of accreditation documents are available in the Office of the Vice President for Academic Affairs/Provost, Oregon Institute of Technology, 3201 Campus Dr., Klamath Falls, OR 97601-8801.

As of January 2015, Oregon Tech Online is an approved institutional participant in the National Council for State Authorization Reciprocity Agreements (NC-SARA) initiative, which allows for increased access to online courses for many out of state students. Oregon Tech Online is authorized by the Washington Student Achievement Council and meets the requirements and minimum educational standards established for degree-granting institutions under the Degree-Granting Institutions Act. This authorization is subject to periodic review and authorizes Oregon Institute of Technology to offer field placement components for specific degree programs. The Council may be contacted for a list of currently authorized programs. Authorization by the Council does not carry with it an endorsement by the Council of the institution or its programs. Any person desiring information about the requirements of the act or the applicability of those requirements to the institution may contact the Council at P.O. Box 43430, Olympia, WA 98504-3430.

# Academic Programs

## Klamath Falls

### Master of Science

Allied Health  
Civil Engineering  
Marriage and Family Therapy

### Master of Science/Bachelor of Science

Electrical Engineering, BS/Renewable Energy Engineering, MS  
Electrical Engineering, BS/MSE  
Renewable Energy Engineering, BS/MS  
Renewable Energy Engineering, BS/MSE

### Bachelor of Applied Science

Technology and Management

### Bachelor of Science

Applied Mathematics  
Applied Psychology  
Biology-Health Sciences  
Business, with options in:  
Accounting  
Management  
Marketing  
Civil Engineering  
Communication Studies  
Computer Engineering Technology  
Dental Hygiene  
Diagnostic Medical Sonography  
Echocardiography  
Electrical Engineering, with emphasis in:  
Automation, Robotics, and Control  
Electrical Power  
Microelectronics  
Renewable Energy  
With a dual major in:  
Systems Engineering and Technical Management  
Electrical Engineering/Renewable Energy Engineering  
Embedded Systems Engineering Technology  
Environmental Sciences  
Geomatics, with options in:  
Geographic Information Systems  
Surveying  
Health Care Management, with options in:  
Administration  
Clinical  
Radiological Science Management  
Health Informatics  
Information Technology  
Manufacturing Engineering Technology  
Mechanical Engineering  
Mechanical Engineering Technology  
Nuclear Medicine and Molecular Imaging Technology  
Nursing (through OHSU School of Nursing)  
Operations Management  
Population Health Management

Radiologic Science  
Renewable Energy Engineering  
With a dual major in:  
Systems Engineering and Technical Management  
Renewable Energy Engineering/Electrical Engineering  
Renewable Energy Engineering/Environmental Science  
Respiratory Care  
Software Engineering Technology  
Vascular Technology

### Associate Degrees

#### Associate of Applied Science

Sleep Health:  
Clinical Sleep Health  
Polysomnographic Technology

#### Associate of Engineering

Computer Engineering Technology  
Software Engineering Technology

### Minors

Arts, Literature, and Philosophy (ALPs)  
Applied Mathematics  
Applied Physics  
Applied Statistics  
Biology  
Business  
Chemistry  
Coaching  
Geographic Information Systems  
Health Informatics  
Human Interaction  
Information Technology  
International Business  
Medical Sociology  
Psychology  
Surveying  
Sustainability  
Technical Communication

### Specializations

Accounting  
Magnetic Resonance Imaging (MRI)  
Management  
Marketing  
Picture Archiving and Communication Systems (PACS)  
Travel and Tourism

### Certificates

Accounting (Post Baccalaureate)  
Applied Behavioral Analysis (Graduate)  
Clinical Sleep Health  
Dispute Resolution  
Polysomnographic Technology

**Portland-Metro****Master of Science**

Engineering – Specialties  
 Automation, Robotics & Control  
 Electrical Engineering  
 Embedded Engineering  
 Optical Engineering  
 Power Engineering  
 Systems Engineering  
 Renewable Energy Engineering

**Master of Science/Bachelor of Science**

Electrical Engineering, BS/Renewable Energy Engineering, MS  
 Renewable Energy Engineering

**Bachelor of Applied Science**

Technology and Management

**Bachelor of Science**

Applied Psychology  
 Electrical Engineering, with emphasis in:  
 Automation, Robotics, and Control  
 Electrical Power  
 Microelectronics  
 Optical Engineering  
 Renewable Energy  
 With dual major in:  
 Automation, Robotics, and Controls Engineering  
 Optical Engineering  
 Systems Engineering and Technical Management  
 Electrical Engineering/Renewable Energy Engineering  
 Electronics Engineering Technology  
 Embedded Systems Engineering Technology  
 Emergency Medical Services Management (joint degree with OHSU)  
 Health Informatics  
 Information Technology  
 Manufacturing Engineering Technology  
 Mechanical Engineering  
 Mechanical Engineering Technology  
 Medical Laboratory Science (joint degree with OHSU)  
 Operations Management  
 Renewable Energy Engineering, with emphasis in:  
 Automation, Robotics, and Control  
 Electrical Power  
 Microelectronics  
 Renewable Energy  
 With a dual major in:  
 Automation, Robotics, and Controls Engineering  
 Optical Engineering  
 Systems Engineering and Technical Management  
 Renewable Energy Engineering/Electrical Engineering  
 Software Engineering Technology

**Associate of Applied Science**

Emergency Medical Technology Paramedic

**Minors**

Applied Mathematics  
 Business  
 Health Informatics  
 Information Technology  
 Psychology  
 Surveying

**Certificates**

Applied Behavioral Analysis (Graduate)

**Online****Master of Science**

Allied Health  
 Engineering  
 Systems Engineering

**Bachelor of Applied Science**

Technology and Management

**Bachelor of Science**

Applied Psychology  
 Dental Hygiene (degree completion)  
 Diagnostic Medical Sonography (degree completion)  
 Echocardiography (degree completion)  
 Health Care Management (degree completion), with options in:  
 Clinical  
 Radiologic Science  
 Health Informatics  
 Information Technology  
 Operations Management  
 Radiologic Science (degree completion)  
 Respiratory Care (degree completion)  
 Vascular Technology (degree completion)

**Associate of Applied Science**

Sleep Health, with options in:  
 Clinical Sleep Health  
 Polysomnographic Technology

**Minors**

Business  
 Health Informatics  
 Information Technology  
 Psychology

**Specializations**

Magnetic Resonance Imaging (MRI)  
 Picture Archiving and Communication Systems (PACS)  
 Certificates  
 Clinical Sleep Health  
 Polysomnographic Technology

**Seattle at Boeing**

**Master of Science**

Manufacturing Engineering Technology

**Bachelor of Science**

Manufacturing Engineering

Technology Mechanical Engineering

Mechanical Engineering Technology

**Chemeketa Community College**

**Bachelor of Science**

Dental Hygiene

# Admissions and Financial Aid

## Office of Admissions

College Union, 1st Floor

800-422-2017 (toll free)

(541) 885-1150

(541) 885-1024 (fax)

[oit@oit.edu](mailto:oit@oit.edu)

[www.oit.edu/admissions](http://www.oit.edu/admissions)

The Oregon Tech Admissions Office is located on the first floor of the College Union on the Klamath Falls campus. Open weekdays from 8 a.m. to 5 p.m., its primary functions are to help prospective students investigate and evaluate Oregon Tech, to manage applications for admission and to assist applicants with the enrollment process. The Admissions Office operates with the cooperation and support of the entire campus community. Admissions welcomes visiting students and their families to daily tours, and sessions with admissions counselors, coaches, and other staff. Oregon Tech also hosts several Campus Preview events annually. For Campus Preview dates or to register online for a visit or Campus Preview, go to [www.oit.edu/visit](http://www.oit.edu/visit) or call (541) 885-1150 or (800) 422-2017. To visit Oregon Tech Portland-Metro, call (503) 821-1250. Hearing impaired persons may call the TTY number at (541) 885-1072. Admission requirements apply to all applicants of Oregon Tech. All students who wish to enroll in more than eight credits in a term, receive financial aid and/or graduate from Oregon Tech must apply and be accepted for admission. Applications for general admission (excluding programs requiring specialized admission) are processed on the campus in Klamath Falls regardless of the campus location for the student.

## Application Deadlines

The priority application deadline for maximum scholarship and financial aid consideration each fall term is March 1. Oregon Tech accepts applications on a rolling basis, but students must have a complete application on file in Admissions three weeks prior to the first day of classes as follows:

### 2018-2019

Fall Term

Winter Term

Spring Term

Summer Term

### Application Deadlines

September 3, 2018

December 17, 2018

March 11, 2019

June 3, 2019

## Applications

Applications for admission are available online at [www.oit.edu/apply](http://www.oit.edu/apply). A complete application consists of an application for admission, application fee, official transcripts, test scores, and other required documentation depending on the type of applicant (see Admission Eligibility Requirements).

Students who were previously admitted, but never enrolled, and students who want to re-enroll after skipping four or more terms must log back into the online application and click the link entitled "new" which is located under the "Admission Term" heading, then select the appropriate application to update their information. Students who have not yet registered for classes may change their entry term by logging back into the online application and click on the link entitled "new" which is located under the "Admission Term" heading, then select the appropriate application to update their term. Students who want to only update their choice of major or choice of campus must use the Application Change Form located online at [www.oit.edu/applications](http://www.oit.edu/applications) under "Additional Resources." Students who wish to enroll as non-degree seeking students in no more than eight credits per term may submit a Non-Admit Application form; however students must be fully admitted to qualify for financial aid. These forms are available online at [www.oit.edu/applications](http://www.oit.edu/applications).

International students must complete the International Student Application. Students seeking enrollment through an approved exchange program must complete the International Exchange Application. Both are available online at [www.oit.edu/international](http://www.oit.edu/international). The following majors require a secondary application process after students are granted general admission and after students meet the eligibility requirements of the program. Each program has its own deadlines, admission requirements and processes which are outlined in the departmental pages of this catalog.

- Medical Laboratory Science (OHSU/Portland-Metro)
- Diagnostic Medical Sonography
- Dental Hygiene (Klamath Falls, Salem)
- Echocardiography
- Nuclear Medicine Technology
- Nursing (with OHSU/Klamath Falls)
- Paramedic/EMT (OHSU/Portland-Metro)

- Radiologic Science
- Respiratory Care
- Vascular Technology

## Application Procedures

Every applicant must complete the following steps:

1. Complete the appropriate *Application for Admission* ([www.oit.edu/applications](http://www.oit.edu/applications)).
2. Submit the \$50 non-refundable application fee. (Applicants to online programs submit an additional \$50 non-refundable Online Program Fee). Checks or money orders should be made payable to Oregon Tech. Students who qualify may opt to defer the application fee until enrollment in classes. *Oregon Tech Application Fee Deferral Forms* are available at <http://www.oit.edu/docs/default-source/admissions-documents/deferral-of-application-fee-for-admission.pdf?sfvrsn=2>.
3. Applicants who have earned fewer than 36 college credits must have official SAT I or ACT scores sent to Oregon Tech. Some applicants who graduated from high school three or more years ago may be exempted from this requirement by permission of the Admissions Director.
4. Have official transcripts from all post-secondary institutions that you attended, or received credit from, sent directly to the Oregon Tech Admissions Office. Any offer of admission is contingent upon the submission of satisfactory final transcripts prior to enrollment at Oregon Tech.
5. Have official high school transcripts or GED test results sent directly to the Oregon Tech Admissions Office. High School records are not required from applicants who graduated prior to 1997 and who have earned at least 36 transferable quarter college credits or 24 transferable college semester credits. Applicants who are currently enrolled in high school may be admitted on the basis of six or more semesters of high school work provided that they will have met the 15 subject requirements at the time of high school graduation. In any case, each student's final official high school transcript must be provided upon graduation to complete the admission process.
6. Have official Advanced Placement (AP) or International Baccalaureate (IB) score reports sent to the Oregon Tech Admissions Office, if applicable.

When applying to an online program, submit an Eligibility Verification Form (<http://bit.ly/1a3EOud>). This will help ensure you meet any additional requirements of your desired program. To see eligibility requirements, visit [www.oit.edu/online/degrees](http://www.oit.edu/online/degrees), and select your desired program.

Some programs at Oregon Tech do not have sufficient space to enroll all qualified applicants who seek admission. In these cases, Oregon Tech reserves the right to offer admission to the most qualified applicants, on a first-come, first-served basis or through a combination of the two strategies.

Upon admission and prior to registration, a completed health form showing evidence of adequate immunizations must be on file with Oregon Tech's Student Health Center. For further information, see the Student Health Center section of this catalog. Students are not required to submit these forms if taking fewer than six credits per term.

If a student fails to submit the required documents in complete and satisfactory order, admission and registration may be cancelled. All records become the property of Oregon Tech.

### Social Security Number Disclosure and Consent Statement

Students are requested to provide, **voluntarily**, a Social Security Number (SSN) to assist Oregon Tech in developing, validating or administering predictive tests and assessments; administering student aid programs; improving instruction; internal identification of students; student parking; collection of student debts; or comparing student educational experiences with subsequent workforce experiences. By providing your Social Security Number, students consent to the uses identified above. This request is made pursuant to ORS 351.070 and 351.085. Provision of a Social Security Number and consent to its use is not required and, if a student chooses so, will not be denied any right, benefit or privilege provided by Applicants may enter a series of zeros (000-00-0000) on their admission application in place of their actual SSN, but should be aware that by not providing their SSN they will not be eligible to receive federal student aid or university scholarships.

Additionally, applicants should be aware that Oregon Tech is required to obtain a Social Security Number in order to file certain returns with the Internal Revenue Service (IRS) for the applicant to receive a 1098T and to furnish a statement to you. The returns that Oregon Tech must file contain information about qualified tuition and related expenses. Privacy Act Notice: Section 6109 of the Internal Revenue Code requires students to give a correct SSN to persons who must file information returns with the IRS to report certain information. The IRS uses the SSN for identification purposes and to help verify the accuracy of tax returns. For more information, refer to IRS code 6050S.

## Admission Requirements

### Freshman Admission

Academic performance is not the sole criterion for admission. Oregon Tech may evaluate a person's behavior and background to determine their ability to maintain the standards of academic and professional conduct expected at the university. An evaluation may take into consideration current behavior and performance as well as past experiences and actions. Simply qualifying for admission does not guarantee admission.

For freshman admission, students must meet entrance requirements adopted by the State Board of Higher Education in Oregon.

Applicants who are enrolled in or who have graduated from regionally accredited high schools must:

1. Submit an official high school transcript. An unweighted cumulative high school grade point average of 3.00 is required for admission. Applicants with a GPA between 2.50 and 2.99 may qualify for admission provided they submit adequate SAT Reasoning Exam scores or ACT scores.
2. Submit results from either the SAT Reasoning Exam, SAT I or ACT
  - a. Applicants with an unweighted cumulative high school grade point average of 3.00 or better must take the SAT or ACT and have official scores submitted to Oregon Tech, but there is no minimum SAT or ACT score.
  - b. Applicants with an unweighted GPA of 2.75 to 2.99 must submit a total SAT score of 880 with a score of at least 440 on the Math portion of the SAT. Those submitting ACT results must have an ACT Math score of at least 17 and a Composite score of at least 17.
  - c. Applicants with an unweighted GPA of 2.50 to 2.74 must submit a total SAT score of 1080 with a score of at least 530 on the Math portion of the SAT. Those submitting ACT results must have an ACT Math score of at least 21 and a Composite score of at least 21.
  - d. Applicants who have graduated from a standard high school three or more years prior to the term they wish to be admitted and enter the university are not required to submit SAT or ACT aptitude test scores. However, if an applicant wishes to be considered for university scholarships, they must submit aptitude test scores.
3. Applicants must satisfactorily (grade of C- or above) complete at least 13 units (one year is equal to one unit) of college preparatory work in the following areas, unless they graduated from high school prior to spring 1985.
  - a. English (4 units). Shall include the study of the English language, literature, speaking and listening, and writing, with emphasis on and frequent practice in writing expository prose during all four years.
  - b. Mathematics (3 units). Shall include first-year algebra and two additional years of college preparatory mathematics selected from geometry (deductive or descriptive); advanced topics in algebra (through Algebra II), trigonometry, analytical geometry, finite mathematics, advanced applications, calculus, and probability and statistics, or courses that integrate topics from two or more of these areas. One unit is strongly recommended in the senior year. (Algebra and geometry taken prior to 9th grade will be accepted.)
  - c. Science (3 units). Shall include at least one year each in two fields of inquiry based college preparatory science such as biology, chemistry, physics, or earth and physical science. Science courses that are "inquiry based" provide students the opportunity to apply scientific reasoning and critical thinking to support conclusions or explanations with evidence from their investigations. It is strongly recommended that one year be taken as a laboratory science.
  - d. Social Studies (3 units). Shall include analysis of societal issues and events. It is strongly recommended that study includes knowledge and use of geographic information, patterns of United States history, patterns of human history, structures and systems of US Government, and analysis of economic systems.
4. Applicants who are unable to meet the 13 subject requirements may be eligible for admission by earning a minimum score of 470 or above (940 total) on each of two College Board SAT Subject Tests (in Math level I or IIC and another test of the student's choice).
5. Applicants who have not graduated from high school and who are applying on the basis of GED scores must submit test results showing a minimum of 170 on each subject area and 680 overall. A special admission option will be offered to test takers who scored no lower than 150 on the Reasoning Through Language Arts Test, no lower than 150 on the Social Studies Test, no lower than 160 on the Science Test, and no lower than 170 on the Mathematics Reasoning Test. GED tests taken prior to 2015 must show a minimum composite score of 580 (58 on GED exams administered prior to 2002) with a minimum score of 410 on each GED subtest (41 on subtests administered prior to 2002). Applicants whose pre-2015 GED scores fall below these standards may qualify on the basis of a combination of GED and SAT Reasoning or ACT exam results:
  - a. Applicants with GED composite scores of 550 to 570 (55 to 57 on tests administered before 2002) need to submit combined SAT Reasoning Exam scores of 800 or better on the Critical Reading (formerly called Verbal) and Math tests with a score of at least 400 on the Math portion of the SAT. Those submitting ACT results must have an ACT Math score of at least 17 and a Composite score of at least 17.
  - b. Applicants with GED composite scores of 500 to 540 (50 to 54 on tests administered before 2002) need to submit combined SAT Reasoning Exam scores of 1000 or better on the Critical Reading (formerly called Verbal) and Math tests with a score of at least 500 on the Math portion of the SAT. Those submitting ACT results must have an ACT Math score of at least 21 and a Composite score of at least 21.
6. Public high school students must graduate from a standard or regionally accredited high school. Private high school students must graduate from regionally accredited high schools. Home-schooled students and graduates of unaccredited or non-standard high schools, as well as applicants who fail to meet the 13 subject requirements, may be admitted by submitting SAT Reasoning Exam score of 1000 on the Math and Critical Reasoning sections combined or an ACT composite score of 21

or better and a minimum score of 470 or above (940 total) on each of two College Board SAT Subject Tests (Math level I or IIC and another test of the student's choice, in a subject other than math).

## Transfer Admission

A transfer student is one who has previously earned credits at another regionally accredited institution of higher education. A student must have earned at least 36 college-level credit hours (24 semester credits) to be admitted on the basis of his/her college record alone.

1. Transfer applicants must have a cumulative 2.25 GPA or better in college level classes unless they hold an Oregon Transfer Module (OTM) or an associate or bachelor's degree, in which case, a cumulative GPA of 2.0 is required.
2. In order to be admitted to Oregon Tech, transfer applicants must demonstrate proficiency in English and Math by completing the equivalent of Math 95 (Intermediate Algebra) or higher and WRI 115 (Introduction to Writing) or higher with grades of "C-" or better.
3. Applicants who do not have an Associate's or a Bachelor's degree must have at least 36 college-level credits. If more than 10 percent of an applicant's credits are in Physical Education, credits beyond the 10 percent threshold will not be counted toward meeting GPA requirements.
4. Applicants must be eligible to re-enroll in the previous institution attended.

Official transcripts from all post-secondary institutions must be submitted for consideration.

Applicants who have earned fewer than 36 quarter or fewer than 24 semester hours of college-level work must also provide high school transcripts or GED scores. They must also provide SAT I or ACT scores. In some cases, these applicants must submit SAT/ACT scores. Admission will be based on both high school and transfer GPA and subject requirements. Students who have completed fewer than 12 transferable quarter credits (8 semester) must meet freshman admission requirements.

A *Transfer Evaluation Report* acknowledging the courses accepted by the university will be sent after admission status has been confirmed. Acceptance of vocational/technical courses may be granted after registration if the student's administering department finds that vocational/technical courses have satisfied certain bachelor's degree requirements. In all cases, course and/or department prerequisites will be enforced.

The transferability of credits earned at Oregon Tech is at the discretion of the receiving college, university, or other educational institution. Students considering transferring to any institution should not assume that credits earned in any program of study at Oregon Tech will be accepted by the receiving institution. Similarly, the ability of a degree, certificate, diploma, or other academic credential earned at Oregon Tech to satisfy an admission requirement of another institution is at the discretion of the receiving institution. Accreditation does not guarantee credentials or credits earned at Oregon Tech will be accepted by or transferred to another institution. To minimize the risk of having to repeat coursework, students should contact the receiving institution in advance for evaluation and determination of transferability of credits and/or acceptability of degrees, diplomas, or certificates earned.

## Transfer Articulation Agreements

Oregon Tech is dedicated to enhancing partnerships with regional community colleges. One important way of doing this is by forming articulation agreements. An articulation agreement is an officially approved agreement that matches coursework between schools. These agreements are designed to help students make a seamless transition when transferring to Oregon Tech. Articulation agreements give students a clear understanding of what courses will transfer to Oregon Tech and satisfy requirements for their major while minimizing overlap or repeat of courses. Some agreements accept an associate's degree in its entirety while other agreements outline specific courses to take as a student plans for transfer. Students should inform the Admissions Office and their academic department advisor when they are utilizing an articulation agreement.

A list of articulation agreements can be found online at [www.oit.edu/articulations](http://www.oit.edu/articulations); students may search by Oregon Tech major or by transfer institution. Questions regarding these agreements may be directed to the students' academic department or the Office of Academic Agreements.

## Non-Admit Students

A non-admit is a student who wishes to enroll in no more than eight credits per term at Oregon Tech, is not seeking a degree from Oregon Tech and has never been fully admitted to Oregon Tech in the past. A non-admit is not eligible for financial aid. Out-of-state residents are subject to non-resident tuition and fees upon enrolling in more than 6 credits. A tuition and fee schedule can be viewed online ([www.oit.edu/college-costs/tuition-fees](http://www.oit.edu/college-costs/tuition-fees)). College-level classes taken while in non-admit status may be used toward Oregon Tech graduation requirements upon completion of the full admission process or may be transferred to other institutions. Enrollment as a non-admit student does not guarantee future admission to Oregon Tech. To enroll at Oregon Tech as a non-admit, submit the Non-Admit Application Form ([www.oit.edu/applications](http://www.oit.edu/applications)) to the Admissions Office, at least one week prior to enrollment. Oregon Tech reserves the right to deny enrollment to those who seek non-admit status.

## Admission to Programs Having Clinical or Practicum Requirements

It is important that prospective students understand that admission to those programs that have clinical or practicum requirements:

1. Is selective;
2. Will be granted after consideration of an applicant's ability to assume professional responsibility for clients, patients or students served by the program; and may be denied to any student with a record of past criminal behavior or psychiatric illness, which bears upon the student's ability to fulfill clinical or practicum responsibilities.

Students seeking admission to online degree completion programs in Radiologic Science, Vascular Technology, Echocardiography, Diagnostic Medical Sonography, or Respiratory Care, must meet all regular admission requirements and be registered professionals working in their chosen field. This will ensure access to clinical sites as required in these programs. For more information, contact the Online Education Office.

## International Student Admission

Oregon Tech welcomes international students as applicants and as vital members of its campus community. In applying for admission, send the following to the Admissions Office:

1. An *International Student Application for Admission* accompanied by a \$50 (U.S.) non-refundable fee.
2. Official transcripts, in English or with an accompanying official translation, of all high school and post-high school institutions attended.
3. Official test scores on the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System exam (IELTS). A minimum score of 520 paper-based TOEFL, 190 computer-based TOEFL, 68 Internet-based TOEFL or 6 IELTS is required for consideration.
4. A completed *Statement of Financial Responsibility* form, indicating that you have the necessary financial resources in U.S. dollars to support yourself while enrolled.
5. A letter, if appropriate, from parents and/or sponsors indicating the amount of financial support they will provide in U.S. dollars.
6. Documentation showing that you, your parents and/or your sponsors have adequate financial resources to meet your expenses while enrolled at Oregon Tech. Examples include official bank statements, tax forms and letters of employment showing annual earnings.
7. An official credential evaluation from an Oregon Tech-approved credential service for all coursework completed at a post-secondary institution outside the United States. Examples include the Association of Collegiate Registrars and Admissions Officers (<http://www.aacrao.org/international/foreignEdCred.cfm>) and World Education Services ([www.wes.org](http://www.wes.org)).

A completed health history and immunization form must be submitted. In addition to the health requirements that need to be fulfilled before registration (refer to Integrated Student Health Center section of this catalog for health history and immunization requirements); international students must have at least one documented MMR vaccine on file at the Integrated Student Health Center prior to the student attending any classes (per OAR 333-050-0130). Also, students from countries identified as high risk for tuberculosis (most countries in Latin America and the Caribbean, Africa, Asia, Eastern Europe and Russia) are required to complete a TB screening upon entrance to Oregon Tech. This may include a TB skin test and/or a chest x-ray. This can be done at the Integrated Student Health Center if records are not available.

## Exchange Student Admission

Oregon Tech welcomes exchange students through multiple exchange partnership agreements. Students at partner institutions work with an advisor at their "home" campus to meet the requirements of Oregon Tech's international exchange application process. It is recommended that exchange students begin the exchange application process at least nine months prior to the planned date of entry. This allows ample time for submission of documents that the U.S. Bureau of Citizenship and Immigration Services requires Oregon Tech to collect before we can issue the I-20 form that is used to secure an F-1 visa.

## Admission Exceptions

The Admissions Committee and Director of Admissions retain the right to make exceptions to the specified requirements for admission or add stipulations to certain offers of admission. For additional information, contact the Director of Admissions.

## Registration

Registration Events for new students occur prior to the start of each term. All students new to the Klamath Falls campus must participate in a Klamath Falls Registration program and all students new to the Portland-Metro campus must participate in Portland-Metro's Orientation & Registration program. In addition to placement testing and meeting with advisors to plan an academic schedule, students have the opportunity during Registration to register for classes, set up Oregon Tech computer and email accounts, receive a university ID card and learn more about making a successful transition to Oregon Tech. Students are encouraged to attend an early Registration event rather than waiting to register at the beginning of a term. Visit [www.oit.edu/newwings](http://www.oit.edu/newwings) or contact the Admissions Office at (541) 885-1150 or [oit@oit.edu](mailto:oit@oit.edu) for more information.

## Placement Testing

Oregon Tech's Student Success Center (SSC) administers all placement testing for Oregon Tech students. Student admission records are examined to determine placement requirements. Students transferring in math credit for calculus or beyond, or who have transferred in math credits to fulfill all of the math requirements for their major, are exempt from the math placement requirement. Transfer students with more than 36 transferable college credits are exempt from the reading placement requirement. Students transferring in college-level writing are exempt from the writing placement requirement. Entering students in health programs requiring Human Anatomy and Physiology with transferable college credit for this course are exempt from the entry assessment for the Human Anatomy and Physiology course sequence. Placement tests are available prior to the term of entry and in conjunction with new student registration. Visit [www.oit.edu/newwings](http://www.oit.edu/newwings) or contact (541) 885-1791 or [testing@oit.edu](mailto:testing@oit.edu) for more information.

## Western Undergraduate Exchange

Students enrolled in some of Oregon Tech's majors are eligible for the Western Undergraduate Exchange (WUE) program. WUE is a tuition-reduction program sponsored by Western Interstate Commission for Higher Education (WICHE) that can save students from the Western United States thousands of tuition dollars each year. Students from Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, North Dakota, South Dakota, Utah, Washington, Wyoming, and Commonwealth of the Northern Mariana Islands are eligible. Students from these states who apply for WUE-eligible majors pay just 150 percent of the in-state tuition. No request is required to receive WUE. Students from WUE states who enter WUE-eligible programs will automatically be reviewed for WUE rates upon admission to Oregon Tech.

## Eligible Programs

All majors in the College of Health, Arts and Sciences except;

- Medical Laboratory Science and pre-Medical Laboratory Science
- Dental Hygiene and pre-Dental Hygiene
- Medical Imaging Technology and pre-Medical Imaging Technology
- Nursing after acceptance by Oregon Health Sciences University
- Emergency Medical Services, Pre-Paramedic, Paramedic, EMS Management
- All majors in the College of Engineering, Technology and Management.

WUE is not offered for the Oregon Tech Online Education programs. WUE students are ineligible for the Presidential Academic Scholarship, although WUE offers the greater savings for non-resident students.

## WUE Requirements

To maintain eligibility you must:

- Remain continuously enrolled throughout fall, winter, and spring of the academic year. Summer enrollment at Oregon Tech is not required to maintain eligibility.
- Enroll in at least 12 credits per term and maintain Satisfactory Academic Standing. Students who are simultaneously admitted to Oregon Tech and a community college to allow dual enrollment must take at least 9 credits per term from Oregon Tech with a combined total of 12 credits per term. GPA and completed credits are monitored each academic year.
- Students wishing to 'stop-out' of enrollment for a term must submit a written request to the Office of the Registrar before the start of that term. Requests are granted at the discretion of the university.
- Be seeking your first bachelor's degree

## Financial Aid Programs and Application Process

*College Union, 1st Floor*

*Klamath Falls*

(541) 885-1280

[dollars@oit.edu](mailto:dollars@oit.edu)

[www.oit.edu/faid](http://www.oit.edu/faid)

The Financial Aid Office is committed to providing high-quality service to all Oregon Tech students, their families and the community. Our office strives to provide information on a complex topic that enables students to make decisions regarding their educational funding.

The information contained in this catalog is general in nature and is not meant to serve as notification of students' rights and responsibilities as financial aid recipients. Oregon Tech's Financial Aid Award Guide serves that purpose. The *Award Guide* is available on our website at [www.oit.edu/faid](http://www.oit.edu/faid). Additional questions regarding the application process should be directed to the Financial Aid Office.

All students applying for federal financial aid must complete the *Free Application for Federal Student Aid* (FAFSA) available at [www.fafsa.gov](http://www.fafsa.gov). A federally approved needs-analysis methodology is applied consistently to information provided by all applicants.

The philosophy behind financial aid is that parents and students have the primary financial responsibility for funding the student's education.

If there are unusual financial circumstances that are not accurately reflected on the FAFSA, the student should contact the Financial Aid Office. Under certain conditions, professional judgment may be used and aid eligibility recalculated. The Financial Aid Office will always take the student's best interest into consideration while, at the same time, upholding federal regulations.

## Veterans

Located in the Financial Aid Office in Klamath Falls, and the Registrar's Office in Portland-Metro, the V.A. Certifying Officials process enrollment certifications through the Veterans Affairs Regional Processing Center for students receiving education benefits. Oregon Tech complies with the Veterans Access, Choice, and Accountability Act of 2014 ("Choice Act") requirements for covered individuals. This benefit allows eligible out-of-state veterans to receive in-state tuition rates.

Any student receiving G.I. Bill education benefits while attending Oregon Tech is required to obtain transcripts from all previously attended schools and submit them to the school for review of prior credit. This includes, but is not limited to: Joint Services Transcripts, ACE-approved credits, DANTES, CLEP, CCAS, Service Members Opportunity Credit, etc. Refer to the Military Credit section of our catalog for more details. Good standing is an additional V.A. requirement. Any student that falls below satisfactory progress for more than one term will lose all veteran benefits until academic standing is improved to good standing. Please see Academic Suspension Policy.

As a Top Veteran-Friendly School (US Veterans Magazine), a 2016 Military Friendly School TM, and a top school in the 2016 Military Advanced Education & Transition (MAE&T), Oregon Tech is committed to providing an exemplary experience for veteran students.

Veterans and dependents receiving education benefits, and military members who submit appropriate documentation have priority registration in order to achieve timely program completion.

Veterans and military members who are not receiving education benefits must submit a copy of one of the following pieces of documentation to receive priority registration:

- US Armed Forces Active Duty Orders
- DD214 under honorable or general conditions

Documentation must be received no later than the end of the 2nd full week of the term to receive priority registration for the upcoming term. For additional resources and information, please reference the veterans tab on the Oregon Tech website or see the V.A. Certifying Official.

## Application Procedures/Priority Deadlines

All students applying for federal and state aid must complete the *Free Application for Federal Student Aid* (FAFSA) and list Oregon Tech's school code (003211). We encourage you to file as soon after October 1st as possible to be considered for your maximum eligibility. Some funds are very limited and are expended early.

Once the FAFSA information is received and reviewed by the Financial Aid Office, new students will receive a letter instructing them on how to log into "Web for Student" to view their award letter and the federally mandated shopping sheet online. Students may accept their aid online and request changes. Returning students will receive an email to their Oregon Tech email account when their award letter is ready to view online. *After accepting aid students must log back in to web for student and answer the Title IV authorization questions (24 hours later)*. The Financial Aid Award Guide is located on our website at [www.oit.edu/faid](http://www.oit.edu/faid). It is important that students read the guide and follow the instructions on the letter they are sent.

Any updates/changes to award letters will result in an email to the student's Oregon Tech email account. If additional information is requested, such as tax transcripts or worksheets, students should return the documents as soon as possible to receive an *Offer of Financial Aid*. The award letter will list all types of aid for which the student is eligible. The *Award Guide* is a detailed booklet explaining programs, disbursement procedures and student rights and responsibilities, as well as cost estimates and other miscellaneous information. It is the student's responsibility as a financial aid recipient to become familiar with the contents of the *Award Guide* and contact the Financial Aid Office if additional questions or concerns arise. Additionally, students should check their **Oregon Tech email accounts** for announcements and notifications from Financial Aid.

The *FAFSA must be filed for each year* a student wishes to be considered for financial aid eligibility.

## Types of Aid

All federal and state programs are need-based with the exception of the Unsubsidized Stafford Loan and the Parent Loan for Undergraduate Students (PLUS). Students receiving federal aid are allowed to receive at maximum, the cost of attendance as

determined by the Financial Aid Office through all aid programs, including outside benefits such as third-party payments. Individual financial-aid packages will vary based on determined cost of attendance, expected family contributions and outside resources.

### **Federal Pell Grants**

The estimated maximum annual Pell Grant for **2018-19 is expected to be \$5,920**. Students may receive Pell Grants for less than full-time, but the grant will be prorated accordingly. Pell Grant eligibility is limited to those students who have not yet obtained a bachelor's degree. All students will be considered for Pell Grant eligibility if they file a FAFSA. Awards are granted based on the federally calculated expected family contribution (EFC).

### **Oregon Opportunity Grant**

The annual Oregon Opportunity Grant award for 2017-18 was \$2,250. This grant program provides funding to Oregon residents in undergraduate programs attending Oregon schools. The Oregon Opportunity Grant is awarded by Oregon Student Access Commission. Students not enrolled full-time (at least 12 credits) may be eligible for a prorated part-time award if attending half-time. By filing a FAFSA, students are applying for this grant. Funds are available on a first come, first-served basis and are limited. A student can receive an Oregon Opportunity Grant for a maximum of 12 terms. More information is available at [www.oregonstudentaid.gov](http://www.oregonstudentaid.gov).

### **Federal Supplemental Educational Opportunity Grants (SEOG)**

SEOG funds are very limited at Oregon Tech, although priority for SEOG funds is given to zero EFC students. The typical award is \$400 for an academic year. Only students who have not yet completed a bachelor's degree and are eligible to receive a Pell Grant will be considered for this grant.

### **Federal Work-Study Program**

The Federal Work-Study Program allows students to earn money by working part-time on campus or at an off-campus community service site. Information regarding available jobs and application procedures are located in the Career Services Office and on the Oregon Tech Web site. Awards are usually \$2,000 per year, which can be earned at any time during the academic year provided the student is enrolled at least half-time. Awards will be increased if money is remaining.

### **Direct Lending**

Federal Stafford Loans (subsidized and unsubsidized) are available to most students through the federal government Direct Loan Program. Loan amounts vary based on student need and grade level in a declared major at Oregon Tech. A fee for guarantee and origination will be taken at the time of disbursement. It is currently 1.066% and subject to change. Contact the Oregon Tech Financial Aid Office for current interest rates. The difference between a subsidized and an unsubsidized loan is that the federal government pays the interest on subsidized loans while the student is in school. Students who wish to borrow through the unsubsidized loan program should remember that interest is accruing on the loan. Interest payments can be made while in school and during the grace period, but are not required. Any interest that has accrued at the time of repayment will be capitalized. Students must complete entrance counseling and fill out a promissory note before funds will be disbursed. To complete these items go to [www.studentloans.gov](http://www.studentloans.gov).

### **Matthews Loan, Matthews Supplemental Loan and Oregon Tech Long Term Loan**

The Matthews Loan, Matthews Supplemental Loan and Oregon Tech Long Term Loan are loans offered by Oregon Institute of Technology. These loans have a five percent interest rate, no origination fee, and repayment begins nine months after students cease to be enrolled at least half-time.

Students must complete a promissory note to receive the funds.

### **Federal Parent Loans for Undergraduate Students (PLUS)**

Parents of dependent students can apply for funds through Parent Loans for undergraduate students. These loans are available for up to the cost of attendance minus other financial aid and resources each year. Interest begins to accrue immediately. A 4.292% origination and guarantee fee will be taken at the time of each disbursement. Loan repayment begins 60 days after the final disbursement of the academic year. If you're a parent PLUS borrower, you can defer repayment of Direct PLUS Loans first disbursed on or after July 1, 2008, while the student for whom you obtained the loan is enrolled at least half-time, and for an additional 6 months after the student graduates or drops below half-time enrollment (half-time enrollment status is determined by your child's school). You must separately request each deferment period. This can now be set up in the application process.

### **Presidential Scholarships**

First-time freshman applicants and transfers will receive consideration for Presidential Scholarships by applying and being accepted for admission by March 1st for the following fall term and meeting the minimum scholarship requirements. These scholarships are for full-time students only and may be renewed for up to four years. Award levels vary depending on each recipient's academic record. For more information, go to [www.oit.edu/scholarships](http://www.oit.edu/scholarships).

## Klamath County Scholarship

The Klamath County Scholarship is automatically awarded to any applicant living in Klamath County who will attend Oregon Tech starting fall term after graduation from high school and who is able to meet the Presidential Scholarship criteria. Students must apply for admission, meet all admission requirements and be accepted for admission by March 1st for enrollment fall term. Recipients must be new full-time undergraduate students at Oregon Tech. This scholarship is valued at \$1,000 and is NOT renewable.

## Oregon Tech Foundation Scholarships

More than 200 new and returning students annually receive funding from scholarships administered by the Oregon Tech Foundation. Alumni, businesses, industry, and friends of Oregon Tech generously fund these awards. To receive consideration, students must be currently enrolled at Oregon Tech, or accepted for admission for the following fall term. Application forms and deadlines are available on the Oregon Tech Web site at [www.oit.edu/otfscholars](http://www.oit.edu/otfscholars). The online scholarship application process is seamless for students and automatically generates a list of scholarships the student is eligible to apply for. The winter application process opens in early December and has a deadline of March 1.

## Leadership and Diversity Scholarships (LAD)

Oregon Tech awards Leadership and Diversity (LAD) Scholarships each year to students who meet the application criteria. Whether the applicant brings a diverse perspective to the Oregon Tech community and the applicant's history of involvement and leadership are two of the criteria considered when awarding this scholarship. LAD scholarship recipients are expected to fulfill ten service hours each term, providing leadership and/or promoting diversity in some way at Oregon Tech or in the community. Leadership and Diversity Scholarships are \$2,000 per year for Oregon residents or those attending under the Western Undergraduate Exchange, and \$3,000 per year for non-residents.

Applicants must be accepted for admission by the Oregon Tech priority deadline and apply through the Oregon Tech Foundation scholarship application by March 1<sup>st</sup>. For more information visit [www.oit.edu/scholarships](http://www.oit.edu/scholarships).

## Owls Scholarship

Any incoming freshman student who achieves 9 or more college credits in a science, technology, engineering or math course, with a grade of B or better, may apply for the Oregon Tech OWLS program. Applicants must have just finished high school and are applying for fall term admission; transfer students are NOT eligible. Scholarship award is \$1,500 when college credits have been completed at Oregon Tech, and \$1,000 if completed elsewhere.

Students must be fully admitted and complete the scholarship application by March 1<sup>st</sup>. For more information visit [www.oit.edu/scholarships](http://www.oit.edu/scholarships).

## Estimated Financial-Aid Budgets for 2018-19 Academic Year

Financial aid budgets can include amounts for tuition and fees, books and supplies, room and board and miscellaneous expenses. Please remember that these are **estimated average costs for students**, and student spending habits will vary. On a very limited, case-by-case basis, the Financial Aid Office may be able to adjust a student's budget as permitted by federal regulations.

## Students with Disabilities

Under certain circumstances, a student's aid package may be adjusted to reflect additional expenses. Please contact the Financial Aid Office if you would like additional information or to schedule an appointment.

## Consortium Agreement Information

In some cases Oregon Tech's Financial Aid Office will process a paper consortium agreement with another school in order to allow a student taking courses at another institution to receive aid from one school for all eligible classes. The school must be one with which Oregon Tech does not have a dual admission agreement. The institution that will be awarding the degree and awarding financial aid is defined as the "home institution"; the "host institution" is defined as the institution from which the student is taking additional courses.

When Oregon Tech is serving as the "home institution," the following criteria must be met to have classes at a "host institution" apply toward financial aid:

1. The student must be fully admitted to one of Oregon Tech's degree-granting programs and eligible for financial aid.
2. The student must be enrolled at least half-time (6 credits) at Oregon Tech
3. The classes taken at the host institution must be 100-level or higher.
4. The classes at the host institution must apply toward the student's Oregon Tech degree.
5. The classes taken at the host institution must not be offered by Oregon Tech during the term of enrollment.

It is the student's responsibility to ensure that both the "host" and the "home" institutions complete the appropriate consortium agreement. Consortium-agreement forms are available at [www.oit.edu/faid](http://www.oit.edu/faid) under "Awards." Students must provide Oregon Tech's Financial Aid Office with a final grade report from the "host institution" within 30 days of completing the course.

## Dual Admitted Students

Oregon Tech has formal dual admit partnerships with multiple community colleges throughout the state. Please go online [www.oit.edu/prospective-students/academic-agreements/dual-enrollment](http://www.oit.edu/prospective-students/academic-agreements/dual-enrollment) to view them.

Students who are dually admitted may be able to combine credits at both schools for full-time enrollment. If Oregon Tech is the home school (giving aid) **the student must be enrolled in six credits at Oregon Tech**. Enrollment and grade information will be transmitted electronically. Credits at the host school need to be applicable to the Oregon Tech degree.

## Estimated Budgets for 2018-19

(as of April, 2018)

Standard Full Year Budget for Fall, Winter, Spring for Full-Time Students

<b>Resident</b>	<i>On Campus</i>	<i>Off Campus</i>
Tuition and Fees	\$10,118	\$10,118
Room and Board	\$9,579	\$11,107
Books	\$1,225	\$1,225
Miscellaneous	\$3,385	\$3,958
<b>Total</b>	<b>\$24,252</b>	<b>\$26,408</b>

<b>Non-Resident</b>	<i>On Campus</i>	<i>Off Campus</i>
Tuition and Fees	\$28,668	\$28,668
Room and Board	\$9,579	\$11,107
Books	\$1,225	\$1,225
Miscellaneous	\$3,330	\$3,958
<b>Total</b>	<b>\$42,802</b>	<b>\$44,958</b>

<b>WUE</b>	<i>On Campus</i>	<i>Off Campus</i>
Tuition and Fees	\$15,177	\$15,177
Room and Board	\$14,369	\$16,661
Books	\$1,225	\$1,225
Miscellaneous	\$3,330	\$3,958
<b>Total</b>	<b>\$34,101</b>	<b>\$37,021</b>

*As of this printing, the tuition and fees for Oregon Tech were not finalized. The proposed rates are as follows for the 2018-19 academic year.*

Tuition is based on 14 credits, 2018-19 carrying load.

Fees based on full-time enrollment.

Budget is based on \$737 per month rent, \$299 per month food, and \$198 per month utilities for off-campus students.

Miscellaneous expenses include medical supplies, entertainment, personal care products, housekeeping supplies, travel, and transportation.

MLS/PAR, RCP and Dental Hygiene/La Grande have a different budget.

A one-time matriculation fee is assessed for first-term students.

Budget increase for computer is \$1,000 maximum with documentation. Please visit [www.ous.edu/factreport/tuition](http://www.ous.edu/factreport/tuition) for the most current information.

## Residency

In Oregon, as in all other states, tuition at publicly supported four-year universities is higher for non-resident students than for resident students.

The rules used in determining residency seek to ensure that only bona fide Oregon residents are assessed the resident fee. Please see [www.oit.edu/registrar](http://www.oit.edu/registrar) for the latest version of the residency policy.

## Reciprocity Agreements

Students from some Northern California counties may be eligible to attend Oregon Tech under reciprocity agreements with College of the Siskiyous, College of the Redwoods, and Shasta College. Reciprocity can allow selected students to attend Oregon Tech at in-state tuition rates. Each participating college has certain restrictions, which may include the county of the student's residence, required enrollment for a period of time first at the community college, the student's major, and how many reciprocity permits the college issues.

## Tuition and Fees

*Snell 116*

(541) 885-1202

Fees and deposits at Oregon Tech are charged according to a uniform plan, varying on the nature of coursework offered. Oregon Tech reserves the right to make changes in fee schedules without notice.

Below is a partial list of the estimated fees paid by students regularly enrolled for undergraduate and graduate study. Payment of full-time fees entitles students to use the library. Students may receive medical attention from the Student Health Center, use the fitness center (Tech Fit Center) and other student services. No reduction in fees is made for students who do not wish to access these services.

The estimated fee schedule for the 2018-19 academic years is provided for planning purposes only. Fees are subject to change. The current fee schedule is available from the Business Office or on the University's website.

### Special Fees

All special fees are subject to change without notice.

#### **Application Fee (Not refundable) - \$50**

Must accompany admission application.

#### **Matriculation Fee (Not refundable) - Undergraduate \$300; Graduate \$150**

A one-time fee assessed to all new Oregon Tech students.

#### **PDF Transcript - \$15**

#### **Petition to Graduate Fee - \$56**

#### **Late Fee Payment - \$99**

Students paying fees after scheduled payment dates of any term can be charged a late charge of \$99.

#### **Late Fee to Add, Drop or Withdraw - \$20**

#### **Return-of-Check Fee - \$25**

If institutional charges are met by a check which is returned because of any irregularity for which the student is responsible, a fine will be charged. The late-payment fee will be added to the returned-check charge where the returned check was used to pay tuition and fees.

#### **Special Examination Fee, per credit - \$50**

Examination for credit.

#### **Lifetime Transcripts (Not refundable) - \$40**

A one-time fee assessed to all new and transfer students for a lifetime transcript request. Official Transcripts are issued at no charge. PDF Transcript - \$15.

#### **Allied Health Curriculum Tuition**

Tuition is assessed an additional 15 percent for students enrolled in Allied Health programs.

#### **Engineering and Technology Differential Tuition**

Tuition is assessed an additional 15 percent for students enrolled in Engineering and Technology programs.

### Special Course Fees, per course

Special fees, in addition to regular tuition, are assigned for some courses. These fees are noted in the *Schedule of Classes* for each term.

### Room and Board Costs

The 2018-19 estimated annual room-and board costs range from \$8,705 to \$9,649, depending on room type and amount of food purchased. Room-and-board charges are assessed by term. Fees are due in accordance with the same fee payment schedule as exists for tuition. Generally, payments are due during the first week of the term.

### Senior Citizen Instruction Fee

Per-credit hour: no charge.

Senior citizens are persons age 65 or older. Such persons are authorized to attend classes on a space available basis. Charges for special materials, if any, are additional. Incidental fee privileges are not provided.

The senior-citizen privilege is extended to persons auditing classes (not seeking credit or working toward a degree).

### Tuition and Fee Refunds

Students who withdraw from the university and who have complied with the regulations governing academic withdrawals may be entitled to certain refunds of fees assessed, depending on the time of withdrawal. The refund schedule has been established by the Oregon Tech Board of Trustees and is on file in the Business Office. Included with the refund schedule is the mandated order in which financial aid must be returned to the appropriate programs for students on financial aid. All refunds are subject to the following regulations:

Any claim for refund must be made in writing before the close of the term in which the claim originated.

An official notice of withdrawal must be completed and necessary clearance signatures filed with the Registrar's Office. Refunds in all cases are calculated from the date of receipt of the application for refund or date of withdrawal, and not from the date when the student ceased attending classes, except in unusual cases when formal withdrawal has been delayed through cause beyond the student's control.

### Parking Fees

All student, staff and faculty vehicles must be registered with the Traffic Commission and operated in compliance with *Regulations Governing Traffic Control*. At the time of vehicle registration, a parking fee will be assessed in accordance with a schedule approved by the President of the University and approved by the Oregon Tech Board of Trustees. Parking permits may be purchased online via web-for-student. Vehicles must be registered by the first day after classes begin. Parking Fees for 2018-19 are:

Students	Faculty/Staff	Permits
\$109/year	\$172/year	Add'l vehicle \$10
\$54.50/term	\$86/term	one-term and full-year permits

### Library Fines and Charges

The following regulations govern library fines and charges:

1. **Books**—A fine of 25 cents per day is charged for each item overdue other than reserve books. No charges are made for the first three days late, but a charge of \$1 is assessed on the fourth day, plus 25 cents per day thereafter (maximum, \$10 each item). Separate charges apply to books borrowed from other libraries.
2. **Billing**—Borrowers failing to return materials within 40 days of the due date will be charged the replacement cost of the items plus the amount of fine (maximum fine-\$10 each item) incurred up to the time the item is reported missing. In addition, the borrower will be assessed a service charge of \$10.
3. **Refunds**—When a lost item for which the borrower has been billed is returned before replacement has been ordered, a refund not exceeding the replacement cost may be made at the discretion of the librarian. In cases where replacement has been ordered, no refunds to the borrower will be made.
4. For Alliance and ILL items, fines accrue until the item is returned, with no set maximum. Replacement charges for Alliance items are \$75, plus a \$20.00 processing charge, plus a \$15.00 billing charge for a total of \$110.00 for each Alliance item not returned. Replacement charges for ILL items are established by the lending library, and will include a \$20.00 processing charge, plus \$15.00 billing charge, for each ILL item not returned.

### 38 U.S.C. 3679(c). Veterans Access, Choice, and Accountability Act of 2014

A student is entitled to pay tuition and fees at Oregon Institute of Technology at the rates provided for Oregon residents without regard to the length of time the person has resided in this state if the student resides in this state while enrolled in the institution and the student:

1. Is receiving Chapter 30: Montgomery OR Chapter 33: Post-9/11 GI Bill educational assistance; and
  - a. Enrolls within 3 years of discharge after serving 90 days or more on active duty; or
  - b. Anyone using transferred entitlement within 3 years of the transferor's discharge after serving 90 days or more on active duty; or
  - c. Surviving Spouses or Children under the Fry Scholarship who enroll within 3 years of an active duty Service member's death in the line of duty after serving 90 days or more; or
2. Students who remain continuously enrolled after initially meeting the requirements and are using Montgomery and Post-9/11 GI Bill educational assistance.

# Academic Policies and Procedures

## Procedures and Regulations

### Student Responsibility

Students are responsible for knowing and understanding Oregon Institute of Technology's requirements relating to registration, academic standards, student activities and student organizations. A partial view of academic regulations is included in the class schedule introduction pages on Oregon Tech's Web site and distributed to new students during their first registration at Oregon Tech. Students are encouraged to meet regularly with their departmental advisors and to contact the Registrar's Office with questions about academic procedures, policies or regulations.

### Academic Advising

Students are assigned faculty advisors from their academic programs. Advisors maintain a file on students' progress and help them plan course loads. If a student should change programs, a new advisor will be assigned. Degree-seeking students are required to meet with their advisors prior to registration.

### Student Classification

Students are classified according to the number of college-credit hours earned as follows: 0-44, freshman; 45-89, sophomore; 90-134 junior; 135 and above, senior. Transfer credits are included in determining classification.

### Quarter System

Oregon Institute of Technology operates on an academic year consisting of three quarters (or terms) of approximately 10 weeks each and a summer session of eight weeks.

### Academic Progress and Petitions Committee

Administration of the regulations governing academic requirements is vested in the Academic Progress and Petitions Committee. This committee also has authority to assess probation or to suspend any student from the university when it appears that the student's work is at such a level that the student cannot benefit by continued attendance. The university requires that students make substantial progress toward meeting graduation requirements, including maintaining a minimum 2.0 GPA. Any cumulative GPA below 2.0 is considered unsatisfactory and will bring the student's record under review. Courses transferred in from other institutions are not included in institutional cumulative GPA.

The Academic Progress and Petitions Committee also serves as an advisory group to the Registrar's Office regarding academic appeals. For information regarding appeals to this committee, students may contact the Registrar's Office.

### Admissions with Special Conditions

If a student is admitted with one or more stipulations and fails to meet any of the prescribed condition(s), that student may be referred to the Academic Progress & Petitions (AP&P) Committee for possible academic disciplinary action, up to and including probation and suspension from the university. The request for review by AP&P can be made by any member of the Admission Committee.

### Academic Warning

An academic warning is a caution to the student that there is a lack of satisfactory academic progress. Students, including first term freshmen, who do not achieve a 2.0 in any given term will receive an Academic Warning. Students who have no earned credits, withdrawals (i.e., all Fs, withdrawals (W) and/or incompletes (I)), for two consecutive terms will also receive an Academic Warning.

### Academic Probation

Students who have attempted two or more terms at Oregon Tech and have an Oregon Tech cumulative GPA below 2.0 will be placed on Academic Probation. Students who have no earned credits, (i.e. all Fs, withdrawals (W) and/or incompletes (I)), for three or more consecutive terms will also be placed on Academic Probation. Students placed on probation will receive notification that they are on Academic Probation as well as instructions on how to proceed. Once placed on probation, students are advised to limit their course load to 13 credits. Courses transferred in from other institutions are not included in institutional cumulative GPA.

### Academic Suspension

Students on academic probation for one term who do not meet the 2.0 cumulative GPA requirement in the successive term of enrollment will be placed on Academic Suspension for at least one term. To re-enroll, a student must complete the prescribed procedures and appeal to the Academic Progress and Petitions Committee for reinstatement. Students should contact the Registrar's Office for re-enrollment information. Students who have been suspended are denied all privileges of the institution. Veteran students receiving benefits will lose all benefits until academic standing is improved to good standing.

**NOTE:** When a student is placed on academic warning, probation or suspension both the student and their advisor will be notified.

## Summer Term

Anyone may enroll in summer term. Formal admission to the university is not necessary and there are no GPA or high school diploma requirements. High school students who want to take college courses are invited to attend. Potential students who have not met the college entrance requirements may take appropriate courses during the summer to correct these deficiencies. Students may register from early May through the first day of summer school. Tuition is on a per-credit basis.

The eight-week term begins in mid-June and ends in mid-August. Four-week sessions begin in mid-June and mid-July. Classes meet Monday through Thursday and are scheduled either during day or evening hours. Many summer classes are offered online via Oregon Tech Online.

A separate summer term class schedule is available on the web in April. This schedule provides a listing of courses, fees, registration and housing information.

## Advanced Standing

### Credit for Prior Learning

Credit for prior learning by a student admitted to Oregon Tech may be granted through a number of independent processes. These include:

- A. Transfer Credit
- B. Military Credit
- C. College Level Examination Programs (CLEP) and Advanced Placement credit (AP)
- D. Credit for National Registry or Licensure Exams
- E. Credit by Examination and
- F. Credit for Prior Experiential Learning

A number of these categories are for credit that is awarded for educational accomplishments attained outside of accredited post-secondary institutions.

These procedures describe the process used to grant the student appropriate academic credit by each of these methods as follows:

### A. Transfer Credit

Oregon Tech makes every effort to give maximum consideration to the transfer work presented by enrolling students. To ensure that the student has the requisite knowledge, Oregon Tech follows these policies in determining credit:

### Accreditation Status of Institution

The institution where the transfer credit was earned must be accredited by an accrediting body recognized by the Council for Higher Education (CHEA).

Students transferring work from an institution that is not accredited by a CHEA-recognized accrediting body may receive transfer credit by:

1. demonstrating prior experiential learning with a portfolio
2. applying for credit after demonstrating competencies in advanced coursework in the same subject area or
3. challenging courses by exam

### International Institutions

Students seeking transfer credit from international institutions must provide Oregon Tech with a credential evaluation from an Oregon Tech-approved credential evaluation service. Credential evaluation information may be obtained from the Office of Admissions. The credential evaluation must include course titles, credits and grades. Students must also provide course descriptions in English from the international institution. Any associated costs are the responsibility of the student.

### Official Transcripts

Prior to the formal awarding of transfer credit, the transfer student must provide an official transcript of coursework completed at all other higher education institutions. Failure to list all colleges attended on the Application for Admission may result in denial of admission or transfer credit.

Admitted transfer students must submit official transcripts at least one term prior to enrollment to ensure timely evaluation of transfer credits.

Any student receiving GI Bill education benefits while attending Oregon Tech is required to obtain transcripts from all previously attended schools and submit them to the school for review of prior credit.

## **Determination of Transfer Credit**

The Oregon Tech Registrar's Office determines the transfer equivalency of general education courses using articulation agreements, course descriptions, course outlines, and course syllabi. The student's major department determines the transfer equivalency for technical or major courses using similar resources.

## **Articulation Agreements**

Oregon Institute of Technology is dedicated to enhancing partnerships with regional community colleges. One important way of doing this is by forming articulation agreements. An articulation agreement is an officially approved agreement that matches coursework between schools. These agreements are designed to help students make a seamless transition when transferring to Oregon Tech. Articulation agreements give students a clear understanding of what courses will transfer to Oregon Tech and satisfy requirements for their major with the least overlap or repeat of courses. Some agreements accept an associate degree in its entirety while other agreements outline specific courses to take as a student plans for transfer. Students should inform the Admissions Office and their academic department advisor when they are utilizing an articulation agreement.

A list of articulation agreements can be found online at [www.oit.edu/articulations](http://www.oit.edu/articulations); students may search by Oregon Tech major or by transfer institution. Questions regarding these agreements may be directed to the students' academic department or the Office of Academic Agreements.

## **Applicability of Transfer Credit**

Oregon Tech provides a report upon the admission of the student, prior to the planned term of enrollment. The evaluation delineates the transfer credit on a course-by-course basis and specifies direct course equivalencies, courses which may be used towards general-education requirements, elective credits and courses which do not receive credit.

At the time of admission, Oregon Tech's report may include elective credits that do not apply towards a specific degree. These credits will be recorded as transfer credit for registration purposes, allowing the student an earlier registration appointment based on total earned credit hours.

Some transfer work, which may not be directly equivalent to Oregon Tech courses, may be appropriately substituted to meet Oregon Tech requirements. Students may seek course substitution approval by completing the Course Substitution form and obtaining the signature of the advisor, department chair and University Registrar.

## **Credit for Alternative-Delivery Courses**

Courses taken by alternative delivery from other accredited institutions will be evaluated as transfer credit.

## **Minimum Grade Standards**

Oregon Tech considers for transfer those courses that carry a grade of D or better from an accredited institution. However, many Oregon Tech departments require C or better course grades for prerequisite and graduation purposes. Oregon Tech does not normally transfer math courses with a "D" grade.

## **Pre-College Level Transfer Credit**

Oregon Tech students who plan to enroll at other institutions during the summer or to complete coursework for the degree in absentia are encouraged to obtain written pre-approval of transfer credit to ensure transfer equivalency for degree purposes.

## **Pre-Approval of Transfer Credit**

Oregon Tech students who plan to enroll at other institutions during the summer or to complete coursework for the degree in absentia are encouraged to obtain written pre-approval of transfer credit to ensure transfer equivalency for degree purposes.

## **B. Military Credit**

Oregon Tech will grant credit for military courses and experiences based on American Council of Education (ACE) guidelines (found in the Guide to the Evaluation of Educational Experience in the Armed Forces) and faculty recommendations. Credit is awarded in accordance with transfer credit policies at Oregon Tech and the Oregon University System. Students may request evaluation of military credit by furnishing an official AARTS or SMART transcript.

## **C. College-Level Examination Programs and Advanced Placement: College Level Examination Program (CLEP)**

Oregon Tech will award credit for several college-level examination programs. These examinations must be completed with a satisfactory score and an original copy of test results must be forwarded to the Registrar's Office from the testing service. In order to receive such credit, the student must be admitted to an Oregon Tech degree program and registered for classes during the term in which the request is made. Oregon Tech awards credit for College-Level Examination Program (CLEP) subject examinations, but not for CLEP general examinations. Information on CLEP course equivalencies and minimum scores may be obtained from the Oregon Tech Registrar's Office.

## Advanced Placement (AP)

Students who complete college-level work in high school under the Advanced Placement (AP) program must achieve a minimum score of three to be granted credit on their Oregon Tech transcript. AP course equivalences may be obtained from the Office of Admissions or Registrar's Office.

A maximum of 25 percent of the credits used toward the degree may be CLEP and AP.

## International Baccalaureate

Oregon Tech evaluates IB test scores much in the same way it evaluates AP scores. Students must have official test scores sent to the Office of Admissions. Oregon Tech may award credit to students who receive a 5 or higher on any Higher Level IB examination. No credit is awarded for Subsidiary Level exams. For more information, please contact the Registrar's Office at (541) 885-1300.

## D. Credit for National Registry or Licensure Exams

Oregon Tech will award a pre-approved block of credit to fully admitted and enrolled students who have passed a national registry or licensure exam in majors offered by the institution. This award of credit is based on the academic department's annual review of the national exam questions in comparison to the curriculum taught on campus. Full information is maintained in the Registrar's Office and via Oregon Tech Online, which coordinates online degree-completion programs offered by Oregon Tech.

## Credit by Examination and Credit for Prior Experiential Learning

Oregon Tech awards credit for educational accomplishments attained outside of accredited post-secondary institutions.

## E. Credit by Examination

Students currently enrolled at Oregon Tech may request credit for a course by special examination. This process is called a course challenge and the provisions are:

1. Credit by examination (course challenge) is available to students who are fully admitted in degree-granting programs
2. Students may not challenge a course which they have previously taken for credit and received a grade other than an audit, nor may they challenge the same course more than once. If students register for a course they wish to challenge, they must drop and challenge the course before the last day to drop without a "W"
3. No more than 25 percent of the credits submitted for graduation may be credit by examination
4. Credit by examination counts toward graduation residency requirements. For a bachelor's degree, students must complete 45 credits at Oregon Tech with the last 15 to be taken on campus. For the associate degree, students must complete 30 credits with the last 15 to be taken on campus
5. Examinations receive either a "P" (pass) or "F" (fail). A pass suggests the student has mastered the material comparable to a grade of "C" or better in the course being challenged. The University Registrar records "P" grades on the student transcript, but does not count the P in grade point average calculations. The University Registrar does not record "F" grades
6. Students must pay a non-refundable per-credit fee, as published by the Office of Business Affairs, prior to the examination
7. Departments are responsible for preparing an appropriate examination, evaluating the student's response and submitting results to the Registrar's Office. Departments reserve the right to declare any course offering as non-challengeable

Further procedures and general guidelines for course challenges may be obtained from the Registrar's Office.

## F. Credit for Prior Experiential Learning

Oregon Institute of Technology recognizes that students learn outside the classroom through experiences on the job, vocational education, professional development courses, workshops, and independent study. Oregon Tech may grant credit for experiential learning when it is judged to be equivalent to college-level courses in the Oregon Tech curriculum. This process is only appropriate for students who wish to demonstrate learning for more than one required course. Typically, credit for experiential learning will replace a series of major specific courses.

### Level of Credit

Oregon Tech grants credit for prior experiential learning at the undergraduate level only. Credit will be awarded only for documented prior learning that has a balance, appropriate to the subject, between theory and practical application, and not just for prior experience. Credit should be appropriate to the academic context in which it is accepted.

### Eligibility Requirements

The student must be fully admitted and enrolled at Oregon Tech. Credit will not be granted until the student has successfully completed the procedure outlined. Credit for prior experiential learning will not be granted if the student has already received credit for the same course. No more than 25 percent of the credits needed for a degree or certificate may be from credit for prior experiential learning. Credit may only be granted for courses offered by Oregon Tech and the university reserves the right to declare any course offering as inappropriate for prior experiential learning credit.

## **Awarding of Credit**

Completion of the institution's review process does not guarantee a student will receive credit for prior experiential learning. If the student successfully demonstrates evidence of college-level learning, credit will be identified on the student's transcript as credit for prior learning. This credit will not be graded or counted in the student's grade point average. Students wishing to appeal the award of credit should appeal to the Provost, whose decision is final.

## **Tuition and Fees**

Fees charged for portfolio assessment are based on the services performed. The application fee for a specified course is published by the Office of Business Affairs. This non-refundable fee must be paid prior to submitting the portfolio for assessment. Proof of payment must accompany the student's Credit for Prior Experiential Learning Application.

## **Transfer of Prior Experiential Learning Credit**

Oregon Tech accepts credit for prior learning from other institutions, provided that the transfer institution awards such credit on the basis of standards similar to those outlined by the Northwest Association of Colleges and Universities (NWCCU).

## **Faculty Evaluator Qualifications**

Credit is awarded based on the recommendation of teaching faculty who are qualified in the subject area, who have adequate training in portfolio evaluation and who are on regular appointment with the university on a continuing basis.

## **Procedure**

Students seeking credit for prior experiential learning should first confer with their advisor to help assess if their experience and learning are appropriate for this process. If it is determined that experiential learning assessment is appropriate, the student should contact the University Registrar.

The University Registrar will determine whether the student has met the eligibility requirements outlined in this procedure. If so, the University Registrar and the Department Chair will sign the student's Credit for Prior Experiential Learning Application. The student must then complete a prior experiential learning documentation course. This course may be utilized for curricular requirements by the major department if appropriate.

Upon completion of the documentation course, the student will submit his/her Credit for Prior Experiential Learning Application and completed portfolio to the appropriate faculty evaluator as determined by the department chair. The faculty member will review the portfolio and if necessary will interview the student. Review of the portfolio will ensure that the learning experience demonstrates the theories, competencies, and outcomes of the academic subject matter. When appropriate, the faculty member may choose to consult with others who have expertise in the subject matter before making a decision as to whether or not to grant credit. The final decision is recorded on the student's Credit for Prior Experiential Learning Application and will be forwarded to the University Registrar. The Credit for Prior Experiential Learning Application will be included in the student's permanent academic record. The portfolio will be retained in accordance with Oregon Tech's archive guidelines.

## **Catalog of Graduation**

The student must meet all degree requirements from one Oregon Tech catalog. The catalog may be chosen from the year the student is first admitted and enrolled at Oregon Tech or from any subsequent year. However, at the time of graduation, all students, including transfer students, must use a catalog that is not more than seven years old.

Transfer students may select their catalog of graduation prior to full admission to Oregon Tech by obtaining written approval from their Oregon Tech major department and the University Registrar. The agreed-upon catalog will be the one a student uses when he/she transfers to Oregon Tech. Students must enroll at Oregon Tech within two years of this approval.

Departments periodically review their curriculum for technical currency. As a result, significant program changes may occur. Courses previously required in the curriculum may no longer be offered. The major department will provide a transition plan for students to fulfill degree requirements.

Programs discontinued by the university may have specific entrance and graduation limits that override this catalog-of-graduation policy.

## **Baccalaureate Upper-Division Credit Requirement**

Baccalaureate students must complete a minimum of 60 credits of upper-division work before a degree will be awarded. Upper-division work is defined as 300- and 400-level classes at a bachelor's-degree-granting institution.

## Grading System

Student academic achievement is evaluated and reported in accordance with a system of letter grades assigned at the end of each course. These grades become part of the student's transcript, a permanent academic record. A summary statement of a student's total academic record is expressed as a cumulative grade point average (GPA).

### Grading Policy

Oregon Tech uses a 4.0 grading scale to evaluate student performance. Upon completion of a course or upon termination of attendance in the course, a student's performance will be graded by the instructor and reported to the University Registrar as follows:

Letter Grade	Meaning	Points Per Credit Hour	Used to Calculate GPA
A	Exceptional	4	Yes
B	Superior	3	Yes
C	Average	2	Yes
D	Inferior	1	Yes
F	Failed	0	Yes
I	Incomplete	0	No
IP	In Progress	0	No
N	Audit	0	No
NP	No Pass: Equated to a "D" or "F"	0	No
P	Pass: Equated to a "C" or better	0	No
W	Withdrawn	0	No
Z	No Grade Assigned	0	No

### Grade Point Average

A student's GPA is computed by assigning a numerical point value to each grade: "A," 4 points per credit; "B," 3 points per credit; "C," 2 points per credit; "D," 1 point per credit; "F," 0 points per credit. GPA at Oregon Tech is truncated. GPA is the quotient obtained by dividing total grade points by total hours attempted. Grades of "I", "P", "NP", "W" and "N" are disregarded in calculating GPA; however, a "P" is equivalent to a "C" or better. For example:

Class #	Title	Credits	Grade	Point Value for Credits	Earned Grade
WRI 121	English Composition	3	B	3	9
ECO 201	Economics	3	C	2	6
MATH 111	College Algebra	4	A	4	16
CHE 101	Elementary Chemistry	3	B	3	9
CHE 104	Elementary Chemistry Lab	1	B	3	3
HED 250	Contemporary Health Issues	2	A	4	8
PHED 190	Racquetball	1	B	3	3
<b>Total</b>					<b>54</b>

GPA = Sum of earned grade points =  $\frac{54}{17} = 3.1764$  or 3.17; credits attempted: 17

### Grade Change Policy

All grades except for 'I' and 'IP' are final when filed by the instructor during grade processing each term. Thereafter, a grade change may be made only in the case of clerical, procedural or calculation error. No grade other than 'I' or 'IP', once reported, may be revised by re-testing or by completing additional work. Any grade change by the instructor of record must take place within one year subsequent to the term in which the grade was reported. Any grade change that is to be filed later than one year must be approved by the appropriate College Dean and the Registrar.

### Non-Standard Grading

Courses may be graded on the pass (P)/no pass (NP) basis at the discretion of the department and the University Registrar. Courses may include, but are not limited to seminars, externships, co-ops, independent study, certificate classes, and physical education.

### Class Drop/Withdrawal Policy

A student may drop/withdraw from a course through Friday of the seventh week of the term. Although teaching faculty may drop a student during the first two weeks of the term, according to the Faculty Initiated Withdrawal Policy, they are not required to do so. Students will be notified of instructor initiated drops in writing.

### Faculty-Initiated Withdrawal Policy

Teaching faculty can drop a student during the first two weeks of the term from a class if the student has not attended by the second regularly scheduled meeting of that class. The student will be notified of the withdrawal in writing by the Registrar's Office.

## Student Initiated Drops/Withdrawals

1. During the first 10 days of the term, a student may drop one or more courses with no record. However, if a student withdraws from all courses, the student's transcript will note "Complete Withdrawal"
2. After the first 10 days of the term, a student who withdraws from one or more courses will receive a "W" for those courses. Students may withdraw from individual courses through Friday of the seventh week of the term
3. After Friday of the seventh week, students will receive a letter grade ("A", "B", "C", "D", "F", "P", "NP", "I" or "IP") from the instructor
4. Complete withdrawals from the university may be processed through Friday of the week prior to final-exam week. Depending on the time of the term, a complete withdrawal will result in a notation of a "complete withdrawal" or "W's" on the student's transcript
5. Students requesting to withdraw from a course(s) after the published withdraw dates that have medical documentation supporting the withdraw should contact the **Dean of Student's Office**

*NOTE: The deadlines for dropping/withdrawing from a course are listed in the Academic Calendar.*

## Incompletes

When the quality of a student's work is satisfactory, but some essential requirement of the course has not been completed for reasons acceptable to the instructor, a grade of Incomplete (I) may be assigned and additional time granted for completion. The instructor is responsible for submitting an "I" grade and completing the Request for Incomplete form and submitting it to the Registrar's Office.

An "I" grade must be removed by the end of the next term (summer session not included). An "I" may only be extended under the most extenuating circumstances and then only for one additional term. If an "I" is not removed within the allotted time, the "I" then reverts to the alternate grade assigned by the instructor on the incomplete form.

Incompletes received in the anticipated term of graduation must be finished and the grades recorded in the Registrar's Office within three weeks after the end of the final term. Otherwise, the diploma will be delayed until the term during which all degree requirements are met.

## In Progress (IP) Grade

The "In Progress" grade is used for classes with coursework that continues past the end of the term in which the student is registered. Examples include externship, co-op, clinical and project classes. The "IP" grade may be retained over multiple terms. "IP" grades that are not changed during the allotted time revert to a grade of "F" for undergraduate and graduate courses.

"IP" grades given at the undergraduate level will be retained for a maximum of four terms. The "IP" grade for a specific graduate level course is maintained by the Registrar's Office for a maximum of five years. Each year the student should file a progress report with the Graduate Council signed by the student and the student advisor. After five years, the student can appeal to the Graduate Council to request a grade change beyond this five-year limit. The Graduate Council has the authority to approve or deny the student's petition.

## No Grade Assigned (Z) Grade

The "No Grade Assigned" grade is a grade assigned by the Registrar's Office when no grade is reported by the instructor. A "Z" grade should be changed by the instructor as soon as possible. If a "Z" is not removed by the completion of the following term, the "Z" reverts to a grade of "F".

## Repeat Policy

The following restrictions apply for course-repeat situations:

1. Students may attempt the same course (for a "W" or a letter grade) a total of four times
2. Each withdrawal ("W") is considered an attempt. Withdrawals, however, are not included in GPA calculations
3. The new grade earned will replace the previous grade(s) when computing GPA. Only the first two earned grades will be excluded for GPA calculations. The last grade earned will be used on the petition to graduate
4. All grades and credits remain on the student's official transcript

*NOTE: Students should consult with their financial aid counselor to determine financial eligibility for repeat courses.*

## Auditing Policy

A student has the option to enroll in a class for informational purposes only. This enrollment is classified as an audit and is regulated by the following procedures:

1. Audit classes are charged at regular tuition rates as printed in the class schedule
2. The only grade an audit class may be granted is "N" (audit). The "N" grade is disregarded in the GPA and is not valid toward graduation requirements
3. Class attendance shall be in accordance with the instructor's attendance policy for all students in the class
4. Instructors having audit students have no obligation to grade or record the audit student's work
5. An audit option may be requested during the registration period. Changes "to" or "from" the audit option may be requested no later than the 10th academic day of the term

6. Students auditing a course may, at a later term:
  - a. Register for the same course for credit
  - b. Challenge the course by examination

### **Excessive Course Load**

Admitted students are allowed to register for 21 credit hours (including audits) during an academic term without special permission. Fifteen credits are the maximum for summer session. Students wishing to register for an overload must have a 3.0 cumulative GPA and receive special approval from the advisor and the University Registrar. Appeals may be considered for special circumstances. The class schedule will provide associated tuition costs each term.

Non-admitted students are restricted to eight credits per term, with the exception of summer where 15 credit hours are the maximum.

### **Substitution within the Curriculum**

Students desiring to depart from the curriculum prescribed in the catalog should contact their departmental advisor to begin the process. It is the responsibility of the student to file a petition with the Registrar's Office for such changes. Substitution forms must be approved and filed prior to or with the petition for graduation in order to assure acceptability toward meeting graduation requirements.

### **Dead Week Policy**

Dead Week (the period of Monday morning prior to finals week until the Monday morning of finals week) is the last week of regularly scheduled activities for the term. As such, Dead Week includes routine activities (e.g., lectures, discussions, laboratories, quizzes, assignments, appropriate course reviews, etc.).

1. Final examinations, when utilized, must be given at the scheduled time during finals week
2. No student activities or athletic events will be scheduled during Dead Week
3. Projects and/or examinations due Dead Week may not exceed 20 percent of the final course grade without giving students at least three weeks prior notice

The appropriate vice president must approve any exceptions to this policy.

### **Final Exams**

All teaching faculty will meet their classes during finals week at the final-examination time designated in the official class schedule issued at the beginning of each term.

1. No student activities or athletic events will be scheduled during finals week
2. Methods of evaluation are at the discretion of the instructor. They should be specified in the course syllabus and distributed to students the first week of class
3. Faculty who use a final examination will administer that exam at the time designated in the official class schedule. Finals times are designed not to conflict

Individual students may request exceptions to this policy. These must be approved in advance by the instructor.

Course instructors may request exceptions to this policy. The exception must be approved by the dean of the school and students should be given at least three weeks prior notice of the change.

### **Academic Forgiveness**

The Academic Forgiveness policy allows undergraduates with an unsatisfactory GPA to drop a maximum of three consecutive terms of work from consideration in their GPA. Academic forgiveness applies to terms only. Students are not allowed to select courses within terms for forgiveness.

Academic forgiveness is granted on a case-by-case basis by the Academic Progress and Petitions Committee. It is an extreme measure; it may be granted only once and only when a student provides clear and convincing evidence of a renewed commitment to advancing his or her education. Once forgiveness is granted, it may not be revoked. Forgiveness can be applied only to credits earned at Oregon Tech.

If the petition is approved, the student's transcript will have a notation stating, "Academic Forgiveness Granted" above each term in which forgiveness was granted. Forgiven courses and grades are no longer calculated in the GPA and do not apply toward graduation. However, a record of all coursework will remain on the transcript.

### **Eligibility**

To apply for consideration for academic forgiveness a student must:

1. Have earned less than a 1.0 term GPA for the term(s) being considered for forgiveness. The term(s) for which forgiveness is being requested must have been taken at least seven years prior to the request
2. Have had at least a two-year lapse in enrollment at Oregon Tech
3. Be currently enrolled at Oregon Tech

4. Have completed a minimum of 30 graded credits at Oregon Tech with minimum cumulative GPA of 3.0 or better since resuming studies at Oregon Tech
5. Apply for forgiveness with the Academic Progress and Petitions Committee before degree completion

### **Procedure**

To apply for academic forgiveness, a student must submit a formal letter of request to the University Registrar, which must include:

1. Specific term(s) (maximum of three consecutive) for which forgiveness is being requested
2. Statement of academic goals and a term-by-term plan for degree completion signed by the student's academic advisor
3. Rationale for the request

The University Registrar will forward the application to the Academic Progress and Petitions Committee for review and will notify the student of the Committee's decision.

## **Graduation**

### **Application for Graduation**

Students must file an *Application to Graduate* at least two terms prior to the term of graduation. These forms are available online at [www.oit.edu/registrar](http://www.oit.edu/registrar), at the Registrar's Office, in the Portland-Metro Programs offices and in academic departments. They are submitted to the Registrar's Office for evaluation.

Oregon Tech Portland-Metro students must schedule a graduation degree-check appointment with their major's program director at least two terms prior to graduation. The final graduation check is completed by the Registrar's Office at the Klamath Falls campus.

### **Sealing of a Degree**

All grade changes, removals of incompletes, and transfer work necessary for completion of degree requirements must be on file in the Office of the Registrar by the Friday following the end of the term of graduation. Academic records are sealed ninety days after the conferral of a degree: no changes to the record will be made following that date.

### **Grade Point Requirement**

Oregon Tech requires a minimum cumulative GPA of 2.0 for graduation.

### **Graduation Residency Requirements**

All degrees require students to take a minimum number of Oregon Tech courses. For an associate degree, a minimum of 30 term-credit hours must be taken from Oregon Tech. For a bachelor's, a minimum of 45 term-credit hours must be taken from Oregon Tech. Credits earned through Oregon Tech course challenge or the Oregon Tech Credit-for-Prior-Learning program are considered resident credits toward graduation requirements. All other credits granted by examination (CLEP or AP) or other methods are non-resident credits. Students desiring to complete course requirements for graduation from Oregon Tech at another college or university must receive prior approval from the Registrar's Office.

### **Catalog of Graduation**

Students must meet all degree requirements from one Oregon Tech catalog. The catalog may be chosen from the year the student is first admitted and enrolled or from any subsequent year. However, at the time of graduation, all students, including transfer students, must use a catalog that is no more than seven years old.

Transfer students may select their catalog of graduation prior to full admission to Oregon Tech by obtaining written approval from their Oregon Tech major department and the University Registrar. The agreed upon catalog will be the one a student uses when he/she transfers to Oregon Tech. Students must enroll at Oregon Tech within two years of this approval.

Departments periodically review their curriculum for technical currency. As a result, significant program changes may occur. Courses previously required in the curriculum can no longer be offered. The major department will provide a transition plan for students to fulfill degree requirements.

Programs discontinued by the university may have specific entrance and graduation limits that override the catalog of graduation.

### **Baccalaureate Upper-Division Credit Requirement**

Baccalaureate students must complete a minimum of 60 credits of upper-division work before a degree will be awarded. Upper-division work is defined as 300- and 400-level classes at a bachelor's-degree-granting institution.

### **Multiple Majors**

An undergraduate student may earn multiple majors if all the degree requirements for each major are met. All successfully completed majors will be listed on both the transcript and diploma.

## Concurrent Degrees

Students may be granted a second bachelor's degree provided they meet the requirements for both degrees and complete an additional 36 credits beyond the requirements of the first degree. 45 credits are required if the first degree was not granted by Oregon Tech and students must meet the general-education requirements as outlined in their catalog of graduation. If the first bachelor's degree was granted by Oregon Tech, the general education requirements are waived for the second degree.

## Curricular Requirements

Curricular requirements are determined by, and vary with, the departments involved. Major requirements are published in this catalog.

## Minors

A minor consists of a minimum of 18 credits in a subject field outside the student's major. The total credits required for a minor depend on the academic discipline, the prerequisites of the required courses and the student's starting level in the discipline. Requirements for approved minors are listed by department in this catalog. Minors will only be granted at the time students receive their baccalaureate degrees. Application for a minor must be submitted to the University Registrar with the student's petition to graduate.

## Course Substitutions

Students may seek course substitution approval by completing the *Course Substitution form* and obtaining the signature of the advisor, department chair and University Registrar. Course substitutions for general education requirements must satisfy the same category of general education requirement. For example, a humanities course specified by the major department may be substituted for another humanities course, subject to the above approvals.

## Graduation in Absentia

Students wishing to complete the Oregon Tech degree by attending another college and transferring work after the minimum residency credits have been met (30 for associate and 45 for bachelor's degree) must complete a *Petition to Graduate* and have the final transferring classes approved for their degree by the transcript evaluator in the Oregon Tech Registrar's Office. This should be done prior to leaving Oregon Tech and beginning at the other college.

## Commencement

Oregon Tech's main graduation ceremony is held in Klamath Falls, Oregon in June each year. We encourage earlier graduates of the academic year (Summer, Fall, and Winter), and the graduating candidates for Spring and Summer to participate. Graduates from all Oregon Tech campuses are also invited to participate. Academic honors are calculated for the June ceremony are calculated and based on Winter term grades and honors are estimated. Summer graduates will not receive academic honors at the spring commencement.

## Diplomas

Diplomas are not issued at Commencement, regardless of graduation term. You will officially graduate when grades are finalized and it is verified that you have successfully completed all degree requirements. Please allow 4-6 weeks for your degree to be officially awarded to your records and mailed.

**NOTE:** *Diplomas are held if there is an outstanding balance on your student account and/or if required loan Exit Interviews have not been completed.*

## Academic Honors

At each Commencement, Oregon Tech recognizes academically outstanding students who will receive their bachelor's degree with academic honors. This honor is based on all Oregon Tech courses. *To be eligible for honors a student must complete a minimum of 75 Oregon Tech GPA hours/credits.*

Academic honors are based on the following criteria:

### Cum Laude

Graduation with honors 3.50-3.74 GPA

### Magna Cum Laude

Graduation with high honors 3.75-3.89 GPA

### Summa Cum Laude

Graduation with highest honors 3.90-4.00 GPA.

**NOTE:** *Students who do not have 75 Oregon Tech credits and who are graduating from a Degree Completion program must complete a minimum of 45 graded Oregon Tech credits to be eligible for honors. For Degree Completion students, who fall into this category, honors are based on all Oregon Tech courses and transfer courses used for the degree.*

Honors recognized at the graduation ceremony do not include grades from the term immediately preceding Commencement. After final grades are posted, the honors standing of some students may change. These students will be notified. A student's final honors standing will be posted on the official transcript. Summer graduates will not receive academic honors at the spring commencement.

Only past and spring honors are recognized at commencement, both in the program and with honor cords. Summer graduates will have honors listed on their diploma and official transcripts upon completion.

### **Academic Term Honors**

*President's List* (Applicable to full-time undergraduate students only)

Each term, students with a GPA of 3.70 or better are included on the President's List.

*Dean's List* (Applicable to full-time undergraduate students only)

Each term, students with a GPA of 3.30-3.69 are included on the Dean's List.

### **Honors**

*Special Recognition*

Each spring a number of Oregon Tech graduates will be selected for membership in national honor societies. Honor society members can be identified by a distinctive honor cord worn over the shoulder at Commencement.

Alpha Chi, which selects members from baccalaureate programs, identifies its honor society graduates with a white cord. Tau Alpha Pi, which selects members from the sophomore, junior and senior classes of engineering-technology majors, identifies its graduates with a crimson cord. Lambda Phi Eta selects from juniors and seniors in Communication Studies. Members are identified by a gold cord. Lambda Nu selects from juniors and seniors in Medical Imaging. Members are identified by a cord that is green, gold and maroon. Sigma Theta Tau, who wear gold and maroon cords, includes Nursing students in the top third of the class.

## **Baccalaureate General Education Requirements**

### **General Education Requirements**

Oregon Tech's General Education requirements provide breadth and depth to the Oregon Tech educational experience. The requirements are designed to help students widen perspectives, explore relationships between subjects and develop critical and analytical thinking skills in areas integrated with a student's major. General education provides the core of an undergraduate university education. These courses help students make progress toward becoming educated persons and provide a foundation for lifelong learning.

Through general education at Oregon Tech, students study broad topics, principles, theories and disciplines. The courses are organized within the curriculum in such a manner that students will acquire knowledge, abilities and appreciation as integrated elements of the educational experience. In addition, general education courses teach students to communicate clearly, think critically and globally, define and solve problems within and across disciplines, calculate logically and apply scientific reasoning. No matter what their major, students will benefit from studying areas of knowledge that help them become competent, well-rounded professionals as well as well-educated human beings and citizens.

The General Education Advisory Council and Oregon Tech's faculty review the general education curriculum regularly. Oregon Tech's goal for General Education is to help students become literate, informed, critical participants in a diverse and rapidly changing global society.

All students must complete the university general education requirements as listed in the curriculum map for the major and in this catalog. If a student holds a baccalaureate degree or higher from a recognized, accredited institution, as determined by Oregon Tech, the Oregon Tech general education requirements for the Oregon Tech baccalaureate may be waived subject to departmental program requirements.

Transfer students entering Oregon Tech who have earned either an Associate of Arts Oregon Transfer degree (AAOT) or an Associate of Science in Business degree (ASOTB) from an Oregon community college will be considered as having met Oregon Tech's lower division general education requirements.

*\* Remedial or developmental courses, including MATH 100 and WRI 115, cannot be used for graduation.*

### **Communication**

SPE 111 - Public Speaking

WRI 121 - English Composition

WRI 122 - Argumentative Writing

Plus 9 credits from the following list: COM 205, COM 225, COM 320, COM 347, COM 401, SPE 314, SPE 321, WRI 123, WRI 214, WRI 227, WRI 327, WRI 328, WRI 350, WRI 410

## Humanities

9 credits selected by student or specified by a major department from the following:

ART - Art

HUM - Humanities

LIT - Literature

MUS - Music

PHIL - Philosophy

Languages (second year)

Other transfer courses, defined as "humanities" by the Registrar's Office, may be used in this category. No more than three credits of activity or performance-based courses may be used in this category.

## Social Science

12 credits selected by student or specified by major department from the following:

ANTH - Anthropology

ECO - Economics

GEOG - Geography

HIST - History

PSCI - Political Science

PSY - Psychology

SOC - Sociology

Other transfer courses, defined as "social science" by the Registrar's Office, may be used in this category.

\* ANTH 101 may not be used to satisfy both Social Science and Science credits

\* GEOG 105 may not be used to satisfy Social Science credits

## Technology

Specific requirements for demonstrating computer proficiency may be established by the academic department.

## Science/Mathematics

One, four credit college-level mathematics course for which at least intermediate algebra is the course prerequisite.

Plus 12 credits selected by student or specified by major department from:

- biological sciences (BIO, CHE)
- mathematics (MATH)
- statistics (STAT 412, STAT 413, STAT 415, or STAT 431)
- physical sciences (PHY)
- physical geography (GEOG 105) or geology (GEOL)
- physical anthropology (ANTH 101)

Other transfer courses, defined as "Science/Mathematics" by the Registrar's Office, may be used in this category. At least four credits must be completed from a laboratory based science course in BIO, CHE, GEOG, GEOL or PHY.

## Baccalaureate Upper-Division Requirement

Baccalaureate students must complete a minimum of 60 credits of upper-division work before a degree will be awarded. Upper-division work is defined as 300- and 400-level classes at a bachelor's-degree-granting institution.

## Bachelor of Science Degree

The Bachelor of Science degree requires the student to opt between completion of 36 credits in mathematics and science or 45 credits in mathematics, science and social science. Students placed at a higher beginning level of mathematics than is published in the curriculum of their major may choose to substitute those mathematics credits surpassed by their accelerated level of placement with electives from any department to attain the required number of general education credits required by the university for graduation.

## Intercultural Studies

Students are encouraged to select at least one class from the following lists of intercultural courses. These courses also satisfy general education requirements:

### Humanities:

COM 205 - Intercultural Communication

LIT 266 - Native American Literature and Film

LIT 235 - American Multicultural Literature

LIT 381 - Contemporary World Literature

HUM 147 - Western Culture in the Classical Age

HUM 148 - Western Culture in the Medieval Age

HUM 149 - Western Culture in the Modern Age

**Social Science:**

ANTH 103 - Introduction to Cultural Anthropology

GEOG 106 - Cultural Geography I

GEOG 107 - Cultural Geography II

GEOG 108 - Cultural Geography III

HIST 392 - Modern Asia

# **University Departments and Programs**

## **Oregon Institute of Technology**

## Health, Arts and Sciences

### Applied Behavior Analysis

MariaLynn Kessler, Program Director  
 Dawn Bailey, Practicum Coordinator  
 John Borgen, BACB VCS Coordinator  
*Participating Faculty:* D. Bailey, J. Borgen, M. Kessler

#### Degree Offered

- Master of Science in Applied Behavior Analysis

Oregon's only master's degree in applied behavior analysis, the MS-ABA curriculum focuses on providing a rigorous and thorough foundation in the science of behavior analysis. Students will be prepared to apply the principles of behavior analysis with diverse populations and in a wide variety of settings. Oregon Tech's MS-ABA prepares students to meet national certification and Oregon licensure requirements.

Courses are taught on the Klamath Falls and Portland-Metro campuses and are available to students everywhere via Zoom (a synchronous videoconferencing program). The use of Zoom technology provides an alternative to fully online, asynchronous programs for students in all areas of the state who prefer the real-time, face-to-face educational experience.

#### Program Mission

The mission of the MS-ABA program is to enable students to become effective and ethical behavior analysts. Students will be prepared to apply principles of behavior analysis to enhance the lives of individuals across a wide variety of settings. The program emphasizes a foundation in theory, concepts, and principles, development of basic behavior analytic skills, and an emphasis on professional and ethical responsibilities.

#### Program Objectives

1. To produce competent graduates who can work effectively and ethically across settings and with diverse populations
2. To enable students to obtain the knowledge and skills necessary for immediate employment in ABA and/or further graduate study in ABA and related areas
3. To prepare students for national certification and Oregon licensure as behavior analysts

#### Licensure and Certification

MS-ABA prepares students to meet national certification and Oregon licensure requirements. The program includes the Behavior Analysts Certification Board® verified course sequence and an intensive practicum experience that meets national certification requirements for supervised experience

**BCBA course sequence:** the Behavior Analyst Certification Board, Inc. ® has verified these courses as meeting the coursework requirements for eligibility to take the Board Certified Behavior Analyst® exam. (Applicants will have to meet additional requirements to qualify)

**ABA Practicum:** second year practicum placements provide students with the Behavior Analyst Certification Board, Inc. ® approved supervised experience required for eligibility to take the Board Certified Behavior Analyst ® exam. Practicum placements are paid positions with approved ABA agencies and, in Klamath Falls, with Oregon Tech's BIG ABA clinic and local schools

#### Admissions

In order to ensure that students have the necessary preparation for success in the MS-ABA program, applicants must meet the Oregon Tech requirements for admission as well as the MS-ABA program specific requirements.

Applicants to the MS-ABA program at Oregon Tech shall meet the following requirements:

- Bachelor's Degree: Bachelor's degree from an accredited four-year institution in Psychology or a related field.
- GPA: Overall undergraduate GPA of 3.0 on a 4.0 scale and 3.0 for the last 90 quarter credits (60 semester) credits of coursework.
- Undergraduate Coursework: A grade of B or better in General Psychology, Research Methods, and Statistics.
- Academic Standing: Be in good academic standing at last college or university attended.
- GRE Scores: Graduate Record Examination scores for Verbal Reasoning at 150, for Quantitative Reasoning at 141, and for Analytical Writing at 3.5. GRE scores over five years old are not accepted.
- Personal Statement and Resume: Applicants will be required to write a statement that addresses career goals and relevance to the program, evidence of aptitude for graduate work and evidence of potential for success in the field.

- Reference Letters: Applicants to the program will be required to provide three letters of reference (at least one academic and one professional) that address the applicant's preparation, abilities, and character.
- Background Check: Due to the sensitive nature of this program in regards to work with children and/or vulnerable populations, applicants must pass a criminal background check such as that conducted by the Oregon Department of Human Services (DHS).
- The department and university can grant conditional admission to candidates not meeting all of the minimum requirements.

## Applied Behavior Analysis, MS

### Curriculum

Required courses and recommended terms during which they should be taken:

#### First Year

##### Fall

- ABA 501 - ABA Colloquium Credit Hours: 1
- ABA 511 - Foundations of ABA I Credit Hours: 3<sup>b</sup>
- ABA 515 - Basic Behavior Analysis Credit Hours: 3
- ABA 521 - Ethics and Professional Issues I Credit Hours: 3<sup>b</sup>

**Total: 10 Credit Hours**

##### Winter

- ABA 501 - ABA Colloquium Credit Hours: 1
- ABA 512 - Foundations of ABA II Credit Hours: 3<sup>b</sup>
- ABA 526 - Behavioral Assessment Credit Hours: 3<sup>b</sup>
- ABA 527 - Radical Behaviorism Credit Hours: 3

**Total: 10 Credit Hours**

##### Spring

- ABA 501 - ABA Colloquium Credit Hours: 1
- ABA 516 - ABA and Human Development Credit Hours: 3
- ABA 525 - Research Methods in ABA Credit Hours: 3<sup>b</sup>
- ABA 531 - Behavioral Change I Credit Hours: 3<sup>b</sup>

**Total: 10 Credit Hours**

##### Summer

- ABA 535 - Special Topics in ABA Credit Hours: 3<sup>b</sup>
- ABA 598 - Supervised Practicum Credit Hours: 2<sup>a</sup>

**Total: 5 Credit Hours**

#### Elective Courses

- ABA 565 - Organizational Behavior Management Credit Hours: 3
- ABA 566 - ABA and Education Credit Hours: 3
- ABA 567 - ABA and Health Credit Hours: 3
- ABA 575 - Community Behavior Analysis Credit Hours: 3
- ABA 576 - Clinical Behavior Analysis Credit Hours: 3
- ABA 577 - ABA and Special Populations Credit Hours: 3

**Total for a M.S. in Applied Behavior Analysis: 62/63 Credit Hours**

<sup>a</sup> Practicum Fee of \$xx (professional liability coverage)

<sup>b</sup> BCBA course sequence

#### Second Year

##### Fall

- ABA 522 - Ethics and Professional Issues II Credit Hours: 3<sup>b</sup>
- ABA 532 - Behavior Change II Credit Hours: 3<sup>b</sup>
- ABA 598 - Supervised Practicum Credit Hours: 2<sup>a</sup>
- ABA 599 - Thesis Credit Hours: 1

**Total: 9 Credit Hours**

##### Winter

- ABA 536 - Behavior, Physiology, and Pharmacology Credit Hours: 3
- ABA 598 - Supervised Practicum Credit Hours: 2<sup>a</sup>
- ABA 599 - Thesis Credit Hours: 1
- ABA Elective Credit Hours: 3

**Total: 9 Credit Hours**

##### Spring

- ABA 598 - Supervised Practicum Credit Hours: 2<sup>a</sup>  
or
- ABA Elective Credit Hours: 3

- ABA 599 - Thesis Credit Hours: 1
- ABA Elective Credit Hours: 3
- ABA Elective Credit Hours: 3

**Total: 9/10 Credit Hours**

## Applied Mathematics Department

Tiernan Fogarty, *Department Chair*

Gregg Waterman, *Scheduling Coordinator*

Cristina Negoita, *Advising Coordinator and Program Director*

Dibyajyoti Deb, *Curriculum Coordinator*

*Professors:* J. Fischer, T. Fogarty, C. Negoita

*Associate Professors:* R. Paul, T. Torres, G. Waterman

*Assistant Professors:* K. Davis, J. Reid, D. Deb, D. Hammond

### General Education

Courses offered by the Department of Applied Mathematics are designed to satisfy the needs of majors and non-majors interested in mathematics primarily as part of a broad technical education. A major emphasis is on development of skills required to solve applied problems.

Success in mathematics requires that entering students begin their study in the course which best matches their ability and background. Accordingly, all entering students must pass a placement examination at the appropriate level before being allowed to register for their initial mathematics course.

### Degree Offered

- Bachelor of Science in Applied Mathematics

### Minor Offered

- Applied Mathematics
- Applied Statistics

### Program Objectives

Coursework for the bachelor's degree is intended to provide a solid foundation of mathematical theory and a broad selection of applied work both in and outside mathematics. The prospective major will complete coursework in calculus, differential equations and numerical methods. Students also take a sequence of introductory physics courses and a further sequence in a technical field outside mathematics.

### Career Opportunities

Upon completing the requirements for the Applied Mathematics degree students will be prepared for a variety of jobs in industry including numerical modeling, signal processing, data analysis, and many others. The degree also provides students a sufficient background to further their education by entering a Masters or Ph.D. program in Mathematics or Applied Mathematics.

### Student Preparation

Students entering the Applied Mathematics Program from high school should have a minimum of two years of algebra, one year of pre-calculus, one year of geometry, and two years of physical science (physics or chemistry preferred). Additional courses in mathematics, science, English and computer programming will be very helpful. Students entering the Applied Mathematics Program by transfer are requested to contact the Mathematics Department concerning transfer of technical course work.

### Applied Mathematics Minor

The minor in Applied Mathematics provides formal recognition of mathematical proficiency. It is composed of a core of required courses and upper-division electives related to the student's major. The minor consists of 29 credits, 19 from required courses and 10 from elective courses.

This minor is open to all majors and is especially recommended for students with an interest in pursuing a career related to mathematics. It will enhance their employability and improve graduate school possibilities.

## Curriculum

A passing grade in all courses and a cumulative GPA of 2.0 or better is required to be awarded the minor. At least 12 credits must be taken at Oregon Tech.

### Required Courses:

- MATH 251 - Differential Calculus Credit Hours: 4
- MATH 252 - Integral Calculus Credit Hours: 4
- MATH 253 - Sequences and Series Credit Hours: 4
- MATH 254 - Vector Calculus I Credit Hours: 4
- MATH 341 - Linear Algebra I Credit Hours: 4
- Plus 10 additional upper-division mathematics credits selected from the list below.

### Upper-Division Electives:

Students are required to consult an advisor from the Mathematics Department to select upper-division mathematics courses that would be most applicable to their major and/or career goals.

- MATH 311 - Introduction to Real Analysis Credit Hours: 4
- MATH 321 - Applied Differential Equations I Credit Hours: 4
- MATH 322 - Applied Differential Equations II Credit Hours: 4
- MATH 327 - Discrete Mathematics Credit Hours: 4
- MATH 342 - Linear Algebra II Credit Hours: 4
- MATH 346 - Number Theory Credit Hours: 3
- MATH 347 - Fundamentals of Abstract Algebra Credit Hours: 4
- MATH 354 - Vector Calculus II Credit Hours: 4
- MATH 362 - Statistical Methods II Credit Hours: 4
- MATH 421 - Applied Partial Differential Equations I Credit Hours: 4
- MATH 422 - Applied Partial Differential Equations II Credit Hours: 4
- MATH 423 - Applied Partial Differential Equations III Credit Hours: 4
- MATH 451 - Numerical Methods I Credit Hours: 4
- MATH 452 - Numerical Methods II Credit Hours: 4
- MATH 453 - Numerical Methods III Credit Hours: 4
- MATH 465 - Mathematical Statistics Credit Hours: 4

**Note:** Not all courses are offered every term or every year

## Applied Mathematics, BS

### Degree Requirements

In addition to the mathematics requirements listed below, students will be required to complete the 200 level calculus-based general physics sequence as well as other general education requirements and Electives necessary to bring the total credit hours to 182. Please see the recommended curriculum map below. All mathematics courses must be completed with a grade "C" or better. Transfer students should consult the Admissions Office and the Mathematics Department to determine which of their courses will satisfy Oregon Tech course requirements.

### Lower-Division Required Courses (18 credits)

- MATH 221 - Introduction to Computational Software Credit Hours:2
- MATH 251 - Differential Calculus Credit Hours:4
- MATH 252 - Integral Calculus Credit Hours:4
- MATH 253 - Sequences and Series Credit Hours:4
- MATH 254 - Vector Calculus I Credit Hours:4

### Upper-Division Core Requirements (44 credits)

- MATH 310 - Mathematical Structures Credit Hours:4
- MATH 311 - Introduction to Real Analysis Credit Hours:4
- MATH 321 - Applied Differential Equations I Credit Hours:4
- MATH 322 - Applied Differential Equations II Credit Hours:4
- MATH 341 - Linear Algebra I Credit Hours:4
- MATH 354 - Vector Calculus II Credit Hours:4
- MATH 361 - Statistical Methods I Credit Hours:4
- MATH 421 - Applied Partial Differential Equations I Credit Hours:4
- MATH 451 - Numerical Methods I Credit Hours:4

### Plus two additional courses chosen from:

- MATH 422 - Applied Partial Differential Equations II Credit Hours:4
- MATH 423 - Applied Partial Differential Equations III Credit Hours:4
- MATH 452 - Numerical Methods II Credit Hours:4
- MATH 453 - Numerical Methods III Credit Hours:4

### Upper-Division Math/Physics Electives (At least 7 credits)

Students will choose 2 upper-level mathematics or physics courses with the approval of a mathematics advisor. No more than 3 credits can be MATH 407.

### Focused Electives (16 credits)

Students will choose appropriate electives from outside of mathematics. These courses should support the program objectives and must be approved by a mathematics advisor. The focused electives must total at least 16 credits at least 9 of which are from a 3 course sequence; see below for examples.

### Examples of Focused Electives Sequences

- CST 116, CST 126, CST 223 Programming Languages
- CHE 221, CHE 222, CHE 223 General Chemistry
- ENGR 211, ENGR 212, ENGR 213 Engineering Mechanics: Statics, Dynamics, Strength of Materials
- PHY 311, PHY 312, PHY 313 Introduction to Modern Physics

### Examples of Focused Electives

- CHE 331, CHE 332, CHE 333 Organic Chemistry
- ENGR 318 - Engineering Mechanics: Fluids
- ENGR 236 - Fundamentals of Electric Circuits
- PSY 361 - Industrial Psychology
- MIT 341 - Magnetic Resonance Imaging

### Notes:

1. Some of the above courses have an additional lab requirement.
2. PHY 221, PHY 222, PHY 223 may not be used as focused electives.

## Curriculum

Required courses and recommended terms during which they should be taken:

### Freshman Year

#### Fall

- MATH 251 - Differential Calculus Credit Hours: 4
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 121 - English Composition Credit Hours: 3
- Social Science Elective Credit Hours: 3
- Elective Credit Hours: 3

**Total: 16 Credit Hours**

#### Winter

- CST 116 - C++ Programming I Credit Hours: 4  
or
- ENGR 266 - Engineering Computation Credit Hours: 3  
or
- ENGR 267 - Engineering Programming Credit Hours: 3
- MATH 252 - Integral Calculus Credit Hours: 4
- PHY 221 - General Physics with Calculus Credit Hours: 4
- WRI 122 - Argumentative Writing Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 17/18 Credit Hours**

#### Spring

- MATH 253 - Sequences and Series Credit Hours: 4
- PHY 222 - General Physics with Calculus Credit Hours: 4
- Humanities Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 14 Credit Hours**

### Sophomore Year

#### Fall

- MATH 254 - Vector Calculus I Credit Hours: 4
- MATH 321 - Applied Differential Equations I Credit Hours: 4
- PHY 223 - General Physics with Calculus Credit Hours: 4
- Elective Credit Hours: 3

**Total: 15 Credit Hours**

#### Winter

- MATH 341 - Linear Algebra I Credit Hours: 4
- MATH 354 - Vector Calculus II Credit Hours: 4
- Elective Credit Hours: 4
- Humanities Elective Credit Hours: 3

**Total: 15 Credit Hours**

#### Spring

- MATH 361 - Statistical Methods I Credit Hours: 4
- Elective Credit Hours: 3
- Elective Credit Hours: 3
- Elective Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 16 Credit Hours**

### Junior Year

#### Fall

- MATH 310 - Mathematical Structures Credit Hours: 4
- SPE 321 - Small Group and Team Communication Credit Hours: 3
- Focused Elective Credit Hours: 3<sup>a</sup>
- Elective Credit Hours: 4 (upper division)

**Total: 14 Credit Hours**

#### Winter

- MATH 311 - Introduction to Real Analysis Credit Hours: 4
- WRI 227 - Technical Report Writing Credit Hours: 3
- Focused Elective Credit Hours: 3<sup>a</sup>
- Elective Credit Hours: 3 (upper division)
- Elective Credit Hours: 3

**Total: 16 Credit Hours**

#### Spring

- MATH 322 - Applied Differential Equations II Credit Hours: 4
- MATH 451 - Numerical Methods I Credit Hours: 4
- Focused Elective Credit Hours: 3<sup>a</sup>
- Math/Physics Elective Credit Hours: 3<sup>b</sup>
- Elective Credit Hours: 2

**Total: 16 Credit Hours**

### Senior Year

#### Fall

- MATH 421 - Applied Partial Differential Equations I Credit Hours: 4
- Focused Elective Credit Hours: 4<sup>a</sup>
- Math/Physics Elective Credit Hours: 4<sup>b</sup>
- Elective Credit Hours: 3

**Total: 15 Credit Hours**

#### Winter

- Mathematics Core Credit Hours: 4 (upper-division)<sup>c</sup>
- Focused Elective Credit Hours: 3<sup>a</sup>
- Social Science Elective Credit Hours: 3
- Elective Credit Hours: 3
- Elective Credit Hours: 3

**Total: 16 Credit Hours**

#### Spring

- Mathematics Core Credit Hours: 4 (upper-division)<sup>c</sup>
- WRI 327 - Advanced Technical Writing Credit Hours: 3  
or
- WRI 350 - Documentation Development Credit Hours: 3
- Elective Credit Hours: 3
- Elective Credit Hours: 3

**Total: 13 Credit Hours**

## Total for a B.S. in Mathematics: 183-184 Credit Hours

<sup>a</sup> Students will choose at least 16 credits from outside of mathematics with the approval of a mathematics advisor. At least 9 credits should be from a 3 course sequence. See above for examples.

<sup>b</sup> Students will choose 2 upper-division courses from mathematics or physics with the approval of a mathematics advisor.

<sup>c</sup> See "Upper-Division Core Requirements" listed above in the degree requirements section. The years and terms that these courses are offered will vary. For questions about availability, please consult with an advisor or contact the Mathematics Department.

## Applied Statistics Minor

The Minor in Applied Statistics is open to students in all majors and is specifically recommended for those students who wish to pursue graduate school or work in research. Students pursuing the minor will have enhanced statistical skills and a deeper understanding of statistics than what is received in one or two introductory courses. A minimum of 18 credits is required to complete this minor, 8 credits from required courses and 10 credits from elective courses.

### Curriculum List

Students are advised to consult an advisor from the Mathematics Department of select upper-division mathematics courses that would be most applicable to their major and/or career goals.

1. A minimum of 18 credits (all earned with grade of "C" or above) is required to earn the minor.
2. Required courses: MATH 361 - Statistical Methods I and MATH 362 - Statistical Methods II. In addition, at least 10 more credits of upper-division courses are needed from the lists below. Note that at least 4 credits of those must come from MATH/STAT courses listed below.
3. At least 12 credits must be taken at OIT.

### Courses

- Upper-Division MATH/STAT Electives (at **least** 4 credits)
- MATH 465 - Mathematical Statistics Credit Hours: 4
- STAT 413 - Categorical Data Analysis Credit Hours: 4
- STAT 431 - Sampling Methods Credit Hours: 4
- STAT 412 - Regression and Time Series Credit Hours: 4
- STAT 415 - Design and Analysis of Experiments Credit Hours: 4
- STAT 414 - Statistical Methods in Epidemiology Credit Hours: 4

### Additional Courses

(at **most** 6 credits)

- ENV 434 - Advanced Data Analysis Credit Hours: 4
- BUS 456 - Business Research Methods Credit Hours: 3  
or
- BUS 457 - Business Research Methods II Credit Hours: 3
- COM 326 - Communication Research Credit Hours: 3
- GME 444 - Adjustment by Least Squares Credit Hours: 4
- MFG 333 - Statistical Methods for Quality Improvement Credit Hours: 3
- MGT 461 - Lean/Six Sigma Management I Credit Hours: 3  
or
- MGT 462 - Lean/Six Sigma Management II Credit Hours: 3  
or
- MGT 463 - Lean/Six Sigma Management III Credit Hours: 3
- PSY 313 - Psychological Research Methods I Credit Hours: 4  
or
- PSY 314 - Psychological Research Methods II Credit Hours: 4

**Note:** Not all courses are offered every term or every year.

## Applied Psychology

Alishia Huntoon, *Program Director, Klamath Falls and Online*

MariaLynn Kessler, *Program Director, Portland-Metro*

Alishia Huntoon, *Externship Coordinator*

Trevor Petersen, *Advising Coordinator*

*Participating Faculty:* J. Borgen, A. Huntoon, M. Kessler, K. Konkel, T. Petersen

### Degree Offered

- Bachelor of Science in Applied Psychology

The Bachelor of Science in Applied Psychology prepares students for careers that apply the principles of psychology in diverse settings. The program provides a strong core curriculum in order for students to understand the foundations, theories, and principles of each area of psychology. As an applied program, both core and elective courses have a skills-based focus, allowing students to identify personal strengths, apply knowledge to real-world situations, create and implement new ideas, and ultimately be prepared to enter the workforce or continue on to graduate programs. A diverse offering of elective courses allows for students to focus on one or many areas of psychology, creating a unique opportunity for students to have an in-depth and personalized psychology degree. Students should consult with their advisor about specific interests for guidance in regards to elective offerings. The Applied Psychology program also offers Capstone in Applied Psychology (CAP) courses. These CAP courses vary by term and give senior students the opportunity to synthesize knowledge learned throughout the degree program and apply core principles and theories of psychology to a selected topic. Through an Applied Experience, students have the opportunity to participate in externships, advanced research courses, or community work to prepare themselves for exciting and rewarding careers in psychology or for additional course work in graduate programs.

### Mission Statement

The mission of the Applied Psychology Program is to enable students to apply core principles and theories of psychology and in-depth knowledge and skills in specific areas of psychology to communicate effectively, think critically, behave ethically and with cultural awareness, and work inter-personally with people from a wide variety of backgrounds.

### Career Opportunities

Nationwide, college graduates with a bachelor's in psychology perform a wide variety of jobs or attend a wide variety of graduate programs. Graduates may work in counseling, education, social service, management, public relations, public health, and other fields. All of these jobs are potentially available to graduates of Oregon Tech's Applied Psychology Program. Many of Oregon Tech's Applied Psychology graduates have found jobs in Oregon and beyond. Human service employers include county and state agencies, as well as a wide range of private and non-profit agencies. Graduates of Oregon Tech's Applied Psychology Program benefit from the emphasis of hands-on training and applied experiences. Graduates have also completed a Master of Arts in Teaching (MAT) and pursue careers in education, such as teaching, school counseling, and special education. Graduates have also been employed in industry and are following management training programs. Finally, graduates have pursued various Master's and doctoral programs in psychology and related fields.

### Applied Behavior Analysis

Applied Behavior Analysis (ABA) is an evidence-based, data-driven, systematic approach to intervention. Practitioners of ABA apply principles of reinforcement and focus on applications that improve the quality of life for individuals. Behavior analysts provide services in a variety of settings including schools, clinics, rehabilitation settings, residential facilities, social service agencies, mental health facilities, businesses, and client homes. They work with diverse populations including individuals and families affected by autism, developmental and intellectual disabilities, brain injury, mental health, geriatrics, child abuse, and neglect.

### Program Objective

Meet the demand for competent behavior analysts by providing BACB® approved course work to professionals seeking national certification and/or licensure as a behavior analyst in Oregon.

### Applied Behavioral Analysis Graduate Certificate

The Certificate in Applied Behavior Analysis is a 27-credit, nine-course sequence for individuals who wish to pursue additional coursework in Applied Behavior Analysis. The Behavior Analyst Certification Board, Inc. ® has approved this course sequence as meeting the course work requirements for eligibility to take the Board Certified Behavior Analyst® exam (applicants for the BCBA® exam will have to meet additional requirements to qualify).

**Required Courses (27 Credits)**

- ABA 511 - Foundations of ABA I Credit Hours: 3
- ABA 512 - Foundations of ABA II Credit Hours: 3
- ABA 521 - Ethics and Professional Issues I Credit Hours: 3
- ABA 522 - Ethics and Professional Issues II Credit Hours: 3
- ABA 525 - Research Methods in ABA Credit Hours: 3
- ABA 526 - Behavioral Assessment Credit Hours: 3
- ABA 531 - Behavioral Change I Credit Hours: 3
- ABA 532 - Behavior Change II Credit Hours: 3
- ABA 535 - Special Topics in ABA Credit Hours: 3

## Applied Psychology, BS

### Degree Requirements

Students must meet the general education requirements, as stated below, and satisfactorily complete the courses listed in this curriculum to obtain the Bachelor of Science in Applied Psychology. A total of 180 credits are required for the degree. Students must complete a core program consisting of 71 credits; those core courses are PSY 201, PSY 202, PSY 203, PSY 215, PSY 216, PSY 301, PSY 311, PSY 312, PSY 313, PSY 317, PSY 330, PSY 331, PSY 334, PSY 335, PSY 339, PSY 455, PSY 475, PSY 255 or MATH 243 or MATH 361, and 12 credits toward an Applied Experience. Any of the following can count toward the Applied Experience: PSY 314, PSY 420, PSY 421, PSY 422, PSY 423, PSY 441, PSY 442, PSY 443, PSY 445, and/or PSY 497. Additionally, students are required to take 54 elective credits, and should work with their advisors to select elective courses that align closely with their interests and career goals. Students electing to take externship are restricted to a maximum of 32 credits. All core courses must be completed with a minimum grade of "C" in order to earn the degree.

**Note:** The Portland-Metro campus is a laptop-required campus with resources like laptop specifications, financial aid, and helpful instructions found at <http://www.oit.edu/portland-metro/college-costs/bring-your-own-device>.

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- PSY 201 - Psychology Credit Hours: 3
- WRI 121 - English Composition Credit Hours: 3
- Laboratory Science Elective Credit Hours: 4
- Social Science Elective Credit Hours: 3

**Total: 13 Credit Hours**

##### Winter

- PSY 202 - Psychology Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3
- Laboratory Science Elective Credit Hours: 4
- Social Science Elective Credit Hours: 3
- Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Spring

- PSY 203 - Psychology Credit Hours: 3
- SPE 111 - Public Speaking Credit Hours: 3
- Laboratory Science Elective Credit Hours: 4
- Social Science Elective Credit Hours: 3
- Elective Credit Hours: 3

**Total: 16 Credit Hours**

#### Sophomore Year

##### Fall

- MATH 111 - College Algebra Credit Hours: 4
- PSY 215 - Abnormal Psychology I Credit Hours: 3
- SPE 321 - Small Group and Team Communication Credit Hours: 3
- Humanities Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Winter

- MATH 243 - Introductory Statistics Credit Hours: 4  
or
- MATH 361 - Statistical Methods I Credit Hours: 4  
or
- PSY 225 - Applied Statistics for the Social Sciences Credit Hours: 4
- PSY 216 - Abnormal Psychology II Credit Hours: 3
- PSY 311 - Human Growth and Development I Credit Hours: 3
- Communications Elective Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Spring

- PSY 301 - Basic Counseling Techniques Credit Hours: 4
- PSY 312 - Human Growth and Development II Credit Hours: 3
- PSY 313 - Psychological Research Methods I Credit Hours: 4
- PSY 317 - Field and Career Preparation Credit Hours: 3

**Total: 14 Credit Hours**

#### Junior Year

##### Fall

- PSY 334 - Behavior Modification I Credit Hours: 4
- PSY 339 - Biopsychology Credit Hours: 3
- Communication Elective Credit Hours: 3
- Electives Credit Hours: 6<sup>a</sup>

**Total: 16 Credit Hours**

##### Winter

- PSY 330 - Social Psychology I Credit Hours: 3
- PSY 335 - Behavior Modification II Credit Hours: 4
- Humanities Elective Credit Hours: 3
- Electives Credit Hours: 6<sup>a</sup>  
and/or
- Applied Experience Credit Hours: 6<sup>b</sup>

**Total: 16 Credit Hours**

**Spring**

- PSY 331 - Social Psychology II Credit Hours: 3
- PSY 455 - Cognitive Psychology Credit Hours: 3
- Electives Credit Hours: 9<sup>a</sup>  
and/or
- Applied Experience Credit Hours: 9<sup>b</sup>

**Total: 15 Credit Hours****Senior Year****Fall**

- PSY 475 - Capstone in Applied Psychology Credit Hours: 3
- Electives Credit Hours: 11<sup>a</sup>  
and/or
- Applied Experience Credit Hours: 11<sup>b</sup>

**Total: 14 Credit Hours****Winter**

- Electives Credit Hours: 14<sup>a</sup>  
or
- Applied Experience Credit Hours: 14<sup>b</sup>

**Total: 14 Credit Hours****Spring**

- Electives Credit Hours: 14<sup>a</sup>  
or
- Applied Experience Credit Hours: 14<sup>b</sup>

**Total: 14 Credit Hours****Note:**

1. 60 upper-division credits required

**Total for a B.S. in Applied Psychology: 180 Credit Hours**<sup>a</sup> Electives – 54 credits<sup>b</sup> Applied Experience – Student must complete at least 12 credits of the following: PSY 314, PSY 420, PSY 421, PSY 422, PSY 423, PSY 441, PSY 442, PSY 443, PSY 445, and PSY 497

## Communication Department

Dan Peterson, *Department Chair*

*Professors:* K. Brown, D. Peterson, M. Schnackenberg

*Associate Professors:* V. Koehn, M. Search, C. Szymyk

*Assistant Professors:* M. Frye, A. Fultz, R. Schwartz

### Degree Offered

- Bachelor of Science in Communication Studies

The Bachelor of Science in Communication Studies allow students flexibility in designing a program that fits their life and career goals. Students choose core courses and Electives from areas such as technical, organizational, and interpersonal communication. In addition, students build a career foundation by completing a *focused sequence of Electives*.

### Career Opportunities

The Communication Studies Program prepares students for careers in areas such as technical communication, organizational communication, new communication technologies, education, human resources, project management, public relations, sales, and mediation.

### General Education Courses

To ensure that Oregon Tech's graduates are skilled communicators, the Communication Department provides writing, speech, and communication courses to satisfy general education requirements. Students in other majors should consult the general education and degree requirements in their major departments.

### Student Preparation

All students who plan to study at Oregon Tech should enroll in writing and speech classes during their high school years to better benefit from the university's communication courses. Students applying to the Communication Studies Program should have especially strong reading and writing skills. It is important to have a well-rounded college preparation background, including courses in math, sciences, and general education.

## Communication Studies, BS

### Degree Requirements

The Bachelor of Science in Communication Studies requires 184 credits. All major courses, general education communication courses, and focused sequence of electives courses must be completed with a grade of "C" or higher.

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- COM 104 - Introduction to Communication Credit Hours: 3
- COM 225 - Interpersonal Communication Credit Hours: 3
- MIS 101 - Word Processing Software Laboratory Credit Hours: 1
- PSY 201 - Psychology Credit Hours: 3
- WRI 121 - English Composition Credit Hours: 3
- Laboratory Science Elective Credit Hours: 4

**Total: 17 Credit Hours**

##### Winter

- COM 105 - Introduction to Communication Theory Credit Hours: 3
- COM 115 - Introduction to Mass Communication Credit Hours: 3
- MIS 102 - Spreadsheet Lab Credit Hours: 1
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Spring

- ART 207 - Seminar Credit Hours: (Hours to be arranged each term.)  
or
- ART 215 - Design Arts and Aesthetics Credit Hours: 3
- COM 106 - Introduction to Communication Research Credit Hours: 3
- COM 205 - Intercultural Communication Credit Hours: 3
- COM 109 - Introduction to Communication Technology Credit Hours: 3
- MIS 103 - Presentation Graphics Software Laboratory Credit Hours: 1
- Social Science Elective Credit Hours: 3

**Total: 16 Credit Hours**

#### Sophomore Year

##### Fall

- COM 216 - Essentials of Grammar and Punctuation Credit Hours: 3
- SPE 321 - Small Group and Team Communication Credit Hours: 3
- WRI 227 - Technical Report Writing Credit Hours: 3
- MATH - Any for which MATH 100 pre-req Credit Hours: 4
- Open Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Winter

- COM 237 - Introduction to Visual Communication Credit Hours: 3
- COM 276 - Democracy and Media Credit Hours: 3
- JOUR 211 - Publications-Student Newspaper Credit Hours: 3
- Focused Sequence Elective Credit Hours: 3
- Open Elective Credit Hours: 3

**Total: 15 Credit Hours**

##### Spring

- COM 248 - Digital Media Production Credit Hours: 3
- COM 255 - Communication Ethics Credit Hours: 3
- Business Elective Credit Hours: 3
- Focused Sequence Elective Credit Hours: 3
- Laboratory Science/Math Elective Credit Hours: 4

**Total: 16 Credit Hours**

#### Junior Year

##### Fall

- COM 301 - Rhetorical Theory and Application Credit Hours: 3
- COM 325 - Gender and Communication Credit Hours: 3
- COM 326 - Communication Research Credit Hours: 3
- Focused Sequence Elective Credit Hours: 3
- Open Elective Upper Division Credit Hours: 3

**Total: 15 Credit Hours**

##### Winter

- COM 345 - Organizational Communication I Credit Hours: 3
- SPE 314 - Argumentation Credit Hours: 3
- Open Elective Upper Division Credit Hours: 3
- Focused Sequence Elective Upper Division Credit Hours: 3
- Focused Sequence Elective Credit Hours: 3

**Total: 15 Credit Hours**

##### Spring

- COM 347 - Negotiation and Conflict Resolution Credit Hours: 3
- COM 358 - Communication and the Law Credit Hours: 3
- Focused Sequence Elective Credit Hours: 3
- Humanities Elective Credit Hours: 3
- Writing Elective Upper Division Credit Hours: 3

**Total: 15 Credit Hours**

**Senior Year****Fall**

- COM 309 - Communication Technology in Use Credit Hours: 3
- COM 420 - Externship Credit Hours: (Variable to a total of 15 credits)
- Humanities Elective Upper Division Credit Hours: 3
- Open Elective Credit Hours: 3
- Social Science Elective Upper Division Credit Hours: 3

**Total: 16 Credit Hours****Winter**

- COM 420 - Externship Credit Hours: (Variable to a total of 15 credits)
- Focused Sequence Elective Credit Hours: 3
- Open Elective Upper Division Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 13 Credit Hours****Spring**

- COM 420 - Externship Credit Hours: (Variable to a total of 15 credits)
- COM 424 - Capstone Course Credit Hours: 3
- Focused Sequence Elective Credit Hours: 3
- Laboratory Science/Math Elective Credit Hours: 4

**Total: 14 Credit Hours****Notes:**

1. There is no guarantee of externships for Communication Studies majors.
2. The best externship experiences are often those identified and arranged by students.

**Total for a B.S. in Communication Studies: 184 Credit Hours**

## Dispute Resolution Certificate

The Dispute Resolution Certificate provides students with a thorough foundation of communication courses related to dispute resolution. The program culminates in specialized courses: negotiation, facilitation, and mediation, giving students expertise in the field. A practicum in mediation offers practical experience in community mediation and guarantees competence of students completing the certificate. This certificate provides students with both the theoretical background and the practical experience to effectively resolve conflicts in a variety of contexts.

### Prerequisite or Corequisite Classes

- SPE 111 - Public Speaking Credit Hours: 3
- WRI 121 - English Composition Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3

### Program Courses

- COM 205 - Intercultural Communication Credit Hours: 3
- COM 225 - Interpersonal Communication Credit Hours: 3
- COM 226 - Nonverbal Communication Credit Hours: 3
- COM 345 - Organizational Communication I Credit Hours: 3
- COM 347 - Negotiation and Conflict Resolution Credit Hours: 3
- COM 348 - Facilitation Credit Hours: 3
- COM 425 - Mediation Credit Hours: 3
- COM 426 - Mediation Practicum Credit Hours: (Variable Credit 1-3)
- SPE 321 - Small Group and Team Communication Credit Hours: 3

## Human Interaction Minor

The Human Interaction Minor supplements Oregon Tech technical and applied science degrees and provides advanced training in interaction skills. The minor offers courses in the analysis and practice of human interaction in a variety of contexts. The minor focuses on helping students to gain competency in building relationships, dealing with difference and managing conflict. Students who have performed well in general education communication courses are encouraged to enroll in this minor. For further information on enrollment, contact the Communication Department curriculum coordinator.

### Career Opportunities

The Human Interaction minor enhances students' employability and career flexibility. Employers in many industries seek employees who demonstrate competent interaction on multi-disciplinary teams, communicate in many (including international) contexts, understand and resolve conflict in the workplace and create effective communication in diverse settings.

### Requirements of Minor

- SPE 321 - Small Group and Team Communication Credit Hours: 3
- COM 205 - Intercultural Communication Credit Hours: 3
- COM 225 - Interpersonal Communication Credit Hours: 3

### In addition, students will select **THREE** from the following list of courses:

- COM 336 - Nonverbal Communication Credit Hours: 3
- COM 325 - Gender and Communication Credit Hours: 3
- COM 345 - Organizational Communication I Credit Hours: 3
- COM 346 - Health Communication Credit Hours: 3
- COM 347 - Negotiation and Conflict Resolution Credit Hours: 3
- COM 446 - Communication and Leadership Credit Hours: 3

## Professional Writing, BS

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- COM 225 - Interpersonal Communication Credit Hours:3
- MATH 111 - College Algebra Credit Hours: 4  
or
- MATH 243 - Introductory Statistics Credit Hours:4
- MIS 101 - Word Processing Software Laboratory Credit Hours: 1
- MIS 102 - Spreadsheet Lab Credit Hours: 1
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 121 - English Composition Credit Hours:3

**Total: 15 Credit Hours**

##### Winter

- COM 115 - Introduction to Mass Communication Credit Hours: 3
- MIS 103 - Presentation Graphics Software Laboratory Credit Hours: 1
- PWR 101 - Introduction to Professional Writing Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours:3
- Humanities Elective (Text Analysis Focus) Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Spring

- ART 226 - Digital Photography Credit Hours: 3  
or
- Graphic Design Credit Hours: 3
- COM 109 - Introduction to Communication Technology Credit Hours: 3
- PWR 102 - Introduction to Web Authoring Credit Hours: 3
- WRI 227 - Technical Report Writing Credit Hours: 3
- Technical Elective Credit Hours: 3 or 4

**Total: 15/16 Credit Hours**

#### Sophomore Year

##### Fall

- COM 215 - Creativity in Communication Credit Hours: 3
- COM 256 - Public Relations Credit Hours: 3
- PWR 215 - Writing in the Public Interest Credit Hours: 3
- SPE 321 - Small Group and Team Communication Credit Hours: 3
- Technical Elective Credit Hours: 3
- Emphasis Elective Credit Hours: 3

**Total: 12 Credit Hours**

##### Winter

- COM 237 - Introduction to Visual Communication Credit Hours: 3
- JOUR 211 - Publications-Student Newspaper Credit Hours: 3
- Humanities Elective Credit Hours: 3
- Emphasis Elective Credit Hours: 3
- WRI/COM Elective Credit Hours: 3

**Total: 15 Credit Hours**

##### Spring

- COM 248 - Digital Media Production Credit Hours: 3
- COM 255 - Communication Ethics Credit Hours: 3
- SPE 314 - Argumentation Credit Hours: 3  
or
- Emphasis Elective Credit Hours: 3
- WRI 328 - Style Credit Hours: 3
- Lab Science Elective Credit Hours: 4

**Total: 16 Credit Hours**

#### Junior Year\*

##### Fall

- COM 301 - Rhetorical Theory and Application Credit Hours: 3
- COM 305 - Contemporary Rhetorical Theory Credit Hours: 3
- COM 326 - Communication Research Credit Hours: 3
- WRI 420 - Document Design Credit Hours: 3
- Social Science Elective Credit Hours: 3
- Math/Science Elective Credit Hours: 4

**Total: 16 Credit Hours**

##### Winter

- PWR 330 - User Research Credit Hours: 3
- PWR 355 - Project Management for Writers Credit Hours: 3
- WRI 415 - Technical Editing Credit Hours: 3
- Social Science Elective Credit Hours: 3
- Technical Elective Credit Hours: 3

**Total: 15 Credit Hours**

##### Spring

- COM 345 - Organizational Communication I Credit Hours: 3
- COM 358 - Communication and the Law Credit Hours: 3
- WRI 410 - Proposal and Grant Writing Credit Hours: 3  
or
- Upper Division Writing Elective Credit Hours: 3
- Emphasis Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3
- Technical Elective Credit Hours: 3

**Total: 18 Credit Hours**

**Senior Year****Fall**

- PWR 499 - Internship in Professional Writing CreditHours: Variable to total of 9 credits
- PWR 490 - Portfolio Development Credit Hours: Variable 2 or 3 (2 credits with Prof. Exam Pass; 3 credits with Prof Exam NP)
- WRI 425 - Advanced Composition Credit Hours: 3
- Emphasis Elective Credit Hours: 3
- Science Elective Credit Hours: 4

**Total: 15/16 Credit Hours****Winter**

- COM 424 - Capstone Course Credit Hours: 3
- PWR 499 - Internship in Professional Writing CreditHours: Variable to total of 9 credits
- PWR Elective Credit Hours: 3 (online or in-class)
- Technical Elective Credit Hours: 3

**Total: 12 Credit Hours****Spring**

- PWR 499 - Internship in Professional Writing CreditHours: Variable to total of 9 credits
- Emphasis Elective Credit Hours: 3
- Emphasis Elective Credit Hours: 3
- Technical Elective Credit Hours: 3

**Total: 12 Credit Hours****Total for a B.S. in Professional Writing: 180/182 Credit Hours****Note:**

1. \*Writing Proficiency Exam required at end of Junior Year

**Emphasis Courses (18 Credits Minimum)**

Students will select from one of the following Emphasis areas in order to satisfy the emphasis elective and technical elective requirements.

**Digital Media Emphasis**

(beyond the required courses in the program)

- COM 115 - Introduction to Mass Communication Credit Hours: 3
- COM 207 - Seminar Credit Hours: (Hours to be arranged each term.) International Media Seminar: Paris
- COM 215 - Creativity in Communication Credit Hours: 3
- COM 248 - Digital Media Production Credit Hours: 3
- COM 309 - Communication Technology in Use Credit Hours: 3
- COM 365 - Electronic Communication and Society Credit Hours: 3
- COM 415 - Developing Multimedia Credit Hours: 3
- HUM 345 - Digital Culture and Society Credit Hours: 3
- HUM 335 - Video Game Studies Credit Hours: 3
- MIS 118 - Introduction to Programming in C# Credit Hours: 4
- PHIL 205 - Introduction to Logic Credit Hours: 3
- PWR 206 - Social Media Credit Hours: 3
- PWR 220 - Writing for Interactive Media Credit Hours: 3
- PWR 315 - Advanced Web Authoring Credit Hours: 3
- WRI 225 - Writing Nonfiction Credit Hours: 3
- WRI 305 - Writing for the Marketplace Credit Hours: 3

**Scientific and Technical Emphasis**

(beyond the required courses in the program)

- BIO 200 - Medical Terminology Credit Hours: 2
- BIO 209 - Current Research Topics in Medical Sciences I Credit Hours: 1
- COM 347 - Negotiation and Conflict Resolution Credit Hours: 3
- MIS 118 - Introduction to Programming in C# Credit Hours: 4
- PHIL 205 - Introduction to Logic Credit Hours: 3
- PHIL 331 - Ethics in the Professions Credit Hours: 3
- PHIL 305 - Medical Ethics Credit Hours: 3
- PWR 306 - Writing for the Health Professions Credit Hours: 3
- PWR 315 - Advanced Web Authoring Credit Hours: 3
- PWR 320 - Structured Authoring Credit Hours: 3
- WRI 225 - Writing Nonfiction Credit Hours: 3
- WRI 327 - Advanced Technical Writing Credit Hours: 3
- WRI 345 - Science Writing Credit Hours: 3
- WRI 350 - Documentation Development Credit Hours: 3

**Writing in Organizations Emphasis**

(beyond the required courses in the program)

- BUS 313 - Health Care Systems and Policy Credit Hours: 3
- COM 347 - Negotiation and Conflict Resolution Credit Hours: 3
- COM 437 - Communication Training and Development Credit Hours: 3
- COM 445 - Organizational Communication II Credit Hours: 3
- COM 446 - Communication and Leadership Credit Hours: 3
- PHIL 331 - Ethics in the Professions Credit Hours: 3
- PSY 347 - Organizational Behavior Credit Hours: 3
- PWR 206 - Social Media Credit Hours: 3
- PWR 215 - Writing in the Public Interest Credit Hours: 3
- PWR 306 - Writing for the Health Professions Credit Hours: 3
- PWR 310 - Professional Writing for International Audiences Credit Hours: 3
- PWR 315 - Advanced Web Authoring Credit Hours: 3
- PWR 320 - Structured Authoring Credit Hours: 3
- WRI 216 - Public Relations Writing Credit Hours: 3
- WRI 327 - Advanced Technical Writing Credit Hours: 3

**Technical Communication Minor**

The Technical Communication Minor supplements Oregon Tech technical degrees and provides advanced training and experience in communication skills. The minor offers specialized communication courses in such varied areas as proposal and grant writing, documentation development, and technical editing.

Students who have performed above-average work in their lower-division communication courses are encouraged to enroll in the program. For further information on enrollment, contact any Communication Department faculty member.

**Career Opportunities**

The Technical Communication Minor will enhance students' flexibility as their careers develop. Employers in private industry, governmental agencies, and research facilities seek a unique combination of skills. First, employers know that the major coursework at Oregon Tech prepares students well. Second, the Technical Communication Minor courses build skills in project development, manual writing and editing, computer-aided writing and publishing, oral presentations, and interviewing skills that complement technical education. Even if students choose not to work as technical writers or editors, the Technical Communication Minor may increase job opportunities and professional advancement.

**Requirements of the Minor**

In addition to the general education requirements in communication, Technical Communication Minor students take four upper-division courses (12 units). Students take two required core courses and choose two Electives from the list below. Students must earn a "C" or better in all courses to complete the minor.

**Required Courses**

- COM 301 - Rhetorical Theory and Application Credit Hours: 3

**Elective Courses**

- COM 365 - Electronic Communication and Society Credit Hours:3
- COM 415 - Developing Multimedia Credit Hours:3
- WRI 350 - Documentation Development Credit Hours: 3
- WRI 410 - Proposal and Grant Writing Credit Hours:3
- WRI 415 - Technical Editing Credit Hours:3
- WRI 420 - Document Design Credit Hours:3

## Dental Hygiene Department

Paula Russell, *Department Chair*

Paula Russell (Klamath Falls), Tina Clarke (Chemeketa): *Program Directors*

*Associate Professors:* J. Cope, E. Hobbs, S. Hopper, P. Russell

*Assistant Professor:* K. Clarke, J. Luebbers, T. Willey

*Instructors:* J. Bopp C. Botsch, K. Beaty, D. Swigart

### Degree Offered

- Bachelor of Science in Dental Hygiene

The Bachelor of Science in Dental Hygiene is offered on the Oregon Tech, Klamath Falls campus, and on the Chemeketa Community College campus in Salem, Oregon.

### Accreditation

The dental hygiene curriculum has been granted the accreditation status of "approval without reporting requirements" by the American Dental Association's Commission on Dental Accreditation, a specialized accrediting body recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education. The program is recognized by the Oregon Board of Dentistry, Oregon Dental Association and the Oregon Dental Hygienists' Association.

### Program Purpose and Mission Statement

The dental hygiene programs prepare students to enter the dental hygiene profession as registered dental hygienists. Graduates are prepared for national and regional examinations and to meet qualifications for licensure. Bachelor degree graduates are prepared for post graduate education in dental hygiene and other related fields of study.

The program provides an educational environment that fosters respect and encourages critical thinking. Its mission is to educate students to become primary health care providers who are well prepared to serve the public in multiple roles and who are empowered to become life-long learners.

### Program Educational Objectives

The dental hygiene graduate will be competent in:

1. Cultural Awareness: Interpersonal and communication skills to effectively interact with diverse population groups
2. Critical Thinking and Problem Solving:
3. Professionalism, Ethical Practice: Applying ethical, legal, and regulatory concepts in the provision and/or support of oral health care services to comprehensive care and management of patients
4. Lifelong Learning: Demonstration competent knowledge and self-assessment skills necessary for life-long learning
5. Community Health: Assessing, planning, implementing, and evaluating community based oral health programs including health promotion and disease prevention activities
6. Provision of Oral Health Care: Provide oral health care to people in all stages of life and for all periodontal conditions.

### Career Opportunities

Dental hygienists are most commonly employed in private dental practices and provide oral health preventive and therapeutic services. Graduates are prepared for licensure as a dental hygienist and with the qualifications to obtain permits and endorsements for expanded practice in such settings as nursing homes, schools, and hospitals. In addition to clinical practice, dental hygienists have careers in the fields of education, research, administration, and public health.

### Student Preparation

A science background is essential for individuals interested in any health sciences profession. Students considering a career in dental hygiene should take a college-bound course of study in high school that includes algebra, chemistry, and biology or human anatomy and physiology.

### Admissions Procedures

Any student who meets the general admissions requirements may enroll in Pre-Dental Hygiene courses (freshman year). A limited number of seats are available in the professional courses (sophomore, junior, and senior years). Students are selected to enter the professional program through an application process.

The application deadline is in April of the calendar year of enrollment. To be eligible for admission into the Dental Hygiene Program the following minimum eligibility requirements must be met:

1. Applicants must have on file with the Oregon Tech Office of Admissions an official *Application for Admission* to Oregon Tech, accompanied by a \$50 non-refundable fee and official transcripts of each college or university attended. Admission to

Oregon Tech is independent of admission to the Dental Hygiene Program. All applicants to Oregon Tech are admitted as pre-dental hygiene majors until accepted into the dental hygiene program.

2. Applicants must have successfully completed or be in progress of completing all freshmen pre-dental hygiene courses. Introduction to Dental Hygiene (DH 100 on campus or DHE 100 online) must be taken through Oregon Tech. All other prerequisite (freshman) courses must be completed by the end of spring term.
3. Applicants must have a minimum cumulative 2.75 GPA in previous college work.
4. Applicants must submit a *Dental Hygiene Application for Admission*, related forms, including official transcripts, and application fee to ADEA\_DHCA.S. Detailed information and forms can be found on the Oregon Tech Dental Hygiene Program web page, [www.oit.edu/dentalhygiene](http://www.oit.edu/dentalhygiene). Applicants must also submit an application fee of \$75 to Oregon Tech Dental Hygiene before the application deadline. This application fee can be mailed to Oregon Tech Dental Hygiene, 3201 Campus Dr., Klamath Falls, OR 97601.

### **Program Requirements**

Dental hygiene students admitted to the Dental Hygiene Program (sophomore, junior, senior years) must purchase instruments and other supplies to be used during clinical practice and pay additional fees associated with dental hygiene courses. A background check and drug test are required prior to final admission into the professional program.

### **Graduation Requirements**

All courses listed in the curriculum for the catalog year a student begins a program must be fulfilled. Total credits required for graduation are: Bachelor of Science degree, 190. A minimum cumulative grade point average (GPA) of 2.0 is required for graduation. Students must maintain a grade of "C" or better in all required courses to continue in the program.

## Dental Hygiene, BS

### Curriculum

The following are required courses and recommended terms for students attending on the Klamath Falls campus. Please visit [www.oit.edu/dentallygiene](http://www.oit.edu/dentallygiene) for transfer information from other Oregon colleges and for recommended course sequencing for those attending on the Chemeketa Community College campus.

#### Pre-Dental Hygiene

##### Freshman Year

###### Fall

- BIO 200 - Medical Terminology Credit Hours: 2
- BIO 231 - Human Anatomy and Physiology I Credit Hours: 4
- DH 100 - Introduction to Dental Hygiene Credit Hours: 2
- CHE Elective with Lab Credit Hours: 4+

**Total: 12 Credit Hours**

###### Winter

- BIO 105 - Microbiology Credit Hours: 4
- BIO 232 - Human Anatomy and Physiology II Credit Hours: 4
- SOC 204 - Introduction to Sociology Credit Hours: 3
- WRI 121 - English Composition Credit Hours: 3

**Total: 14 Credit Hours**

###### Spring

- BIO 205 - Nutrition Credit Hours: 3
- BIO 233 - Human Anatomy and Physiology III Credit Hours: 4
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3

**Total: 13 Credit Hours**

#### Professional Courses

##### Sophomore Year

###### Fall

- CHE 360 - Clinical Pharmacology for the Health Professions Credit Hours: 3
- DH 221 - Dental Hygiene Clinical Practice and Seminar I Credit Hours: 4
- DH 225 - Head and Neck Anatomy, Histology and Embryology Credit Hours: 3
- DH 240 - Prevention I Credit Hours: 3
- DH 366 - Dental Anatomy Credit Hours: 2

**Total: 15 Credit Hours**

###### Winter

- DH 222 - Dental Hygiene Clinical Practice and Seminar II Credit Hours: 4
- DH 241 - Prevention II Credit Hours: 3
- DH 244 - General and Oral Pathology Credit Hours: 3
- DH 252 - Oral Radiology I Credit Hours: 3
- DH 275 - Dental Ethics Credit Hours: 2
- SPE 321 - Small Group and Team Communication Credit Hours: 3

**Total: 18 Credit Hours**

###### Spring

- DH 223 - Dental Hygiene Clinical Practice and Seminar III Credit Hours: 3
- DH 242 - Prevention III Credit Hours: 3
- DH 253 - Oral Radiology II Credit Hours: 2
- DH 254 - Introduction to Periodontology Credit Hours: 1
- DH 267 - Emergency Procedures Credit Hours: 3
- DH 380 - Community Dental Health I Credit Hours: 2
- Social Science Elective Credit Hours: 3

**Total: 17 Credit Hours**

##### Junior Year

###### Fall

- BUS 317 - Health Care Management Credit Hours: 3
- DH 321 - Dental Hygiene Clinical Practice and Seminar IV Credit Hours: 4
- DH 340 - Prevention IV Credit Hours: 3
- DH 354 - Periodontology Credit Hours: 3
- DH 381 - Community Dental Health II Credit Hours: 2
- Psychology Elective Credit Hours: 3

**Total: 18 Credit Hours**

###### Winter

- DH 322 - Dental Hygiene Clinical Practice and Seminar V Credit Hours: 3
- DH 341 - Prevention V Credit Hours: 3
- DH 351 - Pain Management I Credit Hours: 3
- DH 382 - Community Dental Health III Credit Hours: 2
- WRI 227 - Technical Report Writing Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 17 Credit Hours**

###### Spring

- DH 323 - Dental Hygiene Clinical Practice and Seminar VI Credit Hours: 5
- DH 344 - Advanced General and Oral Pathology Credit Hours: 3
- DH 352 - Pain Management II Credit Hours: 2
- DH 363 - Dental Materials Credit Hours: 4
- DH 370 - International Externship Credit Hours: 1 (optional)
- DH 383 - Community Dental Health IV Credit Hours: 1

**Total: 15/16 Credit Hours**

##### Senior Year

###### Summer

- AHED 450 - Instructional Methods Credit Hours: 3
- BUS 331 - Personal Finance Credit Hours: 3
- DH 371 - International Externship Credit Hours: 1 (optional)
- DH 421 - Dental Hygiene Clinical Practice and Seminar VII Credit Hours: 4
- DH 461 - Restorative Dentistry I Credit Hours: 2
- MATH 243 - Introductory Statistics Credit Hours: 4<sup>a</sup>

**Total: 16/17 Credit Hours**

**Fall**

- DH 372 - International Externship Credit Hours: 1 (optional)
- DH 422 - Dental Hygiene Clinical Practice and Seminar VIII  
Credit Hours: 5
- DH 462 - Restorative Dentistry II Credit Hours: 2
- DH 475 - EBDM in Healthcare I Credit Hours: 3
- Communication Elective Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 16/17 Credit Hours****Winter**

- DH 423 - Dental Hygiene Clinical Practice and Seminar IX  
Credit Hours: 5
- DH 454 - Dental Practice Management Credit Hours: 3
- DH 463 - Restorative Dentistry III Credit Hours: 2
- DH 476 - EBDM in Healthcare II Credit Hours: 3
- Humanities Elective Credit Hours: 3
- Psychology Elective Credit Hours: 3

**Total: 19 Credit Hours****Total for a B.S. in Dental Hygiene: 190-193 Credit Hours**

**Note:** All transfer students must abide by the Dental Hygiene Transfer Guide posted on the Oregon Tech Dental Hygiene web page

<sup>a</sup> Students must meet the prerequisite for MATH 243

## Dental Hygiene, Degree Completion, BS

This program offers dental hygienists who have earned an associate's degree the opportunity to complete a Bachelor of Science in Dental Hygiene. The degree is offered through Oregon Tech Online.

Dental hygienists who have graduated with an associate's degree from an accredited dental hygiene program may be eligible to apply to the bachelor's degree completion program. Oregon Tech will make every effort to give maximum consideration to the transfer work presented at time of application. Typically, most professional and related science requirements are accepted. Additional coursework may be necessary to meet Oregon Tech general education requirements and a minimum of 45 credit hours must be completed through Oregon Tech to satisfy residency requirements.

### Graduation Requirements:

The following requirements must be met to earn a bachelor's degree in dental hygiene from Oregon Institute of Technology:

- Transfer your dental hygiene professional courses.
- Complete, or transfer, general education courses required for a bachelor's degree.
- Complete the bachelor's degree completion courses.
- Complete 60 credits of upper-division (300-400 level) coursework. (You will be awarded some upper-division credit for your transferred professional courses.)
- Complete at least 45 credits from Oregon Tech.
- Maintain a grade "C" or better in all courses.

### Courses Granted for Licensure

- DH 100 - Introduction to Dental Hygiene Credit Hours: 2
- DH 221 - Dental Hygiene Clinical Practice and Seminar I Credit Hours: 4
- DH 222 - Dental Hygiene Clinical Practice and Seminar II Credit Hours: 4
- DH 223 - Dental Hygiene Clinical Practice and Seminar III Credit Hours: 3
- DH 225 - Head and Neck Anatomy, Histology and Embryology Credit Hours: 3
- DH 240 - Prevention I Credit Hours: 3
- DH 241 - Prevention II Credit Hours: 3
- DH 242 - Prevention III Credit Hours: 3
- DH 244 - General and Oral Pathology Credit Hours: 3
- DH 252 - Oral Radiology I Credit Hours: 3
- DH 253 - Oral Radiology II Credit Hours: 2
- DH 254 - Introduction to Periodontology Credit Hours: 1
- DH 267 - Emergency Procedures Credit Hours: 3
- DH 275 - Dental Ethics Credit Hours: 2
- DH 321 - Dental Hygiene Clinical Practice and Seminar IV Credit Hours: 4
- DH 322 - Dental Hygiene Clinical Practice and Seminar V Credit Hours: 3
- DH 323 - Dental Hygiene Clinical Practice and Seminar VI Credit Hours: 5
- DH 340 - Prevention IV Credit Hours: 3
- DH 341 - Prevention V Credit Hours: 3
- DH 344 - Advanced General and Oral Pathology Credit Hours: 3
- DH 354 - Periodontology Credit Hours: 3
- DH 363 - Dental Materials Credit Hours: 4
- DH 366 - Dental Anatomy Credit Hours: 2
- DH 380 - Community Dental Health I Credit Hours: 2
- DH 381 - Community Dental Health II Credit Hours: 2
- DH 421 - Dental Hygiene Clinical Practice and Seminar VII Credit Hours: 4
- DH 422 - Dental Hygiene Clinical Practice and Seminar VIII Credit Hours: 5
- DH 423 - Dental Hygiene Clinical Practice and Seminar IX Credit Hours: 5

### Completion Courses

<sup>a</sup> Credits may be granted for additional specialty licensure exams

- AHED 450 - Instructional Methods Credit Hours: 3
- BUS 317 - Health Care Management Credit Hours: 3
- BUS 331 - Personal Finance Credit Hours: 3
- DH 351 - Pain Management I Credit Hours: 3 <sup>a</sup>
- DH 352 - Pain Management II Credit Hours: 2 <sup>a</sup>
- DH 401 - Overview of Advanced Dental Hygiene Credit Hours: 3
- DH 453 - Research and Evidence Based Dentistry I Credit Hours: 3

- DH 454 - Dental Practice Management Credit Hours: 3
- DH 455 - Research and Evidence Based Dentistry II Credit Hours: 3
- DH 470 - Community Assessment and Program Planning Credit Hours: 3
- DH 471 - Community Program Implementation & Evaluation Credit Hours: 3
- MATH 243 - Introductory Statistics Credit Hours: 4
- SPE 321 - Small Group and Team Communication Credit Hours: 3
- Communication Elective Credit Hours: 3
- Humanities Elective Credit Hours: 3
- Humanities Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3
- Elective Credit Hours: 3 (approved by advisor)

### **Additional Required General Education Courses**

(Transfer or Oregon Tech)

- BIO 105 - Microbiology Credit Hours: 4
- BIO 200 - Medical Terminology Credit Hours: 2
- BIO 205 - Nutrition Credit Hours: 3
- BIO 231 - Human Anatomy and Physiology I Credit Hours: 4
- BIO 232 - Human Anatomy and Physiology II Credit Hours: 4
- BIO 233 - Human Anatomy and Physiology III Credit Hours: 4
- CHE 101 - Introduction to General Chemistry Credit Hours: 3
- CHE 104 - Introduction to General Chemistry Laboratory Credit Hours: 1
- CHE 360 - Clinical Pharmacology for the Health Professions Credit Hours: 3
- SOC 204 - Introduction to Sociology Credit Hours: 3
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 121 - English Composition Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3
  
- WRI 123 - Research Writing Credit Hours: 3  
or
- WRI 227 - Technical Report Writing Credit Hours: 3
  
- Humanities Elective Credit Hours: 3
- Psychology Elective Credit Hours: 3
- Psychology Elective Credit Hours: 3

## Emergency Medical Services Department

Jamie Kennel, *Department Chair*

Jamie Kennel, *Program Director Paramedic Program*

Todd Ellingson, *Medical Director*

*Assistant Professors:* H. Jarrard, J. Kennel

*Instructors:* K. Darling, C. Hamper, S. Schmidt, A. Wagner

### Degrees Offered

- Associate of Applied Science (AAS) in Paramedic (joint degree through Oregon Tech and OHSU).
- Bachelor of Science (BS) of Emergency Medical Services Management (joint degree through Oregon Tech and OHSU).

### Career Opportunities

The EMS department provides a full spectrum of pre-hospital training programs and degrees, jointly offered by OHSU and Oregon Tech, starting from your very first EMS or general education course all the way through to completing your bachelor's degree, all created with collaboration from local and national industry leaders including:

- Emergency Medical Technician (EMT) Training and Certification
- Paramedic Training (AAS degree & Nationally Accredited)
- Critical Care Paramedic Training
- Community Care Paramedic / Mobile Integrated Health care Training
- EMS Management (Bachelor's degree)

Depending on your career aspirations, graduates find career employment in a variety of settings including ambulance transport agencies, fire and rescue agencies, air-medical transport agencies, medical support for industrial sites, tactical-medical teams, hospitals, and international aid missions, to name just a few.

The EMT and Paramedic program prepares students for entry positions in the pre-hospital medicine profession. Upon successful completion of the program, graduates are eligible to sit for the National Registry examination, which can lead to both national and state certifications.

### Accreditation

While all programs at the university are accredited by the Northwest Commission on Colleges and Universities (NWCCU), where it is available and adds value to our students, our EMS programs offer additional programmatic accreditation. The Paramedic program is nationally accredited by The Commission on Accreditation of Allied Health Education Programs ([www.caahep.org](http://www.caahep.org)) upon the recommendation of the Committee on Accreditation of Educational Programs for the Emergency Medical Services Professions (CoAEMSP).

### Admission Requirements

All courses offered by the EMS department require only general Oregon Tech admission with one exception: the second year of the Paramedic degree. Due to the large number of applications and relatively limited number of student positions, the second year of the paramedic degree is a competitive application process requiring a separate admissions step, further described on the Oregon Tech website ([www.oit.edu/paramedic](http://www.oit.edu/paramedic)).

Whether you're an incoming freshman or preparing to transfer into one of our programs, students have been most successful when they focus and excel in the following three areas:

- Strong academic performance overall with an emphasis on science coursework performance
- Experience in providing pre-hospital care (e.g. volunteer, intern, BLS transports, etc.) ideally with hands-on direct patient care
- Strong customer service experience with the public

All prospective students are encouraged to meet with the EMS department Program Coordinator to review transcripts and develop a customized plan to get started.

## Emergency Medical Services Management, Community Care Track, BS

### Curriculum

The following are required courses and recommended terms for students wishing to meet the AAS and BS degree requirements. All courses listed on the curriculum map in the catalogue year a student begins a program must be fulfilled for graduation eligibility. Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- BIO 200 - Medical Terminology Credit Hours: 2
- BIO 231 - Human Anatomy and Physiology I Credit Hours: 4
- EMS 151 - Emergency Medical Technician (EMT) I Credit Hours: 6
- MATH 111 - College Algebra Credit Hours: 4

**Total: 16 Credit Hours**

##### Winter

- BIO 232 - Human Anatomy and Physiology II Credit Hours: 4
- EMS 152 - Emergency Medical Technician (EMT) II Credit Hours: 6
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 121 - English Composition Credit Hours: 3

**Total: 16 Credit Hours**

##### Spring

- BIO 233 - Human Anatomy and Physiology III Credit Hours: 4
- EMS 115 - Introduction to EMS Credit Hours: 3
- PSY 201 - Psychology Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 16 Credit Hours**

#### Paramedic Professional Courses (Additional Application Required)

#### Sophomore Year

##### Fall

- CHE 210 - Clinical Pharmacology Credit Hours: 3
- EMS 218 - Trauma Emergencies Credit Hours: 3
- EMS 231 - Medical Emergencies I Credit Hours: 4
- EMS 235 - Basic Electrocardiography Credit Hours: 3
- EMS 241 - Paramedic Crisis Resource Management I Credit Hours: 3
- EMS 271 - Paramedic Skills Laboratory I Credit Hours: 3

**Total: 19 Credit Hours**

#### Winter

- EMS 211 - Prehospital Emergency Pharmacology Credit Hours: 3
- EMS 232 - Medical Emergencies II Credit Hours: 3
- EMS 236 - Advanced Electrocardiography Credit Hours: 3
- EMS 242 - Paramedic Crises Resource Management II Credit Hours: 1
- EMS 272 - Paramedic Skills Laboratory II Credit Hours: 2

- EMS 283 - Clinical Practicum I Credit Hours: 6
- or

- EMS 284 - Clinical Practicum II Credit Hours: 6

**Total: 18 Credit Hours**

#### Spring

- EMS 233 - Medical Emergencies III Credit Hours: 3
- EMS 273 - Paramedic Skills Laboratory III Credit Hours: 1
- EMS 243 - Paramedic Crises Resource Management III Credit Hours: 1

- EMS 283 - Clinical Practicum I Credit Hours: 6
- or

- EMS 284 - Clinical Practicum II Credit Hours: 6

- EMS 291 - Paramedic Field Externship Practicum I Credit Hours: 4

**Total: 15 Credit Hours**

#### Summer

- EMS 292 - Paramedic Field Externship Practicum II Credit Hours: 12

**Total: 12 Credit Hours**

#### Junior Year

##### Fall

- BUS 317 - Health Care Management Credit Hours: 3
- BUS 337 - Principles of Health Care Marketing Credit Hours: 3
- EMS 321 - Community Paramedic I Credit Hours: 4
- EMS 341 - Community Paramedic Clinical I Credit Hours: 2

**Total: 12 Credit Hours**

##### Winter

- BUS 313 - Health Care Systems and Policy Credit Hours: 3
- ECO 202 - Principles of Macroeconomics Credit Hours: 3
- EMS 322 - Community Paramedic II Credit Hours: 4
- EMS 342 - Community Paramedic Clinical II Credit Hours: 2

**Total: 12 Credit Hours**

**Spring**

- ECO 201 - Principles of Microeconomics Credit Hours:3
- WRI 227 - Technical Report Writing Credit Hours:3
- PSY 347 - Organizational Behavior Credit Hours:3
- SPE 321 - Small Group and Team Communication Credit Hours: 3
- Humanities - 300 or 400 Elective Credit Hours:3

**Total: 15 Credit Hours****Senior Year****Fall**

- BUS 349 - Human Resource Management I Credit Hours:3
- MATH 361 - Statistical Methods I Credit Hours:4
- PHIL 331 - Ethics in the Professions Credit Hours:3
- WRI 327 - Advanced Technical Writing Credit Hours:3

**Total: 13 Credit Hours****Winter**

- BUS 316 - Total Quality in Health Care Credit Hours:3
- EMS 496 - Capstone Project I Credit Hours:3
- EMS 456 - Research Methods in EMS Credit Hours:2
- MATH 362 - Statistical Methods II Credit Hours:4
- Math, Science, or Social Science Elective (upper division) Credit Hours:3

**Total: 15 Credit Hours****Spring**

- BUS 467 - Service Management Credit Hours:3
- EMS 497 - Capstone Project II Credit Hours:3
- EMS 444 - EMS Systems Leadership and Management Credit Hours:3
- Math, Science, or Social Science Elective (upper division) Credit Hours:4

**Total: 13 Credit Hours****Total for a B.S. in Emergency Medical Services Management Community Care Track:  
192 Credit Hours**

## Emergency Medical Services Management, Critical Care Track, BS

### Curriculum

The following are required courses and recommended terms for students wishing to meet the AAS and BS degree requirements. All courses listed on the curriculum map in the catalogue year a student begins a program must be fulfilled for graduation eligibility. Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- BIO 200 - Medical Terminology Credit Hours: 2
- BIO 231 - Human Anatomy and Physiology I Credit Hours: 4
- EMS 151 - Emergency Medical Technician (EMT) I Credit Hours: 6
- MATH 111 - College Algebra Credit Hours: 4

**Total: 16 Credit Hours**

##### Winter

- BIO 232 - Human Anatomy and Physiology II Credit Hours: 4
- EMS 152 - Emergency Medical Technician (EMT) II Credit Hours: 6
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 121 - English Composition Credit Hours: 3

**Total: 16 Credit Hours**

##### Spring

- BIO 233 - Human Anatomy and Physiology III Credit Hours: 4
- EMS 115 - Introduction to EMS Credit Hours: 3
- PSY 201 - Psychology Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 16 Credit Hours**

#### Paramedic Professional Courses (Additional Application Required)

#### Sophomore Year

##### Fall

- CHE 210 - Clinical Pharmacology Credit Hours: 3
- EMS 218 - Trauma Emergencies Credit Hours: 3
- EMS 231 - Medical Emergencies I Credit Hours: 4
- EMS 235 - Basic Electrocardiography Credit Hours: 3
- EMS 241 - Paramedic Crisis Resource Management I Credit Hours: 3
- EMS 271 - Paramedic Skills Laboratory I Credit Hours: 3

**Total: 19 Credit Hours**

#### Winter

- EMS 211 - Prehospital Emergency Pharmacology Credit Hours: 3
- EMS 232 - Medical Emergencies II Credit Hours: 3
- EMS 236 - Advanced Electrocardiography Credit Hours: 3
- EMS 242 - Paramedic Crises Resource Management II Credit Hours: 1
- EMS 272 - Paramedic Skills Laboratory II Credit Hours: 2

- EMS 283 - Clinical Practicum I Credit Hours: 6
- or

- EMS 284 - Clinical Practicum II Credit Hours: 6

**Total: 18 Credit Hours**

#### Spring

- EMS 233 - Medical Emergencies III Credit Hours: 3
- EMS 273 - Paramedic Skills Laboratory III Credit Hours: 1
- EMS 243 - Paramedic Crises Resource Management III Credit Hours: 1

- EMS 283 - Clinical Practicum I Credit Hours: 6
- or

- EMS 284 - Clinical Practicum II Credit Hours: 6

- EMS 291 - Paramedic Field Externship Practicum I Credit Hours: 4

**Total: 15 Credit Hours**

#### Summer

- EMS 292 - Paramedic Field Externship Practicum II Credit Hours: 12

**Total: 12 Credit Hours**

#### Junior Year

##### Fall

- BUS 317 - Health Care Management Credit Hours: 3
- BUS 337 - Principles of Health Care Marketing Credit Hours: 3
- ECO 201 - Principles of Microeconomics Credit Hours: 3
- WRI 227 - Technical Report Writing Credit Hours: 3

**Total: 12 Credit Hours**

##### Winter

- BUS 313 - Health Care Systems and Policy Credit Hours: 3
- ECO 202 - Principles of Macroeconomics Credit Hours: 3
- EMS 331 - Critical Care Transport I Credit Hours: 4
- EMS 381 - Critical Care Clinical Practicum I Credit Hours: 1

**Total: 11 Credit Hours**

**Spring**

- EMS 332 - Critical Care Transport II Credit Hours: 3
- EMS 382 - Clinical Care Clinical Practicum II Credit Hours: 3
- HUM - 300 or 400 Elective Credit Hours: 3
- PSY 347 - Organizational Behavior Credit Hours: 3
- SPE 321 - Small Group and Team Communication Credit Hours: 3

**Total: 15 Credit Hours****Senior Year****Fall**

- BUS 349 - Human Resource Management I Credit Hours: 3
- MATH 361 - Statistical Methods I Credit Hours: 4
- PHIL 331 - Ethics in the Professions Credit Hours: 3
- WRI 327 - Advanced Technical Writing Credit Hours: 3

**Total: 13 Credit Hours****Winter**

- BUS 316 - Total Quality in Health Care Credit Hours: 3
- EMS 496 - Capstone Project I Credit Hours: 3
- EMS 456 - Research Methods in EMS Credit Hours: 2
- MATH 362 - Statistical Methods II Credit Hours: 4
- Math, Science, or Social Science Elective (upper division) Credit Hours: 3

**Total: 15 Credit Hours****Spring**

- BUS 467 - Service Management Credit Hours: 3
- EMS 497 - Capstone Project II Credit Hours: 3
- EMS 444 - EMS Systems Leadership and Management Credit Hours: 3
- Math, Science, or Social Science Elective (upper division) Credit Hours: 3

**Total: 12 Credit Hours****Total for a B.S. in Emergency Medical Services Management Critical Care Track: 190 Credit Hours**

## Emergency Medical Technology Paramedic, AAS

### Curriculum

The following are required courses and recommended terms for students wishing to meet the AAS and BS degree requirements. All courses listed on the curriculum map in the catalogue year a student begins a program must be fulfilled for graduation eligibility. Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- BIO 231 - Human Anatomy and Physiology I Credit Hours: 4
- EMS 151 - Emergency Medical Technician (EMT) I Credit Hours: 6
- MATH 100 - Intermediate Algebra Credit Hours: 4
- WRI 121 - English Composition Credit Hours: 3

**Total: 17 Credit Hours**

##### Winter

- BIO 232 - Human Anatomy and Physiology II Credit Hours: 4
- EMS 152 - Emergency Medical Technician (EMT) II Credit Hours: 6
- SPE 111 - Public Speaking Credit Hours: 3

**Total: 13 Credit Hours**

##### Spring

- BIO 200 - Medical Terminology Credit Hours: 2
- BIO 233 - Human Anatomy and Physiology III Credit Hours: 4
- EMS 115 - Introduction to EMS Credit Hours: 3
- PSY 201 - Psychology Credit Hours: 3

**Total: 12 Credit Hours**

#### Paramedic Professional Courses (Additional Application Required)

#### Sophomore Year

##### Fall

- CHE 210 - Clinical Pharmacology Credit Hours: 3
- EMS 218 - Trauma Emergencies Credit Hours: 3
- EMS 231 - Medical Emergencies I Credit Hours: 4
- EMS 235 - Basic Electrocardiography Credit Hours: 3
- EMS 241 - Paramedic Crisis Resource Management I Credit Hours: 3
- EMS 271 - Paramedic Skills Laboratory I Credit Hours: 3

**Total: 19 Credit Hours**

**Total Credit Hours for A.A.S. Degree in EMT – Paramedic:**

**Technical Total: 64 Credit Hours**

**Degree Total: 106 Credit Hours**

#### Winter

- EMS 211 - Prehospital Emergency Pharmacology Credit Hours: 3
- EMS 232 - Medical Emergencies II Credit Hours: 3
- EMS 236 - Advanced Electrocardiography Credit Hours: 3
- EMS 242 - Paramedic Crises Resource Management II Credit Hours: 1
- EMS 272 - Paramedic Skills Laboratory II Credit Hours: 2
- EMS 283 - Clinical Practicum I Credit Hours: 6

**Total: 18 Credit Hours**

#### Spring

- EMS 233 - Medical Emergencies III Credit Hours: 3
- EMS 243 - Paramedic Crises Resource Management III Credit Hours: 1
- EMS 273 - Paramedic Skills Laboratory III Credit Hours: 1
- EMS 284 - Clinical Practicum II Credit Hours: 6
- EMS 291 - Paramedic Field Externship Practicum I Credit Hours: 4

**Total: 15 Credit Hours**

#### Summer

- EMS 292 - Paramedic Field Externship Practicum II Credit Hours: 12

**Total: 12 Credit Hours**

## Environmental Sciences Program

Jherime Kellermann, *Program Director*

John Ritter, *GIS Emphasis Coordinator*

### Degree Offered

- Bachelor of Science in Environmental Sciences

### Dual Major Options

- Bachelor of Science in Civil Engineering and Environmental Sciences  
*Advising Coordinator:* David Thaemert
- Bachelor of Science in Renewable Energy Engineering and Environmental Sciences  
*Advising Coordinator:* James Zipay

The Bachelor of Science degree in Environmental Sciences emphasizes the application of scientific reasoning and methodology to problems concerning: (1) environmental processes and patterns, and/or (2) abiotic-biotic interactions in ecosystems. Methodological training focuses on techniques – and instrumentation – in conjunction with GIS and geospatial analysis.

The program rests on three cores: a core of six lower-division courses in introductory environmental science, a basic sciences core of nine courses (one year each of biology, chemistry and physics), and a mathematics core of five courses, including differential and integral calculus and statistics. The program is by definition interdisciplinary and utilizes the practical knowledge and skills of faculty from a broad range of backgrounds and expertise.

Students may choose to concentrate in one of four technical emphasis areas; Watershed Science, Sustainable Technologies, Geographic Information Systems (GIS) and Biological Resources. Under the direction of an advisor, students may fore go any one area and instead blend offerings from all four areas to create a more individually focused curriculum. The emphasis in Watershed Science focuses on the structure, processes, patterns, ecology, management, and restoration of terrestrial, riparian and aquatic ecosystems. Special attention is granted to the flows of energy and materials through these ecosystems, as well as human impacts on ecosystem functions. The emphasis in Sustainable Technologies focuses on the characterization of environmental processes and patterns for application to the management, planning, and development of renewable resources, with special attention to water and renewable energy. The emphasis in GIS builds on the GIS core curriculum to advance student knowledge and skills in the application of geospatial concepts and technologies to problems in environmental sciences and natural resource management. **The emphasis in Biological Resources...** The core curriculum and technical emphasis areas are supported by courses taught by faculty in the Natural Sciences Department and other departments and programs on campus, including Geomatics, Civil Engineering, Renewable Energy Engineering, Mathematics, Humanities and Social Sciences, and Communication Studies.

### Objectives

The objectives of the Environmental Sciences Program are:

1. To provide students with knowledge and training in the practical application of scientific reasoning and methodology to problems in environmental science and natural resource management.
2. To present complex environmental problems from a systems perspective that demands rigorous data acquisition and analytical techniques.
3. To provide exercises that support critical thinking and problem-solving skills, encourage student collaboration, and employ multiple methodological approaches.
4. To prepare students for professional careers and/or graduate studies by nurturing meaningful undergraduate research projects as a fundamental curricular element.

### Student Preparation

The Environmental Sciences curriculum is a demanding instructional program requiring the development and use of both qualitative and quantitative analytical perspectives and skills. Prospective students for this program are advised to complete two to three years of high school mathematics and science (biology, chemistry, and physics). Students should also be familiar with computer applications. Students transferring from other science or technical programs, including environmental programs at other institutions, are requested to contact the program director for information on program requirements.

### Career Opportunities

Graduates can expect to find employment in, among other places, consulting firms, government agencies (regulatory and research), non-governmental organizations (NGOs), and education and research institutions. Students are also well prepared to enter graduate school. Environmental Sciences students at Oregon Tech have been actively recruited by the U.S. Geological Survey, U.S. Bureau of Reclamation, U.S. Bureau of Land Management, U.S. Fish and Wildlife Service, Oregon State Police Wildlife Enforcement, Klamath County Health Department, Klamath Irrigation District, Klamath County Soil and Water Conservation District, the Nature Conservancy, and JELD-WEN Windows and Doors. Vocational placement of recent graduates has been excellent and many Environmental Sciences majors find part-time or summer employment directly related to their studies and career interests.

## Environmental Sciences, BS

### Degree Requirements

Students must meet the general education requirements, as stated elsewhere in this catalog, and complete the courses listed in the curriculum to obtain a Bachelor of Science in Environmental Sciences. A total of 183 credits are required for the degree. Students are encouraged to develop a technical emphasis area based on their own interests.

Students are required to pass each science course with a grade of "C" or better. This requirement is based on the quantitative skills needed in later courses as well as the degree of integration in subject material that is present throughout the program.

### The Environmental Sciences Curriculum

The Environmental Sciences curriculum integrates "hands-on" skills and knowledge. Field or laboratory work are important components of many ES courses. Several freshman and sophomore courses allow a student to develop skills in computer applications, Geographic Information Systems (GIS), Global Positioning Systems (GPS), simulation modeling, and riparian assessment methods.

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- BIO 211 - Principles of Biology Credit Hours:4
- ENV 111 - Introduction to Environmental Sciences Credit Hours: 4
- GEOG 105 - Physical Geography Credit Hours:4
- GIS 103 - The Digital Earth Credit Hours:3
- WRI 121 - English Composition Credit Hours:3

**Total: 18 Credit Hours**

##### Winter

- BIO 212 - Principles of Biology Credit Hours:4
- GIS 134 - Geographic Information Systems Credit Hours:3
- MATH 111 - College Algebra Credit Hours:4
- WRI 122 - Argumentative Writing Credit Hours:3

**Total: 14 Credit Hours**

##### Spring

- BIO 213 - Principles of Biology Credit Hours:4
- GIS 205 - GIS Data Integration Credit Hours:2
- MATH 112 - Trigonometry Credit Hours:4
- Technical Emphasis Elective Credit Hours: 4<sup>a</sup>

**Total: 14 Credit Hours**

#### Sophomore Year

##### Fall

- CHE 221 - General Chemistry I Credit Hours:5
- ENV 214 - Watershed Science & Technology Credit Hours:3
- MATH 251 - Differential Calculus Credit Hours:4
- Technical Emphasis Elective Credit Hours: 4<sup>a</sup>

**Total: 16 Credit Hours**

##### Winter

- CHE 222 - General Chemistry II Credit Hours:5
- ENV 224 - Scientific Reasoning and Methodology Credit Hours:3
- ENV 275 - Careers in Environmental Sciences Credit Hours:2
- MATH 252 - Integral Calculus Credit Hours:4

**Total: 14 Credit Hours**

##### Spring

- CHE 223 - General Chemistry III Credit Hours:5
- ENV 226 - Environmental Data Analysis Credit Hours:3
- SPE 111 - Public Speaking Credit Hours:3
- Technical Emphasis Elective Credit Hours: 4<sup>a</sup>

**Total: 15 Credit Hours**

#### Junior Year

##### Fall

- CHE 331 - Organic Chemistry I Credit Hours:4
- PHY 221 - General Physics with Calculus Credit Hours:4
- WRI 227 - Technical Report Writing Credit Hours:3
- Social Science Elective Credit Hours:3

**Total: 14 Credit Hours**

##### Winter

- CHE 315 - Environmental Chemistry and Toxicology Credit Hours:3
- ECO 201 - Principles of Microeconomics Credit Hours:3
- ENV 314 - Environmental Management and Restoration Credit Hours:3
- MATH 361 - Statistical Methods I Credit Hours:4
- PHY 222 - General Physics with Calculus Credit Hours:4

**Total: 17 Credit Hours**

##### Spring

- Ecology Requirement Credit Hours: 4<sup>b</sup>
- CHE 465 - Fate and Transport of Pollutants Credit Hours:4
- ENV 434 - Advanced Data Analysis Credit Hours:4
- or
- MATH 362 - Statistical Methods II Credit Hours:4
- PHY 223 - General Physics with Calculus Credit Hours:4

**Total: 16 Credit Hours**

**Senior Year****Fall**

- SPE 321 - Small Group and Team Communication Credit Hours: 3
- Humanities Elective Credit Hours: 3
- Technical Emphasis Elective Credit Hours: 4<sup>a</sup>
- Writing Elective Credit Hours: 3<sup>c</sup>

**Total: 13 Credit Hours****Winter**

- ENV 475 - Professionalism & Job Readiness Credit Hours: 3
- Humanities Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3
- Technical Emphasis Elective Credit Hours: 4
- Technical Emphasis Elective Credit Hours: 3

**Total: 16 Credit Hours****Spring**

- ENV 484 - Sustainable Human Ecology Credit Hours: 4
- ENV 485 - Ecoregional Studies Credit Hours: 3
- Humanities Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3
- Technical Emphasis Elective Credit Hours: 3<sup>a</sup>

**Total: 16 Credit Hours****Total for a B.S. in Environmental Science: 183 Credit Hours**<sup>a</sup> A total of 27 hours of technical emphasis electives are required for graduation<sup>b</sup> Choice of BIO 337, BIO 367, or BIO 377<sup>c</sup> Choice of WRI 327, WRI 328, WRI 350, or WRI 410**Technical Electives**

- BIO 107, BIO 207, BIO 307, BIO 407<sup>d</sup>
- BIO 313 - Botany Credit Hours: 4
- BIO 366 - Zoology Credit Hours: 4
- BIO 367 - Plant Ecology Credit Hours: 4
- BIO 377 - Wildlife Ecology Credit Hours: 4
- BIO 386 - Omithology Credit Hours: 4
- BIO 446 - Conservation Biology Credit Hours: 3
- CHE 107, CHE 207, CHE 307, CHE 407<sup>d</sup>
- CHE 341 - Instrumental Methods/ Data Acquisition I Credit Hours: 4
- CHE 342 - Instrumental Methods/ Data Acquisition II Credit Hours: 4
- ENV 107, ENV 207, ENV 307, ENV 407<sup>d</sup>
- ENV 265 - Field Methods in Environmental Sciences Credit Hours: 3
- ENV 336 - Environmental Hydrology Credit Hours: 4
- ENV 365 - Advanced Field Methods in Environmental Sciences Credit Hours: 3
- ENV 465 - Ecological Restoration & Monitoring Credit Hours: 4
- ENV 469 - Treatment Wetlands Credit Hours: 3
- ENV 495 - Research in Environmental Sciences Credit Hours: 4
- GEOG 107, GEOG 207, GEOG 307, GEOG 407<sup>d</sup>
- GEOG 305 - Geomorphology Credit Hours: 4
- GEOG 315 - Climatology & Atmospheric Science Credit Hours: 4
- GEOG 335 - Soils Credit Hours: 4
- GEOL 107, GEOL 207, GEOL 307, GEOL 407<sup>d</sup>
- GIS 306 - Geospatial Raster Analysis Credit Hours: 4
- GIS 316 - Geospatial Vector Analysis I Credit Hours: 4
- GIS 332 - Customizing the GIS Environment I Credit Hours: 4
- GIS 426 - Geospatial Vector Analysis II Credit Hours: 4
- GIS 432 - Customizing the GIS Environment II Credit Hours: 4
- GIS 446 - GIS Database Development Credit Hours: 4

- GIS 456 - GIS Web Services and Management Credit Hours: 3
- GME 161 - Plane Surveying I Credit Hours: 4
- GME 425 - Remote Sensing Credit Hours: 4

<sup>d</sup>May be repeated for credit

## Humanities and Social Sciences Department

Mark Neupert, *Department Chair*

Alishia Huntoon, *Program Director, Extern Coordinator and Curriculum Coordinator, Applied Psychology*

Maria Lynn Kessler, *Program Director Applied Psychology – Portland-Metro, Program Director Applied Behavior Analysis*

*Professors:* M. Clark, M. Kessler, M. Neupert

*Associate Professors:* K. Adams, A. Huntoon, R. Madden

*Assistant Professors:* J. Borgen, B. Bunting, K. Chapman, K. Konkel, S. Nathenson, Y. Rowher

*Instructor:* S. Machado

### Degrees Offered

- Bachelor of Science in:
  - Applied Psychology
  - Population Health Management
- Master of Science
  - Marriage and Family Therapy

### Minors Offered

- Arts, Literature, and Philosophy (ALPs)
- Medical Sociology
- Psychology

### Graduate Certificates Offered

- Applied Behavior Analysis (ABA)

### Module Offered

- Oregon Transfer (OTM)

The Humanities and Social Sciences Department offers a wide variety of classes that meet the general education requirements for all students. In addition, these classes meet the lower-division requirements for college transfer students in many pre-professional programs.

### Department Goals and Objectives

1. To provide coursework in the humanities and social sciences in order to prepare students for employment in a rapidly changing global market.
2. To provide course offerings in multiculturalism and globalization.
3. To assist students in developing critical thinking and problem-solving abilities and to develop scientific knowledge and inquiry skills.
4. To assist students in developing ethical and cultural awareness.
5. To prepare students to be responsible citizens and lifelong learners.
6. To assist students in developing an aesthetic appreciation of the arts.

### Arts, Literature, and Philosophy (ALPs) Minor

The ALPs minor may be completed by students from any major and is especially recommended to students who want an opportunity to take a secondary focus in the Humanities during their time at Oregon Tech. This secondary focus will give them an opportunity to further explore their passions in the fields of Arts, Literature, and Philosophy while receiving official recognition of their newly-acquired expertise. The minor will give students the ability to take more Humanities classes that are relevant to their major program and their future career goals while instilling in them the knowledge and values associated with a traditional liberal arts education.

The minor requires 18 credit hours, including one of the required courses listed below (3 credits). The remaining courses must be chosen from the following prefixes: ART, HUM, LIT, PHIL. At least 12 of these 15 credit hours must be upper division courses. Transfer students must take at least 9 hours of their minor credits at Oregon Tech to qualify.

### Requirements of the Minor

#### Required Course

(3 credits, one from this set is required, but others can be counted toward electives, below):

- HUM 105 - Texts, Images, Games Credit Hours: 3
- HUM 125 - Introduction to Technology, Society and Values Credit Hours: 3
- HUM 147 - Western Culture in the Classical Age Credit Hours: 3 (f/k/a Introduction to Humanities I)

- HUM 148 - Western Culture in the Medieval Age Credit Hours: 3 (f/k/a Introduction to Humanities II)
- HUM 149 - Western Culture in the Modern Age Credit Hours: 3 (f/k/a Introduction to Humanities III)
- LIT 253 - 19th Century American Literature Credit Hours: 3 (f/k/a American Literature I)
- LIT 254 - 20th Century American Literature Credit Hours: 3 (f/k/a American Literature II)
- LIT 255 - Contemporary American Literature Credit Hours: 3 (f/k/a American Literature III)
- PHIL 105 - Introduction to Ethics Credit Hours: 3
- PHIL 205 - Introduction to Logic Credit Hours: 3

### Electives

(15 credits, at least 12 upper division):

- ART 205 - Introduction to Watercolors Credit Hours: 3
- ART 210 - Beginning Sculpture Credit Hours: 3
- ART 220 - Basic Drawing Credit Hours: 3
- ART 226 - Digital Photography Credit Hours: 3
- ART 280 - Introductory Painting Credit Hours: 3
- ART 282 - Introduction to Acrylic Painting Credit Hours: 3
- HUM 105 - Texts, Images, Games Credit Hours: 3
- HUM 125 - Introduction to Technology, Society and Values Credit Hours: 3
- HUM 147 - Western Culture in the Classical Age Credit Hours: 3 (f/k/a Introduction to Humanities I)
- HUM 148 - Western Culture in the Medieval Age Credit Hours: 3 (f/k/a Introduction to Humanities II)
- HUM 149 - Western Culture in the Modern Age Credit Hours: 3 (f/k/a Introduction to Humanities III)
- HUM 235 - Introduction to Film Credit Hours: 4
- HUM 345 - Digital Culture and Society Credit Hours: 3
- HUM 335 - Video Game Studies Credit Hours: 3
- LIT 104 - Introduction to Literature Credit Hours: 3
- LIT 105 - Introduction to Literature Credit Hours: 3
- LIT 106 - Introduction to Literature Credit Hours: 3
- LIT 225 - Contemporary Theater: Ashland Plays Credit Hours: 3
- LIT 235 - American Multicultural Literature Credit Hours: 3
- LIT 253 - 19th Century American Literature Credit Hours: 3 (f/k/a American Literature I)
- LIT 254 - 20th Century American Literature Credit Hours: 3 (f/k/a American Literature II)
- LIT 255 - Contemporary American Literature Credit Hours: 3 (f/k/a American Literature III)
- LIT 266 - Native American Literature and Film Credit Hours: 3
- LIT 305 - Nature Writing and the Environment Credit Hours: 3
- LIT 315 - Science Fiction Literature and Film Credit Hours: 3
- LIT 325 - The Metropolis Credit Hours: 3
- LIT 335 - Nonfiction Travel Writing Credit Hours: 3
- LIT 345 - Post-Apocalyptic Literature and Film Credit Hours: 3
- LIT 367 - Art and Trash in Contemporary Fiction Credit Hours: 3
- LIT 373 - British Culture and Literature: Romanticism to the Present Credit Hours: 3
- LIT 381 - Contemporary World Literature Credit Hours: 3
- LIT 456 - Topics in Film Credit Hours: 3
- PHIL 105 - Introduction to Ethics Credit Hours: 3
- PHIL 205 - Introduction to Logic Credit Hours: 3
- PHIL 215 - Ethical Theory Credit Hours: 3
- PHIL 305 - Medical Ethics Credit Hours: 3
- PHIL 315 - The Ethics of Emerging Technology Credit Hours: 3
- PHIL 325 - Environmental Ethics Credit Hours: 3
- PHIL 331 - Ethics in the Professions Credit Hours: 3
- PHIL 335 - Philosophy of Science Credit Hours: 3
- PHIL 342 - Business Ethics Credit Hours: 3
- PHIL 405 - Advanced Logic Credit Hours: 3

## Medical Sociology Minor

The Department of Humanities and Social Sciences offers a Medical Sociology Minor as a supplement to the Oregon Tech technical and applied degrees related to health, health care, management and social science. The minor offers courses covering the central topics of medical sociology, including the social factors in health and illness, the patient experience of illness, the role of health care professionals, and the interaction between health and society.

The Medical Sociology Minor is designed with the current employer demands and changes in health care organization in mind. Many employers within the health care field seek employees who are culturally competent, prepared to work with diverse populations, and are familiar with social determinants of health.

A minimum of 20 or 21 credits is required to complete the minor. Enrollment in the minor is through the Humanities and Social Sciences Department; contact the department chair or your advisor for more information.

### Required Courses

- SOC 204 - Introduction to Sociology Credit Hours: 3<sup>a</sup>
- SOC 225 - Medical Sociology Credit Hours: 3
- SOC 235 - Introduction to Sustainability Credit Hours: 3
- SOC 335 - Health Inequality and Cultural Competency Credit Hours: 3

### Choose three courses from the following:

Two of the three courses must be 300 or 400 level.

- BIO 200 - Medical Terminology Credit Hours: 2
- BUS 316 - Total Quality in Health Care Credit Hours: 3
- COM 225 - Interpersonal Communication Credit Hours: 3
- COM 345 - Organizational Communication I Credit Hours: 3
- COM 346 - Health Communication Credit Hours: 3
- HIST 275 - Introduction to the History of Medicine Credit Hours: 3
- PHIL 305 - Medical Ethics Credit Hours: 3
- PSY 202 - Psychology Credit Hours: 3
- PSY 330 - Social Psychology I Credit Hours: 3
- PSY 336 - Health Psychology I Credit Hours: 3
- PSY 371 - Human Sexuality I Credit Hours: 3
- PSY 372 - Human Sexuality II Credit Hours: 3
- SOC 305 - Rural Health Credit Hours: 3
- STAT 414 - Statistical Methods in Epidemiology Credit Hours: 4
- SOC 307 - Seminar Credit Hours: (Hours to be arranged each term.) will be considered as electives pending program director approval.
- SOC 407 - Seminar Credit Hours: (Hours to be arranged each term.) will be considered as electives pending program director approval.
- or
- PSY 307 - Seminar Credit Hours: (Hours to be arranged each term.) will be considered as electives pending program director approval.
- PSY 407 - Seminar Credit Hours: (Hours to be arranged each term.) will be considered as electives pending program director approval.

<sup>a</sup> Students are required to take SOC 204 before taking SOC 225

## Psychology Minor

The psychology minor is open to all majors and is especially recommended for students majoring in allied health and medical sciences, management, and communication studies. The minor offers a variety of courses in psychology that can enhance knowledge. A minimum of 24 credits is required to complete the minor. Students should meet with a psychology advisor when choosing electives to fulfill the minor requirements. Enrollment in the minor is through the Humanities and Social Sciences Department; contact the department chair or your advisor for more information.

### Requirements of the Minor

1. A minimum of 24 credits is required to earn the minor.
2. A minimum of 12 credits must be selected from upper-division coursework. Students must pay strict attention to prerequisite requirements.

3. Courses Required lower division courses (9 credits):
  - a. PSY 201 - Psychology
  - b. PSY 202 - Psychology
  - c. PSY 203 - PsychologyAdditional Courses:
  - i. 12 credits of upper division psychology courses
  - ii. 3 credits of lower or upper division courses
4. For all courses counted toward the Minor in Psychology, a letter grade of "C" or better is required to be awarded the minor.
5. At least 12 credits of courses in this minor must be completed at Oregon Tech.

**Note:** Not all courses are offered every term or every year.

# Marriage and Family Therapy

Dr. Kathleen Adams, *Program Director*

## Degree Offered

- Master of Science in Marriage and Family Therapy (MS MFT)

A comprehensive 90 credit, three year program, the MS MFT is offered on Oregon Tech's Klamath Falls campus with a course schedule designed for working adults: evening, weekend and hybrid courses.

## Program Mission Statement

Oregon Tech's Master of Science in Marriage and Family Therapy program prepares graduates to become skilled Marriage and Family Therapists with multicultural competence, expertise in rural mental health care, medical family therapy and technology in mental health care.

In strong collaboration with local child and family service organizations, health care and mental health care providers, the MS MFT program supports and strengthens mental health care and child and family services in the under-served rural areas that are southern Oregon and northern California.

## Program Objectives

### Strong Curriculum

Oregon Tech's MS MFT program delivers a strong, comprehensive curriculum that exceeds curriculum requirements of the Oregon State Board of Licensed Counselors and Therapists, and the Commission on Accreditation of Marriage and Family Therapy Education (COAMFTE) programs. The MS MFT program prepares students to become leaders in the field, with particular focus on mental health care and child and family services in rural areas, medical family therapy, and the effective and ethical integration of technology in rural health care.

### Community Service

Oregon Tech's MS MFT program supports and strengthens rural mental health care and child and family services, in southern Oregon and northern California.

### Continuing Education

Oregon Tech's MS MFT program provides contemporary, immediately applicable continuing education seminars and conferences to educate and instruct the general public, program staff in public and private service organizations, and students and professionals. The MS MFT program also assists other organizations in conducting similar activities.

## Oregon Tech's MS MFT is Unique

### Community Involvement

Strong community collaboration allows students to work in area child and family service agencies, part-time, from the beginning of their studies. Additionally, a limited number of Graduate Assistantship are awarded for program support or research work in community agencies.

### Medical Family Therapy

MS MFT students develop the knowledge and skills required to become indispensable leaders in the rapidly developing multidisciplinary field of Medical Family Therapy.

### Career Success

Committed to helping students excel in their careers, faculty in Oregon Tech's MS MFT program mentor students beyond graduation, through completion of post grad clinical hours and licensing exams.

### Mental Health Care in Under-served and Rural Areas

Mental health care needs in rural areas, like southern Oregon, provide unique challenges that require unique approaches. Oregon Tech's MS MFT students develop the expertise and skills required to excel as rural mental health care providers.

### Technology

MS MFT students become experts in the ethical and practical use of technology in health care.

### Exceeding Clinical Licensing Requirements

The Oregon Tech MS MF program has a comprehensive curriculum designed to meet, and exceed, the curriculum requirements of:

- Oregon Licensing Boards:
  - Licensed Marriage and Family Therapist
  - Licensed Professional Counselor

- Certified Alcohol and Drug Counselors III (CADCIII)
- California MFT Licensing Board
- Commission on Accreditation of Marriage and Family Therapy Education (COAMFTE).

## Career Opportunities

The U.S. Labor Department projects that the demand for Marriage and Family Therapists (MFT's) will increase, with employment in the profession expected to rise 14 percent between 2008 and 2018.

MFT's are trained in both psychotherapy and in family systems, which allows them to focus on understanding client symptoms in the context of the relational interactions that influence behavior. Family-based therapy is a powerful model for change. Research has shown that family-based interventions such as those utilized by MFTs are as effective as—and in many cases more effective than—alternative therapies, often at a lower cost. MFTs apply a holistic perspective to health care; they are concerned with the overall, long-term well-being of individuals and their families. Whoever the client, MFTs view problems from a relationship perspective.

## Admission

MFTs come from a wide variety of backgrounds including social studies, psychology, religious studies, the humanities, nursing, pastoral counseling, and education. The field is founded in a multidisciplinary studies, the rich traditions of the humanities and social sciences, and in the practical approaches of psychology.

The application and selection process identifies candidates with strong academic skills, maturity, experience, and clinical and leadership potential. Successful applicants submit a personal essay, academic transcripts and recommendations from professionals familiar with applicant maturity and academic and clinical potential. Selected applicants participate in an interview with the Admissions Committee.

## Academic Coursework Prerequisites

Qualified applicants must have successfully completed the following undergraduate courses with a grade of B or better:

- Intro Psychology or Intro Social Psychology
- Human Sexuality
- Theories of Personality or Theories of Counseling
- Human Development or Lifespan Development

## Academic Deficiencies and Conditional Acceptance

Applicants who have not successfully completed the academic coursework prerequisites may be accepted on the condition that the prerequisite coursework is successfully completed with a grade of B or better before starting MS MFT coursework. Oregon Tech offers the prerequisite courses throughout the year, including summer sessions.

## Oregon Transfer Module (OTM)

The Oregon Transfer Module (OTM) provides a one-year curriculum for students who plan to transfer to a State of Oregon community college or university. The module allows students to complete one year of general education foundation course work that is academically sound and will meet the admission standards of the receiving school. Students should work closely with an academic advisor to ensure selection of appropriate course work. Upon transfer, students may be required to complete additional course work in general education or an academic major specific to the receiving institution. Students who transfer prior to the completion of the Oregon Transfer Module will have their courses individually evaluated by the receiving institution. Students must complete a minimum of 45 credits of lower division course work with a grade of "C-" or better in order to receive credit for the Oregon Transfer Module. A minimum of 12 credits must be earned at Oregon Tech. The following courses may be used to complete the Oregon Transfer Module:

## FOUNDATIONAL SKILLS

### Writing and Oral Communication

#### Writing

- Two courses of college level composition

#### Oral Communication

- One course of Public Speaking or Communication

#### Mathematics

- One course of College level Math

**INTRODUCTION TO DISCIPLINES****Arts and Letters/Humanities**

- 3 courses of Arts and letters/Humanities
- Oregon Tech only allows 3 credits of performance or studio-based courses in this category

**Science/Math/Computer Science**

- 3 courses, including at least one biological or physical science with a laboratory

**Social Science**

- 3 courses of Social Science

**Marriage and Family Therapy, MS****Degree Requirements**

The MS MFT requires successful completion of 90 credits of MS MFT graduate coursework. Courses are delivered in lockstep order, with prerequisites for each term offered in the previous term.

**Required Coursework**

- MFT 500 - Child & Adolescent Development
- MFT 501 - Adult Development
- MFT 510 - Introduction to Marriage & Family Therapy
- MFT 511 - Family Therapy Theory & Practice I
- MFT 512 - Family Therapy Theory and Practice II
- MFT 515 - MFT Practicum
- MFT 516 - MFT Practicum
- MFT 517 - MFT Practicum
- MFT 520 - Counseling: Theory & Skills
- MFT 521 - Child & Adolescent Therapy
- MFT 522 - Couples Therapy
- MFT 523 - Group Therapy
- MFT 524 - Play Therapy
- MFT 525 - Trauma & Healing
- MFT 530 - Child & Adolescent Psychopathology
- MFT 531 - Adult Psychopathology & Diagnosis
- MFT 532 - Psychopathology and the Family
- MFT 533 - Violence & Abuse in Intimate Relationships
- MFT 534 - Psychological Assessment
- MFT 540 - Research Methods
- MFT 550 - Professional Studies: Ethics
- MFT 560 - Developing Cultural Competencies
- MFT 561 - Sexuality and Therapy
- MFT 562 - Rural Mental Health Care
- MFT 563 - Psychopharmacology
- MFT 564 - Substance Abuse & Co-Occurring Disorders
- MFT 565 - Mental Health Care & Technology
- MFT 566 - Medical Family Therapy in Rural Areas
- MFT 570 - Internship I
- MFT 571 - Internship II
- MFT 572 - Internship III
- MFT 580 - Independent Study in Marriage and Family Therapy
- MFT 585 - Special Project or Training in Marriage and Family Therapy
- MFT 590 - Clinical Capstone I
- MFT 591 - Clinical Capstone II

## Medical Imaging Technology Department

Debbie McCollam, *Department Chair*

Robyn Cole, *Diagnostic Medical Sonography Program Director*

Barry Canaday, *Echocardiography Program Director*

Don McDonnell, *Radiologic Science Program Director*

Chris Caster, *Vascular Technology Program Director*

Richard Hoylman, *Nuclear Medicine and Molecular Imaging Technology Program Director and Clinical Coordinator*

Tara Guthrie, *Echocardiography Clinical Coordinator*

Lisa Steinbock, *Radiologic Science Clinical Coordinator*

Bobbi Kowash, *Diagnostic Medical Sonography Clinical Coordinator*

Leah Jolly, *Vascular Technology Clinical Coordinator*

Janette Isaacson, *Vascular Technology and Echocardiography Degree Completion*

*Program Director, Masters of Science in Allied Health*

Gary Zimmerman, *Radiologic Science Degree Completion Program Director*

Robyn Cole, *Diagnostic Medical Sonography Degree Completion Program Director*

Vanessa Bennett, *Nuclear Medicine Clinical Coordinator, and Scheduling Coordinator*

*Professors:* D. McCollam, T. McVay, S. Schultz, G. Zimmerman

*Associate Professors:* B. Canaday, C. Caster, R. Cole, R. Hoylman, D. McDonnell

*Assistant Professors:* V. Bennett, M. Breedlove, R. Carson

*Instructors:* T. Guthrie, L. Jolly, B. Kowash, L. Steinbock

*Participating Faculty:* J. Isaacson Assistant Professor (Online Education)

*Participating Faculty:* J. Steenport (Online PACs)

### Degrees Offered

- Bachelor of Science in Diagnostic Medical Sonography
- Bachelor of Science in Echocardiography
- Bachelor of Science in Nuclear Medicine and Molecular Imaging Technology
- Bachelor of Science in Radiologic Science
- Bachelor of Science in Vascular Technology
- Master of Science in Allied Health

### Specializations Offered

- Magnetic Resonance Imaging
- Picture Archiving and Communication Systems (PACS)

### Department Objectives

The objectives of the Medical Imaging Technology Department are:

1. To prepare students to become effective participants in the medical imaging professions.
2. To provide the residents of Oregon and the Pacific Northwest with Bachelor of Science degrees in Medical Imaging Technology.
3. To prepare students for professions that require critical-thinking and problem solving skills.
4. To instill an effective influence of professional character, the knowledge and experience to pass the National Registry exams.
5. To instill lifelong learning.

### Accreditation

Oregon Institute of Technology is accredited by Northwest Commission on Colleges and Universities, 8060 165th Ave. NE, Suite 100, Redmond, WA 98052-3981, an institutional accrediting body recognized by the Council for Higher Education Accreditation and/or the Secretary of the U.S. Department of Education.

The Diagnostic Medical Sonography, Echocardiography and Vascular Technology programs are programmatically accredited through the Commission on Accreditation of Allied Health Education Programs (CAAHEP), upon review of the Joint Review Committee on Education in Diagnostic Medical Sonography (JRC-DMS).

#### *Echocardiography - Goal and Mission Statement*

To prepare competent entry-level adult cardiac sonographers in the cognitive (knowledge), psychomotor (skills), and affective (behavior) learning domains

#### *Diagnostic Medical Sonography - Goal and Mission Statement*

To prepare competent entry-level general sonographers in the cognitive (knowledge), psychomotor (skills), and affective (behavior) learning domains

*Vascular Technology - Goal and Mission Statement*

To prepare competent entry-level vascular sonographers in the cognitive (knowledge), psychomotor (skills), and affective (behavior) learning domains

**Bachelor of Science Program Descriptions**

The Department of Medical Imaging Technology offers bachelor's degrees in five professional programs, which encompass the spectrum of imaging sciences. The curriculum of each bachelor's degree program provides the technical, scientific, and communication skills essential for the application of learned concepts. Each program prepares students for immediate employment and for successfully passing the national and state registry examinations in each field.

*Diagnostic Medical Sonography (also called sonography, ultrasound, or general ultrasound)*

Sonography uses high frequency sound wave imaging and Doppler instrumentation to aid in the diagnosis of pathology and disease processes. The sonographer gathers pertinent patient history, creates images, and submits preliminary findings to the reading physician. Common exams include: obstetric, gynecological, peritoneal, retroperitoneal, pelvic, thoracic, musculoskeletal, extremity, neurological, and superficial procedures. Invasive applications are also performed in most clinical settings.

*Echocardiography*

Echocardiography is a safe method of obtaining ultrasound images for diagnosis of cardiac pathology in adult and pediatric patient populations. Echocardiographers perform imaging exams that include acquisition of detailed images of heart anatomy, evaluation of pathologies, and measurement/analysis of hemodynamic flow patterns within the heart and the heart's major vessels. The Echocardiographer prepares the study images and reports pertinent findings to the interpreting cardiologist as part of the diagnostic process.

*Nuclear Medicine and Molecular Imaging Technology*

Nuclear Medicine and Molecular Imaging Technology is an imaging science that demonstrates pathology through physiologic processes using radioactive compounds. Sometimes these data are fused with anatomical data such as Computed Tomography (CT) and Magnetic Resonance Imaging (MRI). This branch of imaging science has been in existence for over four decades. This training also prepares the future Nuclear Medicine Technologist with skills in CT, MRI, PET/ CT, and Spect/CT.

*Radiologic Science*

This program has been in existence at Oregon Tech for more than 50 years. The training prepares the future radiologic technologist with a wide variety of skills, including radiography, fluoroscopy, mobile and surgical radiography, Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Mammography, Cardiovascular Interventional Technology (CIT), Quality Assurance, and imaging department management.

*Vascular Technology*

Vascular technology is a profession which utilizes ultrasound, Doppler, color Doppler and various physiologic testing procedures to aid in the diagnosis of disease of the vascular system. Vascular technologists conduct patient interviews, compile health histories and determine risk assessments pertaining to vascular disease. The technologists choose appropriate testing modalities and provide referring physicians with preliminary interpretation of results.

**Master of Science Program Description**

The Department of Medical Imaging Technology offers a Master of Science in Allied Health, which is fully an online degree for students who hold a Bachelor's degree and are a registered professional in a health care setting. The program will focus on preparing allied health professionals for advancement in management, education and administration in their respective health care disciplines.

**Facilities**

Oregon Tech's state-of-the-art imaging equipment allows medical imaging students to become familiar with a wide variety of imaging procedures like those performed in most medical centers. Students may also spend significant time at Sky Lakes Medical Center where they will gain experience directly with patients, prior to externship. This experience plus the academic coursework prepares the student well for the medical imaging professions.

**Externships**

All five of the bachelor's degree programs in medical imaging culminate in a senior year of clinical externship at a medical center. The 11-month externship is spent at the affiliate institution under the supervision of a clinical instructor. Students do not have classes on the Oregon Tech campus during this year. The location of externship will be determined by a lottery conducted by medical imaging faculty. All students will be guaranteed an externship subject to the following:

1. All academic requirements must be met before externship assignments will be made.
2. Students must satisfy Oregon requirements for clinical placement as listed in Oregon Administrative Rules (OAR 409-030-0100 to 409-030-0250).

Upon successful completion of the externship year, imaging students will be eligible to sit for the professional registry pertaining to their degree.

## Admission Requirements

### Pre-Medical Imaging Technology: Freshman Year

Enrollment is open to all students who meet the general entry requirements to the university. Students will be listed as Pre-Medical Imaging Technology (Pre-MIT) students. Admittance to the Oregon Tech Pre-MIT Program does not mean the student has been accepted into a specific MIT program.

### Program Selection Criteria

Selection criteria are available on the MIT website at [www.oit.edu/mit](http://www.oit.edu/mit). Students must complete all the courses, including general education, in the specified freshman year (pre-medical imaging) curriculum. Selection will be made at the end of the spring term of the pre-medical imaging technology year. The number of students selected each year will be determined by the number of qualified applicants, and by the availability of clinical sites. Therefore, the number of qualified applicants may exceed the number of spaces available. Prior acceptance does not guarantee future acceptance into any MIT Program. Students must reapply yearly.

Selection will be based upon the following criteria and point system:

1. **GPA:** Students must have a total of a 2.75 **weighted** GPA (though a 3.0 or higher is highly recommended), in the following courses (or equivalent transfer courses) to apply to one of the five MIT Programs.
  - BIO 200 - Medical Terminology
  - BIO 231 - Human Anatomy and Physiology I
  - BIO 232 - Human Anatomy and Physiology II
  - BIO 233 - Human Anatomy and Physiology III
  - CHE 101 - Introduction to General Chemistry
  - CHE 104 - Introduction to General Chemistry Laboratory
  - MATH 112 - Trigonometry
  - MIT 103 - Introduction to Medical ImagingGPA points are calculated as GPA x 10. (For example, a 3.5 GPA x 10 = 35). To determine how to calculate weighted GPA, see website at [www.oit.edu/mit](http://www.oit.edu/mit).
2. All applicants must attend an Oregon Tech hosted selection event at the end of spring term. Several activities are conducted during this event to allow students to demonstrate communication skills, and professionalism. Faculty from the MIT Department and industry leaders are present at the selection event to evaluate those skills.

## Application Requirements

Applications are available on the MIT website at [www.oit.edu/mit](http://www.oit.edu/mit).

Applications are due spring term. Incomplete applications will not be accepted. An application fee of \$75 is required. There are no refunds of the application fee. Repeat applicants must follow the same procedures as first-time applicants.

The application form allows ranking of programs by choice (first and second) and only one application per student will be accepted. If multiple applications are received, they will be returned along with the application fees.

## Transfer Students

Transfer students who meet the academic requirements of the pre-medical imaging technology year, will not find a course at another college which substitutes for MIT 103 - Introduction to Medical Imaging. This course may be taken as a distance learning course. It must be completed in the summer, fall, winter or spring term prior to the application to a professional program. The MIT application is available at [www.oit.edu/mit](http://www.oit.edu/mit). Transfer students must apply to both Oregon Tech and MIT using two separate application processes.

## Graduation Requirements

All credits listed in the curriculum for the catalog year a student begins a program must be fulfilled.

Students must maintain a 2.00 GPA to be eligible for graduation. In addition, a final grade of "C" or better must be earned in all professional courses (DMS, ECHO, NMT, RDSC, VAS), and science/mathematics courses to continue in the program. A final grade of "C" or better must be also earned in all required communications courses by the end of the junior year to continue on in the program. Once the student is admitted into a professional program as a sophomore, all curricular requirements must be met within four academic years. Rare exceptions to the time limitation will be considered on a case by case basis, at the discretion of the re-admittance committee described below. When a student unsuccessfully attempts a programmatic course fall term, sophomore year, they must reapply to the program or another imaging program. If the student has an unsuccessful attempt subsequent to fall term sophomore year the student must submit a letter of intent to the program director of the specific program they seek to re-enter. The MIT re-admittance committee will determine if another opportunity will be granted. If re-admittance is approved additional requirements will be prescribed by the MIT committee.

Other requirements such as auditing courses, attending labs, and/or remedial work will be specified by the committee. The student must remain in compliance with committee's recommendations and requirements to satisfy degree progress. When a student attempts unsuccessfully a second time in the same or a different programmatic course, they are terminated from that program. Additionally, if a student receives a "D," "F" or "W" in two or more programmatic courses in one term, they will be dismissed from that program. The student may apply for admittance to a second imaging program under the same application criteria as other applicants. After two unsuccessful attempts to complete two different programs, the student may not apply for a third program.

## Career Opportunities

There continues to be a high demand for bachelor's degree prepared medical imaging professionals. Graduates have excellent opportunities for employment in hospitals, clinics, private practice, state and federal agencies, and with appropriate experience, in supervision, education and industry.

## Degree Completion Programs

The Diagnostic Medical Sonography, Echocardiography, Radiologic Science and Vascular Technology programs offer degree completion programs for registered technologists (in good standing) who wish to pursue a bachelor's degree in their field. These programs are fully online. There is no requirement to come to campus.

## Master of Science in Allied Health

The MSAH program supports Oregon Tech's mission to offer rigorous applied degree programs by providing scholarly, research based, high quality coursework (aligned with the National Center for Healthcare Leadership guidelines) ensuring student success in the work place.

The discipline of allied health leadership in health care settings involves effective communication, building relationships, self-confidence, self-development, team leadership, change leadership, accountability, collaboration, organizational development, performance measurements, financial skills, innovative thinking and strategic orientation. The MSAH curriculum emphasizes strong foundational course work and hands-on application through real life health care cases to prepare students to be effective professionals in their communities. Typical students in the program are already employed and are working to advance their degrees and career opportunities in leadership, management, and administration of public health systems, health care systems, hospitals, and hospital networks.

## Allied Health, MS

### Curriculum

This program will be delivered completely online with the exception of two respiratory care courses that will require students to come to the Klamath Falls campus during a summer quarter.

*\*Students must complete the allied health core courses, as well as one track to receive the MS in Allied Health.*

### Core Courses

- ALH 505 - ALH Introduction to Information Technology for Healthcare Professionals Credit Hours: 1
- ALH 510 - Science Review Health Care Professionals Credit Hours: 3
- ALH 515 - Scientific Writing and Healthcare Leadership Literature Review Credit Hours: 3
- ALH 525 - Effective Healthcare Leadership Teams Credit Hours: 3
- ALH 535 - Assessment, Planning, Implementation and Evaluation Credit Hours: 3
- ALH 545 - Pertinent Ethical and Legal considerations for Healthcare Leaders Credit Hours: 3
- ALH 555 - Leadership Theory for Healthcare Leaders Credit Hours: 3
- ALH 565 - Population Health Issues for the Allied Health Professionals Credit Hours: 3
- ALH 575 - Methods of Research for Allied Health Professionals Credit Hours: 3
- ALH 585 - Financial Considerations and Political Strategies for Healthcare Leaders Credit Hours: 3
- ALH 595 - Curriculum Design for Allied Healthcare Professionals Credit Hours: 3
  
- ALH 509 - Master's Capstone Project Presentation and Defense Credit Hours: 6  
or
- ALH 599 - Master's Thesis Presentation and Defense Credit Hours: 6

### Track 1 Administrative / Healthcare Leadership Track in Allied Health

- ALH 506 - Program Administration Credit Hours: 3
- STAT 505 - Biostatistics I Credit Hours: 3
- STAT 515 - Epidemiology I Credit Hours: 3
- WRI 510 - Grant Proposal Writing Credit Hours: 3

**Track 2 Dental Hygiene Track in Allied Health**

- ALH 506 - Program Administration Credit Hours: 3
- ALH 508 - Medical Education Theories and Methods Credit Hours: 3
- STAT 505 - Biostatistics I Credit Hours: 3
- WRI 510 - Grant Proposal Writing Credit Hours: 3

**Track 3 Respiratory Care Track in Allied Health**

- ALH 508 - Medical Education Theories and Methods Credit Hours: 3
- RCP 561 - Individual Development Plan Credit Hours: 3
- RCP 565 - Clinical Preceptorship Credit Hours: 3
- RCP 575 - Accreditation Practicum Credit Hours: 3

**Total for a M.S. in Allied Health: 49 Credit Hours**

## Diagnostic Medical Sonography, BS

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Pre-Medical Imaging Technology

##### Freshman Year

###### Fall

- BIO 231 - Human Anatomy and Physiology I Credit Hours: 4
- CHE 101 - Introduction to General Chemistry Credit Hours: 3
- CHE 104 - Introduction to General Chemistry Laboratory Credit Hours: 1
- MATH 111 - College Algebra Credit Hours: 4
- MIT 103 - Introduction to Medical Imaging Credit Hours: 3

**Total: 15 Credit Hours**

###### Winter

- BIO 232 - Human Anatomy and Physiology II Credit Hours: 4
- MATH 112 - Trigonometry Credit Hours: 4
- WRI 121 - English Composition Credit Hours: 3
- Humanities Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 17 Credit Hours**

###### Spring

- BIO 200 - Medical Terminology Credit Hours: 2
- BIO 233 - Human Anatomy and Physiology III Credit Hours: 4
- PSY 201 - Psychology Credit Hours: 3  
or
- PSY 202 - Psychology Credit Hours: 3  
or
- PSY 203 - Psychology Credit Hours: 3
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3

**Total: 15 Credit Hours**

#### Professional Courses

##### Sophomore Year

###### Fall

- BIO 335 - Cross-Sectional Anatomy Credit Hours: 3
- DMS 223 - Applications of Abdominal Sonography I Credit Hours: 3
- DMS 252 - Sophomore Laboratory I Credit Hours: 1
- PHY 217 - Physics of Medical Imaging Credit Hours: 3
- Humanities Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 16 Credit Hours**

###### Winter

- DMS 224 - Applications of Abdominal Sonography II Credit Hours: 3
- DMS 235 - Diagnostic Medical Sonography Patient Care Credit Hours: 3
- DMS 253 - Sophomore Laboratory II Credit Hours: 1
- MIT 231 - Sonographic Principles and Instrumentation I Credit Hours: 4
- WRI 227 - Technical Report Writing Credit Hours: 3

**Total: 14 Credit Hours**

###### Spring

- DMS 225 - Applications of Abdominal Sonography III Credit Hours: 3
- DMS 234 - Pelvic Sonography Credit Hours: 3
- DMS 254 - Sophomore Laboratory III Credit Hours: 1
- MIT 232 - Sonographic Principles and Instrumentation II Credit Hours: 4
- Social Science Elective Credit Hours: 3

**Total: 14 Credit Hours**

#### Junior Year

##### Fall

- DMS 346 - Musculoskeletal Sonography Credit Hours: 3
- DMS 352 - Junior Laboratory I Credit Hours: 1
- DMS 365 - Sonographic Pathology Credit Hours: 3
- DMS 337 - Breast Sonography Credit Hours: 3
- SPE 321 - Small Group and Team Communication Credit Hours: 3

**Total: 13 Credit Hours**

##### Winter

- BUS 316 - Total Quality in Health Care Credit Hours: 3  
or
- BUS 317 - Health Care Management Credit Hours: 3  
or
- BUS 313 - Health Care Systems and Policy Credit Hours: 3
- DMS 316 - Survey of Vascular Technology Credit Hours: 3
- DMS 342 - Survey of Adult Echocardiography Credit Hours: 3
- DMS 353 - Junior Laboratory II Credit Hours: 1
- DMS 370 - Obstetrical Sonography Credit Hours: 3

**Total: 13 Credit Hours**

##### Spring

- DMS 343 - Fetal Echo, Neonatal, and Pediatric Sonography Credit Hours: 3
- DMS 354 - Junior Laboratory III Credit Hours: 1
- DMS 373 - Obstetrical Pathology Credit Hours: 3
- DMS 388 - Externship Preparation Credit Hours: 2
- Communication Elective Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 15 Credit Hours**

**Senior Year**

**Summer**

- DMS 430 - Diagnostic Medical Sonography Externship  
Credit Hours: 15

**Total: 15 Credit Hours**

**Fall**

- DMS 430 - Diagnostic Medical Sonography Externship  
Credit Hours: 15

**Total: 15 Credit Hours**

**Winter**

- DMS 430 - Diagnostic Medical Sonography Externship  
Credit Hours: 15

**Total: 15 Credit Hours**

**Spring**

- DMS 430 - Diagnostic Medical Sonography Externship  
Credit Hours: 15

**Total: 15 Credit Hours**

**Total for a B.S. in Diagnostic Medical Sonography: 192 Credit Hours**

## Diagnostic Medical Sonography, Degree Completion, BS

### Courses Granted for Registry

- DMS 223 - Applications of Abdominal Sonography I Credit Hours: 3
- DMS 224 - Applications of Abdominal Sonography II Credit Hours: 3
- DMS 225 - Applications of Abdominal Sonography III Credit Hours: 3
- DMS 234 - Pelvic Sonography Credit Hours: 3
- DMS 235 - Diagnostic Medical Sonography Patient Care Credit Hours: 3
- DMS 252 - Sophomore Laboratory I Credit Hours: 1
- DMS 253 - Sophomore Laboratory II Credit Hours: 1
- DMS 254 - Sophomore Laboratory III Credit Hours: 1
- DMS 370 - Obstetrical Sonography Credit Hours: 3
- DMS 388 - Externship Preparation Credit Hours: 2 (waived)
- DMS 430 - Diagnostic Medical Sonography Externship Credit Hours: 45
- MIT 103 - Introduction to Medical Imaging Credit Hours: 3
- MIT 231 - Sonographic Principles and Instrumentation I Credit Hours: 4
- MIT 232 - Sonographic Principles and Instrumentation II Credit Hours: 4
- PHY 217 - Physics of Medical Imaging Credit Hours: 3

**Total: 80 Credit Hours**

### Completion Credits

- BIO 335 - Cross-Sectional Anatomy Credit Hours: 3
  
- BUS 313 - Health Care Systems and Policy Credit Hours: 3
- or
- BUS 316 - Total Quality in Health Care Credit Hours: 3
- or
- BUS 317 - Health Care Management Credit Hours: 3
  
- DMS 316 - Survey of Vascular Technology Credit Hours: 3<sup>a</sup>
- DMS 337 - Breast Sonography Credit Hours: 3
- DMS 342 - Survey of Adult Echocardiography Credit Hours: 3
- DMS 343 - Fetal Echo, Neonatal, and Pediatric Sonography Credit Hours: 3
- DMS 346 - Musculoskeletal Sonography Credit Hours: 3
- DMS 352 - Junior Laboratory I Credit Hours: 1
- DMS 353 - Junior Laboratory II Credit Hours: 1
- DMS 354 - Junior Laboratory III Credit Hours: 1
- DMS 365 - Sonographic Pathology Credit Hours: 3
- DMS 373 - Obstetrical Pathology Credit Hours: 3
- DMS 430A - Diagnostic Medical Sonography Externship Credit Hours: 8
- DMS 430B - Diagnostic Medical Sonography Externship Credit Hours: 7
- SPE 321 - Small Group and Team Communication Credit Hours: 3
- Communication Elective Credit Hours: 3

**Total: 51 Credit Hours**

### Transfer Courses

- BIO 200 - Medical Terminology Credit Hours: 2
- BIO 231 - Human Anatomy and Physiology I Credit Hours: 4
- BIO 232 - Human Anatomy and Physiology II Credit Hours: 4
- BIO 233 - Human Anatomy and Physiology III Credit Hours: 4
- CHE 101 - Introduction to General Chemistry Credit Hours: 3
- CHE 104 - Introduction to General Chemistry Laboratory Credit Hours: 1
- MATH 111 - College Algebra Credit Hours: 4
- MATH 112 - Trigonometry Credit Hours: 4
  
- PSY 201 - Psychology Credit Hours: 3
- or
- PSY 202 - Psychology Credit Hours: 3
- or
- PSY 203 - Psychology Credit Hours: 3

- SPE 111 - Public Speaking Credit Hours: 3
- WRI 121 - English Composition Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3
- WRI 227 - Technical Report Writing Credit Hours: 3
- Humanities Electives Credit Hours: 9
- Social Science Electives Credit Hours: 9
- Elective Credit Hours: 2

**Total: 61 Credit Hours**

<sup>a</sup> Credits may be granted for additional specialty registry exams. Please contact Program Director for more information.

# Echocardiography, BS

## Curriculum

Required Courses and recommended terms during which they should be taken:

### Pre-Medical Imaging Technology

#### Freshman Year

##### Fall

- BIO 231 - Human Anatomy and Physiology I Credit Hours: 4
- CHE 101 - Introduction to General Chemistry Credit Hours: 3
- CHE 104 - Introduction to General Chemistry Laboratory Credit Hours: 1
- MATH 111 - College Algebra Credit Hours: 4
- MIT 103 - Introduction to Medical Imaging Credit Hours: 3

**Total: 15 Credit Hours**

##### Winter

- BIO 232 - Human Anatomy and Physiology II Credit Hours: 4
- MATH 112 - Trigonometry Credit Hours: 4
- WRI 121 - English Composition Credit Hours: 3
- Humanities Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 17 Credit Hours**

##### Spring

- BIO 200 - Medical Terminology Credit Hours: 2
- BIO 233 - Human Anatomy and Physiology III Credit Hours: 4
- PSY 201 - Psychology Credit Hours: 3  
or
- PSY 202 - Psychology Credit Hours: 3  
or
- PSY 203 - Psychology Credit Hours: 3
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3

**Total: 15 Credit Hours**

### Professional Courses

#### Sophomore Year

##### Fall

- BIO 220 - Cardiovascular Physiology Credit Hours: 4
- ECHO 231 - Echocardiography I Credit Hours: 4
- PHY 217 - Physics of Medical Imaging Credit Hours: 3
- WRI 227 - Technical Report Writing Credit Hours: 3

**Total: 14 Credit Hours**

##### Winter

- BIO 346 - Pathophysiology I Credit Hours: 3
- ECHO 232 - Echocardiography II Credit Hours: 4
- MIT 231 - Sonographic Principles and Instrumentation I Credit Hours: 4
- Social Science Elective Credit Hours: 3

**Total: 14 Credit Hours**

##### Spring

- BIO 347 - Pathophysiology II Credit Hours: 3
- ECHO 225 - Cardiopulmonary Patient Management Practices Credit Hours: 3
- ECHO 320 - Cardiographic Methods Credit Hours: 3
- ECHO 332 - Invasive Cardiology Credit Hours: 3
- MIT 232 - Sonographic Principles and Instrumentation II Credit Hours: 4

**Total: 16 Credit Hours**

#### Junior Year

##### Fall

- BUS 316 - Total Quality in Health Care Credit Hours: 3  
or
- BUS 317 - Health Care Management Credit Hours: 3  
or
- BUS 313 - Health Care Systems and Policy Credit Hours: 3
- ECHO 333 - Echocardiography III Credit Hours: 4
- ECHO 321 - Stress and Transesophageal Echo Credit Hours: 3
- SPE 321 - Small Group and Team Communication Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Winter

- CHE 360 - Clinical Pharmacology for the Health Professions Credit Hours: 3
- ECHO 325 - Pediatric Echocardiography Credit Hours: 3
- ECHO 376 - Survey of Vascular Testing Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 12 Credit Hours**

##### Spring

- ECHO 334 - Echocardiography IV Credit Hours: 4
- ECHO 385 - Echocardiography Laboratory Management Credit Hours: 3
- ECHO 388 - Externship Preparation Credit Hours: 3
- Communication Elective Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 16 Credit Hours**

#### Senior Year

##### Summer

- ECHO 420 - Echocardiography Externship Credit Hours: 15

**Total: 15 Credit Hours**

##### Fall

- ECHO 420 - Echocardiography Externship Credit Hours: 15

**Total: 15 Credit Hours**

##### Winter

- ECHO 420 - Echocardiography Externship Credit Hours: 15

**Total: 15 Credit Hours**

**Spring**

- ECHO 420 - Echocardiography Externship Credit Hours: 15

**Total: 15 Credit Hours**

**Total for a B.S. in Echocardiography: 195 Credit Hours**

## Echocardiography, Degree Completion, BS

### Courses Granted for Registry

- BIO 220 - Cardiovascular Physiology Credit Hours: 4
- BIO 346 - Pathophysiology I Credit Hours: 3
- BIO 347 - Pathophysiology II Credit Hours: 3
- ECHO 225 - Cardiopulmonary Patient Management Practices Credit Hours: 3
- ECHO 231 - Echocardiography I Credit Hours: 4
- ECHO 232 - Echocardiography II Credit Hours: 4
- ECHO 320 - Cardiographic Methods Credit Hours: 3
- ECHO 321 - Stress and Transesophageal Echo Credit Hours: 3
- ECHO 333 - Echocardiography III Credit Hours: 4
- ECHO 388 - Externship Preparation Credit Hours: 3 (waived)
- ECHO 420 - Echocardiography Externship Credit Hours: 45
- MIT 103 - Introduction to Medical Imaging Credit Hours: 3
- MIT 231 - Sonographic Principles and Instrumentation I Credit Hours: 4
- MIT 232 - Sonographic Principles and Instrumentation II Credit Hours: 4
- PHY 217 - Physics of Medical Imaging Credit Hours: 3

**Total: 90 Credit Hours**

### Completion Courses

- BUS 313 - Health Care Systems and Policy Credit Hours: 3  
or
- BUS 316 - Total Quality in Health Care Credit Hours: 3  
or
- BUS 317 - Health Care Management Credit Hours: 3
- CHE 360 - Clinical Pharmacology for the Health Professions Credit Hours: 3
- ECHO 325 - Pediatric Echocardiography Credit Hours: 3<sup>a</sup>
- ECHO 332 - Invasive Cardiology Credit Hours: 3
- ECHO 334 - Echocardiography IV Credit Hours: 4
- ECHO 365 - Abdominal/Renal Testing Credit Hours: 4
- ECHO 376 - Survey of Vascular Testing Credit Hours: 3<sup>a</sup>
- ECHO 385 - Echocardiography Laboratory Management Credit Hours: 3
- ECHO 420A - Echocardiography Externship Credit Hours: 8
- ECHO 420B - Echocardiography Externship Credit Hours: 7
- ECHO 421 - Echo Senior Project Credit Hours: 4
- SPE 321 - Small Group and Team Communication Credit Hours: 3
- Communication Elective Credit Hours: 3

**Total: 51 Credit Hours**

<sup>a</sup>Optional credits may be awarded for additional registries

### Transfer Courses

- BIO 200 - Medical Terminology Credit Hours: 2
- BIO 231 - Human Anatomy and Physiology I Credit Hours: 4
- BIO 232 - Human Anatomy and Physiology II Credit Hours: 4
- BIO 233 - Human Anatomy and Physiology III Credit Hours: 4
- CHE 101 - Introduction to General Chemistry Credit Hours: 3
- CHE 104 - Introduction to General Chemistry Laboratory Credit Hours: 1
- MATH 111 - College Algebra Credit Hours: 4
- MATH 112 - Trigonometry Credit Hours: 4
- PSY 201 - Psychology Credit Hours: 3  
or
- PSY 202 - Psychology Credit Hours: 3  
or
- PSY 203 - Psychology Credit Hours: 3
- SPE 111 - Public Speaking Credit Hours: 3

- WRI 121 - English Composition Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3
- WRI 227 - Technical Report Writing Credit Hours: 3
- Humanities Electives Credit Hours: 9
- Social Science Electives Credit Hours: 9
- Elective Credit Hours: 3

**Total: 62 Credit Hours**

## **Magnetic Resonance Imaging (MRI) Specialization**

The educational requirement for taking the MR registry is minimal for ARRT registered Radiologic Technologists, but the learning curve is steep. For technologists with little knowledge of MR physics and procedures a specialization is offered on campus and fully online that culminates in completing the didactic and clinical requirements. Online students must have access for clinical practice at their place of employment, and permission from management.

### **Requirements of the Specialization**

- BIO 335 - Cross-Sectional Anatomy Credit Hours: 3
- BIO 375 - Cross Sectional Anatomy II Credit Hours: 1 or 3 (set up for variable credit)
- MIT 341 - Magnetic Resonance Imaging Credit Hours: 4
- MIT 342 - Magnetic Resonance Imaging II Credit Hours: 3
- MIT 365 - Magnetic Resonance Imaging Review Credit Hours: 2
- MIT 411 - Magnetic Resonance Externship Credit Hours: 5

## Nuclear Medicine and Molecular Imaging Technology, BS

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Pre-Medical Imaging Technology

##### Freshman Year

###### Fall

- BIO 231 - Human Anatomy and Physiology I Credit Hours: 4
- CHE 101 - Introduction to General Chemistry Credit Hours: 3
- CHE 104 - Introduction to General Chemistry Laboratory Credit Hours: 1
- MATH 111 - College Algebra Credit Hours: 4
- MIT 103 - Introduction to Medical Imaging Credit Hours: 3

**Total: 15 Credit Hours**

###### Winter

- BIO 232 - Human Anatomy and Physiology II Credit Hours: 4
- MATH 112 - Trigonometry Credit Hours: 4
- WRI 121 - English Composition Credit Hours: 3
- Humanities Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 17 Credit Hours**

###### Spring

- BIO 200 - Medical Terminology Credit Hours: 2
- BIO 233 - Human Anatomy and Physiology III Credit Hours: 4
- PSY 201 - Psychology Credit Hours: 3  
or
- PSY 202 - Psychology Credit Hours: 3  
or
- PSY 203 - Psychology Credit Hours: 3
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3

**Total: 15 Credit Hours**

#### Professional Courses

##### Sophomore Year

###### Fall

- CHE 350 - Clinical Pharmacology for Nuclear Medicine Credit Hours: 3
- NMT 212 - Nuclear Medicine Physics/Radiation Biophysics Credit Hours: 3
- NMT 217 - Patient Care Credit Hours: 4
- PHY 217 - Physics of Medical Imaging Credit Hours: 3

**Total: 13 Credit Hours**

###### Winter

- NMT 205 - Nuclear Medicine Administration Credit Hours: 2
- NMT 215 - Radiochemistry and Radiopharmacy Credit Hours: 4
- SPE 321 - Small Group and Team Communication Credit Hours: 3
- WRI 227 - Technical Report Writing Credit Hours: 3

**Total: 12 Credit Hours**

###### Spring

- NMT 225 - Nuclear Physics/ Instrumentation Credit Hours: 4
- NMT 256 - Cardiovascular Imaging Credit Hours: 3
- Communication Elective Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 13 Credit Hours**

#### Junior Year

##### Fall

- BUS 316 - Total Quality in Health Care Credit Hours: 3  
or
- BUS 317 - Health Care Management Credit Hours: 3  
or
- BUS 313 - Health Care Systems and Policy Credit Hours: 3
- NMT 311 - Imaging Procedures I Credit Hours: 4
- MIT 341 - Magnetic Resonance Imaging Credit Hours: 4
- NMT 367 - PET Imaging Credit Hours: 3

**Total: 14 Credit Hours**

##### Winter

- BIO 335 - Cross-Sectional Anatomy Credit Hours: 3
- BIO 346 - Pathophysiology I Credit Hours: 3
- NMT 312 - Imaging Procedures II Credit Hours: 4
- NMT 355 - Computed Tomography Credit Hours: 4
- Social Science Elective Credit Hours: 3

**Total: 17 Credit Hours**

##### Spring

- NMT 313 - Therapeutic Procedures Credit Hours: 3
- NMT 325 - SPECT Imaging and Computer Applications Credit Hours: 4
- NMT 388 - Externship Preparation Credit Hours: 3
- Humanities Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 16 Credit Hours**

#### Senior Year

##### Summer

- NMT 410 - Nuclear Medicine Technology Externship Credit Hours: 15

**Total: 15 Credit Hours**

**Fall**

- NMT 410 - Nuclear Medicine Technology Externship Credit  
Hours: 15

**Total: 15 Credit Hours****Winter**

- NMT 410 - Nuclear Medicine Technology Externship Credit  
Hours: 15

**Total: 15 Credit Hours****Spring**

- NMT 410 - Nuclear Medicine Technology Externship Credit  
Hours: 15

**Total: 15 Credit Hours****Total for a B.S. in Nuclear Medicine and Molecular Imaging Technology: 192 Credit Hours****Picture Archiving and Communication Systems (PACS) Specialization**

Medical Imaging Technology students with an interest and aptitude in computer science have a unique opportunity at Oregon Tech. Networked digital imaging has created the need for technologists with specialized training. Career opportunities for managers of image networks are on the rise, but few working technologists have the training to prepare them for entering this field.

With the availability of Computer Systems and Management Information Systems majors at Oregon Tech, a specialization in Picture Archiving and Communication Systems (PACS) is available for motivated students to pursue this opportunity.

**Requirements of the Specialization**

- Students must earn a "C" or better in all courses to be awarded the specialization.
- MIT 209 - PACS I: Intro to Picture Archiving Communications System Credit Hours: 3
- MIT 219 - PACS II: PACS Communication and Administration Credit Hours:3
- MIT 229 - PACS III: PACS Technical Requirements and Image Quality Credit Hours: 3
- MIT 239 - PACS IV: PACS Implementation and System Management Credit Hours:3
- MIT 249 - PACS V: DICOM Credit Hours: 3
- MIT 259 - PACS VI: PACS Security Credit Hours: 3

## Radiologic Science, BS

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Pre-Medical Imaging Technology

##### Freshman Year

###### Fall

- BIO 231 - Human Anatomy and Physiology I Credit Hours: 4
- CHE 101 - Introduction to General Chemistry Credit Hours: 3
- CHE 104 - Introduction to General Chemistry Laboratory Credit Hours: 1
- MATH 111 - College Algebra Credit Hours: 4
- MIT 103 - Introduction to Medical Imaging Credit Hours: 3

**Total: 15 Credit Hours**

###### Winter

- BIO 232 - Human Anatomy and Physiology II Credit Hours: 4
- MATH 112 - Trigonometry Credit Hours: 4
- WRI 121 - English Composition Credit Hours: 3
- Humanities Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 17 Credit Hours**

###### Spring

- BIO 200 - Medical Terminology Credit Hours: 2
- BIO 233 - Human Anatomy and Physiology III Credit Hours: 4
- PSY 201 - Psychology Credit Hours: 3  
or
- PSY 202 - Psychology Credit Hours: 3  
or
- PSY 203 - Psychology Credit Hours: 3
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3

**Total: 15 Credit Hours**

#### Professional Courses

##### Sophomore Year

###### Fall

- PHY 217 - Physics of Medical Imaging Credit Hours: 3
- RDSC 201 - Imaging Techniques I Credit Hours: 4
- RDSC 235 - Equipment Operation and Maintenance Credit Hours: 3
- Communication Elective Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 16 Credit Hours**

###### Winter

- RDSC 202 - Imaging Techniques II Credit Hours: 4
- RDSC 205 - Patient Care Credit Hours: 4
- RDSC 210 - Radiographic Positioning I Credit Hours: 4
- RDSC 366 - Radiographic Pathology Credit Hours: 3

**Total: 15 Credit Hours**

###### Spring

- BIO 335 - Cross-Sectional Anatomy Credit Hours: 3
- RDSC 211 - Radiographic Positioning II Credit Hours: 4
- RDSC 233 - Contrast Media Procedures Credit Hours: 4
- RDSC 272 - Radiation Protection Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 17 Credit Hours**

##### Junior Year

###### Fall

- BIO 336 - Essentials of Pathophysiology Credit Hours: 3
- RDSC 301 - Radiographic Positioning III Credit Hours: 4
- RDSC 320 - Surgical, Trauma and Mobile Radiography Credit Hours: 4
- RDSC 355 - Computed Tomography Credit Hours: 4

**Total: 15 Credit Hours**

###### Winter

- BUS 313 - Health Care Systems and Policy Credit Hours: 3  
or
- BUS 316 - Total Quality in Health Care Credit Hours: 3  
or
- BUS 317 - Health Care Management Credit Hours: 3

- MIT 341 - Magnetic Resonance Imaging Credit Hours: 4
- SPE 321 - Small Group and Team Communication Credit Hours: 3
- WRI 227 - Technical Report Writing Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 16 Credit Hours**

###### Spring

- MIT 342 - Magnetic Resonance Imaging II Credit Hours: 3  
or
- RDSC 354 - Mammography Credit Hours: 4
- RDSC 326 - Cardiovascular/Interventional Technology Credit Hours: 4
- RDSC 388 - Externship Preparation Credit Hours: 2
- Social Science Elective Credit Hours: 3

**Total: 13 Credit Hours**

##### Senior Year

###### Summer

- RDSC 410 - Radiologic Science Externship Credit Hours: 15

**Total: 15 Credit Hours**

###### Fall

- RDSC 410 - Radiologic Science Externship Credit Hours: 15

**Total: 15 Credit Hours**

**Winter**

- RDSC 410 - Radiologic Science Externship Credit Hours:  
15

**Total: 15 Credit Hours**

**Spring**

- RDSC 410 - Radiologic Science Externship Credit Hours:  
15

**Total: 15 Credit Hours**

**Total for a B.S. in Radiologic Science: 199 Credit Hours**

## Radiologic Science, Degree Completion, BS

### Courses Granted for Registry

- MIT 103 - Introduction to Medical Imaging Credit Hours: 3
- PHY 217 - Physics of Medical Imaging Credit Hours: 3
- RDSC 201 - Imaging Techniques I Credit Hours: 4
- RDSC 202 - Imaging Techniques II Credit Hours: 4
- RDSC 205 -Patient Care Credit Hours: 4
- RDSC 210 - Radiographic Positioning I Credit Hours: 4
- RDSC 211 - Radiographic Positioning II Credit Hours: 4
- RDSC 233 - Contrast Media Procedures Credit Hours: 4
- RDSC 235 - Equipment Operation and Maintenance Credit Hours: 3
- RDSC 272 - Radiation Protection Credit Hours: 3
- RDSC 301 - Radiographic Positioning III Credit Hours: 4
- RDSC 320 - Surgical, Trauma and Mobile Radiography Credit Hours: 4
- RDSC 388 - Externship Preparation Credit Hours: 2 (waived)
- RDSC 410 - Radiologic Science Externship Credit Hours: 45

**Total: 89 Credit Hours**

### Completion Courses

- BIO 335 - Cross-Sectional Anatomy Credit Hours: 3
- BIO 336 - Essentials of Pathophysiology Credit Hours: 3
  
- BUS 313 - Health Care Systems and Policy Credit Hours: 3  
or
- BUS 316 - Total Quality in Health Care Credit Hours: 3  
or
- BUS 317 - Health Care Management Credit Hours: 3
  
- MIT 341 - Magnetic Resonance Imaging Credit Hours: 4
- RDSC 326 - Cardiovascular/Interventional Technology Credit Hours: 4<sup>a</sup>
  
- RDSC 354 - Mammography Credit Hours: 4<sup>a</sup>  
or
- RDSC 355 - Computed Tomography Credit Hours: 4
  
- RDSC 366 - Radiographic Pathology Credit Hours: 3
- RDSC 411 - Special Radiologic Science Externship Credit Hours: 15
- SPE 321 - Small Group and Team Communication Credit Hours: 3
- Communication Elective Credit Hours: 3

**Total: 49 Credit Hours**

<sup>a</sup>Optional credit may be awarded for additional registries

### Transfer Courses

- BIO 200 - Medical Terminology Credit Hours: 2
- BIO 231 - Human Anatomy and Physiology I Credit Hours: 4
- BIO 232 - Human Anatomy and Physiology II Credit Hours: 4
- BIO 233 - Human Anatomy and Physiology III Credit Hours: 4
- CHE 101 - Introduction to General Chemistry Credit Hours: 3
- CHE 104 - Introduction to General Chemistry Laboratory Credit Hours: 1
- MATH 111 - College Algebra Credit Hours: 4
- MATH 112 - Trigonometry Credit Hours: 4
  
- PSY 201 - Psychology Credit Hours: 3  
or
- PSY 202 - Psychology Credit Hours: 3  
or
- PSY 203 - Psychology Credit Hours: 3
  
- SPE 111 - Public Speaking Credit Hours: 3

- WRI 121 - English Composition Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3
- WRI 227 - Technical Report Writing Credit Hours: 3
- Humanities Electives Credit Hours: 9
- Social Science Electives Credit Hours: 9
- Elective Credit Hours: 2

**Total: 61 Credit Hours**

## Vascular Technology, BS

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Pre-Medical Imaging Technology

##### Freshman Year

###### Fall

- BIO 231 - Human Anatomy and Physiology I Credit Hours: 4
- CHE 101 - Introduction to General Chemistry Credit Hours: 3
- CHE 104 - Introduction to General Chemistry Laboratory Credit Hours: 1
- MATH 111 - College Algebra Credit Hours: 4
- MIT 103 - Introduction to Medical Imaging Credit Hours: 3

**Total: 15 Credit Hours**

###### Winter

- BIO 232 - Human Anatomy and Physiology II Credit Hours: 4
- MATH 112 - Trigonometry Credit Hours: 4
- WRI 121 - English Composition Credit Hours: 3
- Humanities Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 17 Credit Hours**

###### Spring

- BIO 200 - Medical Terminology Credit Hours: 2
- BIO 233 - Human Anatomy and Physiology III Credit Hours: 4
- PSY 201 - Psychology Credit Hours: 3  
or
- PSY 202 - Psychology Credit Hours: 3  
or
- PSY 203 - Psychology Credit Hours: 3
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3

**Total: 15 Credit Hours**

#### Professional Courses

##### Sophomore Year

###### Fall

- BIO 220 - Cardiovascular Physiology Credit Hours: 4
- PHY 217 - Physics of Medical Imaging Credit Hours: 3
- VAS 214 - Vascular Anatomy Credit Hours: 4
- VAS 225 - Patient Management Practices Credit Hours: 3
- WRI 227 - Technical Report Writing Credit Hours: 3

**Total: 17 Credit Hours**

###### Winter

- BIO 346 - Pathophysiology I Credit Hours: 3
- MIT 231 - Sonographic Principles and Instrumentation I Credit Hours: 4
- VAS 246 - Peripheral Arterial Disease Credit Hours: 4
- VAS 335 - Radiographic Vascular Anatomy Credit Hours: 3

**Total: 14 Credit Hours**

###### Spring

- BIO 347 - Pathophysiology II Credit Hours: 3
- MIT 232 - Sonographic Principles and Instrumentation II Credit Hours: 4
- VAS 245 - Peripheral Venous Disease Credit Hours: 4
- Social Science Elective Credit Hours: 3

**Total: 14 Credit Hours**

##### Junior Year

###### Fall

- BUS 316 - Total Quality in Health Care Credit Hours: 3  
or
- BUS 317 - Health Care Management Credit Hours: 3  
or
- BUS 313 - Health Care Systems and Policy Credit Hours: 3
- SPE 321 - Small Group and Team Communication Credit Hours: 3
- VAS 365 - Abdominal Vascular Disease Credit Hours: 4
- VAS 375 - Survey of Abdominal Sonography Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 16 Credit Hours**

###### Winter

- CHE 360 - Clinical Pharmacology for the Health Professions Credit Hours: 3
- VAS 366 - Special Circulatory Problems Credit Hours: 4
- VAS 337 - Survey of Echocardiography Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 13 Credit Hours**

###### Spring

- VAS 367 - Cerebrovascular Disease Credit Hours: 4
- VAS 385 - Vascular Laboratory Management Credit Hours: 3
- VAS 388 - Externship Preparation Credit Hours: 3
- Communication Elective Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Senior Year

###### Summer

- VAS 420 - Vascular Technology Externship Credit Hours: 15

Total: 15 Credit Hours

###### Fall

- VAS 420 - Vascular Technology Externship Credit Hours: 15

**Total: 15 Credit Hours**

###### Winter

- VAS 420 - Vascular Technology Externship Credit Hours: 15

**Total: 15 Credit Hours**

**Spring**

- VAS 420 - Vascular Technology Externship Credit Hours: 15

**Total: 15 Credit Hours****Total for a B.S. in Vascular Technology: 197 Credit Hours****Vascular Technology, Degree Completion, BS****Courses Granted for Registry**

- BIO 346 - Pathophysiology I Credit Hours: 3
- BIO 347 - Pathophysiology II Credit Hours: 3
- MIT 103 - Introduction to Medical Imaging Credit Hours: 3
- MIT 231 - Sonographic Principles and Instrumentation I Credit Hours: 4
- MIT 232 - Sonographic Principles and Instrumentation II Credit Hours: 4
- PHY 217 - Physics of Medical Imaging Credit Hours: 3<sup>a</sup>
- VAS 214 - Vascular Anatomy Credit Hours: 4
- VAS 225 - Patient Management Practices Credit Hours: 3
- VAS 245 - Peripheral Venous Disease Credit Hours: 4
- VAS 246 - Peripheral Arterial Disease Credit Hours: 4
- VAS 367 - Cerebrovascular Disease Credit Hours: 4
- VAS 388 - Externship Preparation Credit Hours: 3 (waived)
- VAS 420 - Vascular Technology Externship Credit Hours: 45

**Total: 84 Credit Hours****Completion Credits**

- BIO 220 - Cardiovascular Physiology Credit Hours: 4
- BUS 313 - Health Care Systems and Policy Credit Hours: 3  
or
- BUS 316 - Total Quality in Health Care Credit Hours: 3  
or
- BUS 317 - Health Care Management Credit Hours: 3
- CHE 360 - Clinical Pharmacology for the Health Professions Credit Hours: 3
- SPE 321 - Small Group and Team Communication Credit Hours: 3
- VAS 335 - Radiographic Vascular Anatomy Credit Hours: 3
- VAS 337 - Survey of Echocardiography Credit Hours: 3
- VAS 365 - Abdominal Vascular Disease Credit Hours: 4
- VAS 366 - Special Circulatory Problems Credit Hours: 4
- VAS 375 - Survey of Abdominal Sonography Credit Hours: 3<sup>a</sup>
- VAS 385 - Vascular Laboratory Management Credit Hours: 3
- VAS 420A - Special Vascular Technology Externship Credit Hours: 8
- VAS 420B - Special Vascular Technology Externship Credit Hours: 7
- Communication Elective Credit Hours: 3

**Total: 51 Credit Hours****Transfer Courses**

- BIO 200 - Medical Terminology Credit Hours: 2
- BIO 231 - Human Anatomy and Physiology I Credit Hours: 4
- BIO 232 - Human Anatomy and Physiology II Credit Hours: 4
- BIO 233 - Human Anatomy and Physiology III Credit Hours: 4
- CHE 101 - Introduction to General Chemistry Credit Hours: 3
- CHE 104 - Introduction to General Chemistry Laboratory Credit Hours: 1
- MATH 111 - College Algebra Credit Hours: 4
- MATH 112 - Trigonometry Credit Hours: 4
- PSY 201 - Psychology Credit Hours: 3  
or
- PSY 202 - Psychology Credit Hours: 3

or

- PSY 203 - Psychology Credit Hours: 3
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 121 - English Composition Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3
- WRI 227 - Technical Report Writing Credit Hours: 3
- Humanities Electives Credit Hours: 9
- Social Science Electives Credit Hours: 9
- Elective Credit Hours: 3

**Total: 62 Credit Hours**

<sup>a</sup>Optional credit may be awarded for additional registries

## Medical Laboratory Science Program

Dawn Taylor, *Department Chair and Program Director*

*Assistant Professors:* R. Brown C. Doty, D. Taylor

*Instructors:* D. Brown, R. Barrett

*Adjunct Faculty:* The program utilizes faculty physicians and faculty medical laboratory professionals at Oregon Health & Science University (OHSU) and community medical, research, and public health laboratories.

*Early Admission MLS Program (EAMLSP) Advisors:* Dawn Taylor and Deb Disko (Portland-Metro), Rosalind McClure (Klamath Falls)

### Degree Offered

- Bachelor of Science in Medical Laboratory Science (joint degree between Oregon Tech and OHSU)

Oregon Tech, in partnership with OHSU, offers a course of study leading to a Bachelor of Science in Medical Laboratory Science degree. Students take coursework that combines a rigorous competency-based science curriculum with community-sponsored clinical training. Graduates are prepared to enter the medical laboratory science profession and to pursue career opportunities in various laboratory settings including medical, research, and public health. Students who successfully complete the degree program are eligible to take the *Medical Laboratory Scientist (MLS)* national board certification examination offered by the *American Society for Clinical Pathology (ASCP)*.

### Accreditation

The Medical Laboratory Science professional program is accredited by the *National Accrediting Agency for Medical Laboratory Science (NAACLS)*, 5600 North River Road, Suite 720, Rosemont, Illinois 60018-5119, (773) 714-8880.

### Mission Statement

The mission of the Oregon Tech • OHSU Medical Laboratory Science Program is to educate, train, and graduate professionally competent and ethical individuals, committed to life-long learning, and who are prepared to meet current and future workplace challenges in medical laboratory science.

### Program of Study

During the *pre-professional phase* of study, students complete a minimum of 95-quarter hours that includes (a) 47-quarter hours of general education coursework, including two college-level math courses, one of which must be statistics; (b) 24-quarter hours of biology (200 level or above) that must include one microbiology course and one immunology course; and (c) 24-quarter hours of chemistry (200 level of above). Students must receive a grade of C or better in all required course work.

Through an application process students are selected to enter the professional program.

**NOTE:** *Oregon Tech Early Admission MLS Program (EAMLSP) students who complete EAMLSP requirements are automatically admitted to the MLS professional program. For more information on the Early Admission MLS Program, contact the Department of MLS program office at (503) 821-1146 or EAMLSP advisor Rosalind McClure on the Klamath Falls campus at (541) 885-1525.*

The MLS professional program is admission-restricted and 15 months (5 consecutive terms) long, beginning in September of the academic year in which a student is admitted and ending in December of the following year. Admitted students spend four quarters completing clinical laboratory science-specific coursework on the Oregon Tech Portland-Metro campus. Upon successful completion of the on-campus work, students are assigned to one or more program-affiliated laboratories to complete an extended fifth term (16 weeks) of clinical training. During clinical training, students spend 40 hours per week applying knowledge and skills to perform a wide variety of testing in a contemporary, accredited medical laboratory and to further develop discipline-specific competency under supervision of clinical instructors. Currently, the Department of MLS maintains affiliations with accredited laboratories in Oregon, Washington, Idaho, Nevada and Arizona.

Students admitted to the MLS professional program are guaranteed placement for their clinical training subject to the following policies and procedures:

1. Due to the variable availability of training sites year to year and the nature of contractual agreements with affiliated training sites, student placement at a specific site may not be possible. Therefore, placement of students for clinical training is determined by the program in consultation with clinical affiliate training sites.
2. Before beginning clinical training, students must comply with all training site and Oregon standardized administrative requirements including but not limited to immunizations, screening (e.g., background check, drug screen, etc.), trainings (e.g., safety, CPR, etc.), and proof of health insurance coverage valid for the entire clinical training period.
3. All academic and non-academic requirements must be met to the satisfaction of program faculty before a student is permitted to start clinical training.
4. Students are solely responsible for transportation and housing needs associated with their clinical training placement.

## Professional Program Application and Admission Requirements

The professional program admits one cohort of students a year. Except for EAMLSP students, all prospective students should submit completed applications from September 1st to December 31st of the preceding year for which an applicant seeks admission. Students can download application instructions and the application forms from URL <http://www.oit.edu/portland-metro/academics/degrees/medical-laboratory-science/how-to-apply>.

Importantly, transfer and post-baccalaureate students must also submit a separate application for admission to Oregon Tech. Prospective students may apply online at URL <http://www.oit.edu/portland-metro/admissions>. When asked, applicants should select "Pre MLS" as their major. NOTE: **Admission to Oregon Tech does not mean that an applicant has been admitted to the MLS professional program.**

Admission to the professional program is criterion-based, competitive, and decided by the program admissions committee. Admission selection is based upon scholarship, personal qualifications, recommendations from three references, and interview results. Selected candidates are interviewed in February and applicants selected for admission are notified in writing by the Program Director during March. To be eligible for admission, candidates for the MLS professional program must meet the following minimum eligibility requirements:

- **Those applicants who have earned a Baccalaureate degree must have completed a minimum of 95 transferable quarter credit hours to include:**
  - **Mathematics:** one college-level math course. Minimum requirements are met by MATH 111 - College Algebra. **Additional required math course:** statistics;
  - **Biology:** 24-quarter credit hours that must include one course in immunology and a course in microbiology. The microbiology coursework must include a laboratory component either integral to the course or taken separately; courses must be at the 200-level or above and not survey type. **Additional highly recommended courses:** general biology, genetics, anatomy and physiology, cellular or molecular biology; and
  - **Chemistry:** 24-quarter credit hours of chemistry; courses must be at the 200 level or above and not survey type. **Highly recommended courses:** general chemistry, organic chemistry, biochemistry, and quantitative analysis
- Those applicants who have not earned a Baccalaureate degree must have completed a minimum of 95 transferable quarter hours to include the prerequisites listed in 1 above and:
  - 18-quarter credit hours of Communication course work including specified course work in writing and speech (see Baccalaureate General Education Requirements described elsewhere in this catalog);
  - 9-quarter credit hours of Humanities course work in topical areas such as Art, Art History or Appreciation, Music, Music History or Appreciation, English (excluding writing and speech), Linguistics, and Philosophy (no more than three credits of activity of performance-based courses may be used in this category); and
  - 12-quarter credit hours of Social Science course work in topical areas such as Anthropology, Economics, Geography, History, Political Science, Psychology, and Sociology.

Prerequisite course work does not need to be completed to apply, but official transcript(s) documenting completion of all outstanding prerequisite coursework with grades of 'C' or better must be on file with the MLS Department office before any offer of admission is finalized. The Oregon Tech Registrar's office will review each applicant's transcripts to confirm that the requirements are met. Applicants who have met **admission requirements** seven or more years prior to application to the MLS Program must complete additional academic work to qualify. This may be accomplished by:

- Completing a course in chemistry and a course in biology with a grade of C or better; courses must be at the 200-level or above and not survey type; or
- Receiving credit by examination in biochemistry and in microbiology; or
- Achieving a CLEP score at or above the 50th percentile on both the biology and chemistry examinations.

Applicants seeking transfer credit from international institutions must provide a credential evaluation from an Oregon Tech-approved credential evaluation service and must meet requirements as described in two above. Contact the Oregon Tech Office of Admissions on-line at <http://www.oit.edu/admissions/international-students> or by telephone 503.821.1250 or 1.800.422.2017 for additional information.

- All applicants must have a minimum GPA of 2.5 to apply.

## Health Insurance

Students admitted to the MLS program are required to have and show proof of comprehensive health insurance coverage. This is because during a student's tenure in the MLS program they will work with patient samples and be in close contact with patients who may be ill. This means MLS program students are at a high risk for exposure to certain infections.

**Note:** MLS program students are NOT permitted to begin the program or attend a clinical externship without demonstrating proof of health insurance.

## Oregon Tech Freshman Advantage: The Early Admission MLS Program

Oregon Tech students who have completed winter term of their freshman year in good academic standing may apply to the Early Admission Medical Laboratory Science Program (EAMLSP). NOTE: Students must have at least 60 credits of pre-professional coursework yet to complete to be eligible for the Early Admission MLS program.

EAMLSP students who meet the following minimum eligibility requirements are automatically admitted to the MLS professional program:

1. At the time of application to the EAMLSP, students must be enrolled at either the Klamath Falls or Portland-Metro Oregon Tech campus with a minimum GPA of 3.0, and have at least 60 credits of pre-professional coursework yet to complete; and
2. A EAMLSP-track student must carry a minimum of 12-credits at Oregon Tech per term; and
3. Complete all pre-professional MLS program coursework with grades of "C" or better; and
4. Earn a minimum GPA of 3.00 in each term; and
5. Maintain a cumulative GPA of at least 3.25 in each term; and
6. Adhere to the Student Life Policies and Regulations and the Oregon Tech Academic Regulations - see the Oregon Tech General Catalog and Oregon Tech Student Handbook;
7. Job-shadow a minimum of 10 hours in an approved medical laboratory setting;
8. Complete MLS 100 - Introduction to Medical Laboratory Science with a grade of "B" or better; and
9. Pass a criminal background check.

## Essential Requirements

In accordance with its accreditation standards, the MLS program has established essential requirements. To be admitted and maintain enrollment, participate in, and successfully complete the MLS professional program, a student must meet these non-academic standards of performance:

1. Students must demonstrate the ability to acquire and to communicate information. Specifically, a program student must be able to:
  - a. Read for comprehension and follow verbal and written instructions to demonstrate mastery of information presented in coursework, including relevant content in basic science and clinical courses, at a level deemed appropriate by the faculty.
  - b. Effectively communicate in written and spoken English in order to transmit information to faculty, staff, peers, and members of the health care team.
  - c. Make a correct judgment in seeking supervisory help and consultation in a timely manner.
  - d. Competently utilize technology to research, investigate, acquire and present information obtained by observation and experimentation.
  - e. Use strategies that minimize miscommunication.
  - f. At all times and in all circumstances, follow established procedures to safeguard protected patient information communicated by non-electronic and electronic means.
2. Students must demonstrate sufficient motor and sensory function to execute movements required to carry out work assignments in all phases of diagnostic testing, including pre-analytical, analytical, and post-analytical. Specifically, a program student must be able to:
  - a. Distinguish physical and/or chemical attributes, including color, shape, size, and fine detail of objects both macroscopically and microscopically.
  - b. Demonstrate sufficient dexterity to safely manipulate specimens, laboratory utensils, tools, equipment and instrumentation including computer touch-screens, keyboards and handheld calculators, necessary to obtain and report complete and accurate diagnostic test results.
  - c. Demonstrate adequate mobility to attend to duties in the various locations of the medical laboratory work environment.
  - d. Use sensory skills to acquire and apply information presented by various means and media, including demonstrations.
  - e. Perform sustained, often repetitive physical activity that may require sitting, standing and/or walking for prolonged periods of time.
  - f. Accurately read, record, and when necessary, respond to numbers, letters and symbols displayed in print whether transmitted through non-electronic, electronic or other technological media.
  - g. Demonstrate proficiency performing a wide range of tests in areas of the contemporary medical laboratory including but not limited to hematology, clinical chemistry, immunohematology, and microbiology, molecular and other emerging diagnostic venues.
3. Students must project an image of professionalism through behavior, speech, and grooming. Each student is to possess requisite knowledge and skill and safely perform a wide variety of test procedures with precision and accuracy. Specifically, a program student must be able to:
  - a. Follow established laboratory safety protocols when working with various sample types including blood, urine, and other body fluids and tissues, and with microbial organisms that may be infectious, and hazardous chemicals.
  - b. Work accurately and safely under stress and time constraints, and make subjective evaluations and decisions when mistakes may have a negative and/or high impact on patient care.
  - c. Adapt to changing environments, maintain a professional demeanor and concentration in distracting situations.

- d. Demonstrate attributes that include integrity, responsibility, and tolerance.
- e. Speak, act and perform all work in an ethical manner.
- f. Show respect for self and others.
- g. Work independently as well as cooperatively with others, performing professional obligations in a timely, responsible manner.
- h. Prioritize tasks and accept responsibility for work performed independently and as a team member.
- i. Assess his or her performance, willingly accept criticism, and actively seek ways to improve.

## Medical Laboratory Science, BS

### Graduation Requirements

BS MLS degree students must complete 200 quarter credits hours, maintain a minimum GPA of 2.00, and earn a grade of "C" or better in all professional program courses (MLS) as prescribed by the curriculum outline.

**Note:** The Portland-Metro campus is a laptop-required campus with resources like laptop specifications, financial aid, and helpful instructions found at <http://www.oit.edu/portland-metro/college-costs/bring-your-own-device>.

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Pre-Medical Laboratory Science

This is the curriculum map to be followed by EAMLSP students.

#### First Year

##### Fall

- Biology Elective Credit Hours (200 level or above): 4  
or
- Recommended: BIO 211 - Principles of Biology Credit Hours: 4  
or
- Recommended: BIO 231 - Human Anatomy and Physiology I Credit Hours: 4
- Chemistry Elective Credit Hours (200 level or above): 5  
or
- Recommended: CHE 221 - General Chemistry I Credit Hours: 5
- MATH 111 - College Algebra Credit Hours: 4
- WRI 121 - English Composition Credit Hours: 3

**Total: 16 Credit Hours**

##### Winter

- Biology Elective Credit Hours (200 level or above): 4  
or
- Recommended: BIO 212 - Principles of Biology Credit Hours: 4  
or
- Recommended: BIO 232 - Human Anatomy and Physiology II Credit Hours: 4
- Chemistry Elective Credit Hours (200 level or above): 5  
or
- Recommended: CHE 222 - General Chemistry II Credit Hours: 5
- WRI 122 - Argumentative Writing Credit Hours: 3
- Humanities Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 18 Credit Hours**

#### Spring

- Biology Elective Credit Hours (200 level or above): 4  
or
- Recommended: BIO 213 - Principles of Biology Credit Hours: 4  
or
- Recommended: BIO 233 - Human Anatomy and Physiology III Credit Hours: 4
- Chemistry Elective Credit Hours (200 level or above): 5  
or
- Recommended: CHE 223 - General Chemistry III Credit Hours: 5
- MLS 100 - Introduction to Medical Laboratory Science Credit Hours: 2 (only required for MLS early admission track students)
- SPE 111 - Public Speaking Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 16/17 Credit Hours**

#### Second Year

##### Fall

- BIO 345 - Medical Microbiology Credit Hours: 5
- Chemistry Elective Credit Hours (200 level or above): 4
- Communication Elective Credit Hours: 3<sup>a</sup>
- Statistics Elective Credit Hours: 4

**Total: 16 Credit Hours**

##### Winter

- Biology Elective Credit Hours (200 level or above): 3
- Chemistry Elective Credit Hours (200 level or above): 4
- Communication Elective Credit Hours: 3<sup>a</sup>
- Humanities Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Spring

- BIO 436 - Immunology Credit Hours: 4
- Chemistry Elective Credit Hours (200 level or above): 4
- Communication Elective Credit Hours: 3<sup>a</sup>
- Humanities Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 17 Credit Hours**

**Communication Electives**

Students must choose courses from the following list:

- COM 205 - Intercultural Communication Credit Hours: 3<sup>a</sup>
- COM 225 - Interpersonal Communication Credit Hours: 3
- COM 320 - Advanced Intercultural Communication Credit Hours: 3<sup>a</sup>
- COM 347 - Negotiation and Conflict Resolution Credit Hours: 3
- COM 401 - Civil Engineering Project I Credit Hours: 6
- SPE 314 - Argumentation Credit Hours: 3
- SPE 321 - Small Group and Team Communication Credit Hours: 3
- WRI 123 - Research Writing Credit Hours: 3
- WRI 214 - Business Correspondence Credit Hours: 3
- WRI 227 - Technical Report Writing Credit Hours: 3
- WRI 327 - Advanced Technical Writing Credit Hours: 3
- WRI 328 - Style Credit Hours: 3
- WRI 350 - Documentation Development Credit Hours: 3
- WRI 410 - Proposal and Grant Writing Credit Hours: 3

<sup>a</sup>COM 205 and COM 320 **may not** be used to satisfy both Communication and Humanities credits

**Professional Courses**

All senior level courses require admission to the Medical Laboratory Science Program or instructor consent.

**Professional Courses****Fall**

- MLS 420 - Clinical Immunology and Infectious Serology Credit Hours: 5
- MLS 474 - Medical Parasitology Credit Hours: 2
- MLS 432 - Foundations of Medical Laboratory Science I Credit Hours: 4
- MLS 442 - Hematology I Credit Hours: 6

**Total: 17 Credit Hours**

**Winter**

- MLS 415 - Clinical Chemistry I Credit Hours: 6
- MLS 444 - Microbiology I Credit Hours: 6
- MLS 452 - Hematology II Credit Hours: 5
- MLS 462 - Foundations of Medical Laboratory Science II Credit Hours: 2

**Total: 19 Credit Hours**

**Spring**

- MLS 416 - Clinical Chemistry II Credit Hours: 6
- MLS 443 - Immunohematology I Credit Hours: 4
- MLS 445 - Microbiology II Credit Hours: 4
- MLS 449 - Principles of Urinalysis Credit Hours: 3
- MLS 457 - Research Seminar Credit Hours: 1

**Total: 18 Credit Hours**

**Total for a B.S. Medical Laboratory Science: 183 Credit Hours**

**Summer**

- MLS 417 - Clinical Chemistry III Credit Hours: 2
- MLS 422 - Molecular Diagnostic Methods Credit Hours: 3
- MLS 424 - Hemostasis Credit Hours: 3
- MLS 453 - Immunohematology II Credit Hours: 3
- MLS 464 - Medical Mycology and Virology Credit Hours: 2

**Total: 13 Credit Hours**

**Fall**

- MLS 463 - Foundations of Medical Laboratory Science III Credit Hours: 1
- MLS 470 - Chemistry and Immunology Externship Credit Hours: 4
- MLS 471 - Hematology Externship Credit Hours: 4
- MLS 472 - Microbiology Externship Credit Hours: 4
- MLS 473 - Immunohematology Externship Credit Hours: 3

**Total: 16 Credit Hours**

## Natural Sciences Department

Rosalind McClure, *Department Chair*

*Professors:* B. Clark, H.-Y. Li, T. McVay, M. O'Shaughnessy, E. Schechtel, R. Swisher, K. Usher

*Associate Professors:* R. Wilde, R. McClure

*Assistant Professors:* S. Anthony, M. Beekman, K. Byrne, M. Hughes, J. Kellermann, G. Pak, L. Parratt, E. Taylor, T. Lund

### Degrees Offered

- Bachelor of Science in Biology-Health Sciences
- Bachelor of Science in Environmental Sciences

### Minors Offered

- Applied Physics
- Biology
- Chemistry
- Sustainability

The Department of Natural Sciences prepares students for challenging, rewarding careers in health, biological, and environmental sciences. The department also provides courses in biology, chemistry, and physics in support of degrees in nursing, medical imaging, dental hygiene, respiratory care, management and engineering programs.

### Biology Program

Many students have an interest in biology. At Oregon Tech we have designed two programs that prepare graduates for rewarding careers that require a strong foundation in biology. For outdoor or field-oriented options, please refer to the Environmental Sciences program in our department. It offers several emphases, including Watershed Science, which can readily be tailored to biological interests and student research projects. Graduates from our Environmental Sciences program often go on to careers with public and private agencies such as US Fish and Wildlife Service, US Forest Service and the Nature Conservancy. For medically-oriented options in biology, please see our Biology-Health Sciences program. It offers a strong preparation to apply to professional programs, exceeding the minimum requirements for highly competitive fields such as Medicine, Pharmacy, Dentistry, Veterinary Medicine, Physician Assistant, and others.

### Biology-Health Sciences Program

Ken Usher, *Program Director*

#### Degree Offered

- Bachelor of Science in Biology-Health Sciences

#### Objective and Career Opportunities

If you are interested in pre-medical, pre-dental, pre-veterinary, pre-pharmacy, pre-physical therapy, etc., then this is the major you want. The degree program provides an intensive course of study in the basic sciences, social sciences, communication, and mathematics to prepare students for entry into professional programs. The program will meet prerequisite requirements for schools of medicine, dentistry, veterinary medicine, osteopathic medicine, optometry, pharmacy, and podiatry and for graduate programs in physical therapy and occupational therapy. Courses in health management, medical microbiology, biochemistry, and molecular & cell biology also provide strong preparation for graduate work in biotechnology, public health, and medical administration. This major can also prepare one for a career in education with an emphasis in biology.

#### Student Preparation

The Biology-Health Sciences curriculum is a demanding instructional program requiring considerable effort in science and mathematics coursework. Prospective students are advised to complete two to three years of high school mathematics and a minimum of three years of high school science (biology, chemistry, and physics).

#### Pre-Professional Program in Dentistry

Burt Clark, *Advising Coordinator*

The pre-professional program in dentistry prepares the student for entrance into dental school. While the requirements for admission to dental schools vary and some will accept students earlier, a bachelor's degree is highly encouraged for acceptance. In fact, 82% of first-year dental students have completed a four-year baccalaureate degree before starting dental school and 90% have four years of pre-dental college courses before acceptance. The curriculum at Oregon Institute of Technology provides the prerequisite courses for dental school including a full year of general biology, general chemistry, organic chemistry, biochemistry, advanced anatomy & physiology, and physics. All of these have year-long labs. In addition, health-specific courses in cell biology, clinical pharmacology,

medical genetics, medical microbiology, neuroscience, nutrition, pathophysiology, and immunology are taken along with calculus, humanities, psychology, and English composition courses.

Because the pre-dental requirements for each dental school vary slightly, it is suggested by sophomore year of college that students look at the requirements for several dental schools along with their dream school. It is also recommended that students do not use AP credit to fill prerequisites for dental school since most do not accept them. There are eight advisors in Oregon Tech's pre-dental program and it is encouraged that students work closely with the advisor they connect best with. The Biology-Health Sciences Program also urges students to begin volunteering in dental settings, possibly during high school and especially during college. For students still in high school, it is advisable to enroll in many sciences courses before college to help prepare for future success.

Admission to dental school is very competitive and requires strong academic achievement. Besides a strong college GPA and application, students must take the dental admission test (DAT) offered by the American Dental Association. The test measures a student's comprehension of scientific information and academic ability. Once accepted, it will take approximately four years to complete dental school.

For complete program requirements and a list of appropriate courses, please see the Biology-Health Sciences Program. Completion of this program will lead to a Bachelor of Science in Biology-Health Sciences.

### **Pre-Professional Program in Medicine**

Burt Clark, *Advising Coordinator*

This program prepares students for entrance into medical school and is often referred to as pre-med. The curriculum at Oregon Institute of Technology provides a pathway to complete all the prerequisites that medical schools like to see and more. There are eight advisors in the pre-med program and students are encouraged to work closely with the advisor they connect best with. Advisors guide students on courses selection, job or volunteer experience, and lead them through the medical school application process. Admission into medical school requires a four-year bachelor's degree with a preference for a science major over a non-science major. Once accepted, medical school then requires approximately four years of education and three to six years of internship and residency. More than 17,000 students enter medical school each year with half of the class being women.

Students are urged to volunteer in medical settings, possibly during high school and especially during college. For students currently in high school, it is advised that the student enrolls in many sciences courses before college to help them prepare for future success. It is recommended that students do not use AP credit to fill medical school prerequisites since they often do not accept them. Nonetheless, it is encouraged to take AP courses in high school since the rigor is excellent college preparation.

Students considering a career in medicine should explore the websites of the schools they have interest in as the prerequisites for each may vary. Students are suggested to read the Medical School Admissions Requirements (MSAR) published by the Association of American Medical Colleges. The pre-med program at Oregon Tech includes a full year of general biology, general chemistry, organic chemistry, biochemistry, advanced anatomy & physiology, and physics. All of these have year-long labs. In addition, health-specific courses in cell biology, clinical pharmacology, medical genetics, medical microbiology, neuroscience, nutrition, pathophysiology, and immunology are taken along with calculus, humanities, psychology, and English composition courses. While the curriculum is very challenging, admission into medical school is highly competitive and requires strong academic achievement. The coursework at Oregon Tech helps students prepare for the medical college admission test (MCAT) required by nearly all medical schools. The test, which is divided into four sections includes physical sciences, biological sciences, verbal reasoning, and writing sample, is used to predict a student's ability to succeed academically.

For complete program requirements and a list of appropriate courses please see the Biology-Health Sciences Program. Completion of this program will lead to a Bachelor of Science in Biology-Health Sciences.

### **Pre-Professional Program in Pharmacy**

Burt Clark, *Advising Coordinator*

A pharmacy degree normally takes four years to complete. Most first-year pharmacy students have completed four years of undergraduate education and possess a bachelor's degree in the sciences. One also must complete the prerequisites for the pharmacy school. The curriculum at Oregon Institute of Technology provides the prerequisite courses including a full year of general biology, general chemistry, organic chemistry, biochemistry, advanced anatomy & physiology, and physics. All of these have year-long labs. Additional courses in cell biology, clinical pharmacology, medical genetics, medical microbiology, neuroscience, nutrition, pathophysiology, and immunology are taken along with calculus, humanities, psychology, statistics and English composition courses.

The pre-professional program in pharmacy at Oregon Tech has eight advisors and students are encouraged to work closely with the advisor they connect best with. Students are urged to begin volunteering in pharmacy settings, possibly during high school and especially during college. For students currently in high school, it is recommend to shadow and talk with pharmacists and to take many science courses before college to help prepare for future success.

The application process to pharmacy school is done through the Pharmacy College Application Service (PharmCAS). Students are encouraged to look at their web site while also looking at the sites of schools they have an interest in. Some pharmacy schools require the Pharmacy College Admissions Test (PCAT). Oregon State University and the pharmacy schools in California do not. Admission to school is competitive so a strong undergraduate GPA, community service, and communications and leadership skills will help.

For complete program requirements and a list of appropriate courses please see the Biology-Health Sciences Program. Completion of this program will lead to a Bachelor of Science in Biology-Health Sciences.

## **Pre-Professional Program in Veterinary Medicine**

Burt Clark, *Advising Coordinator*

The pre-professional program in veterinary medicine prepares students for entrance into veterinary school. There are twenty-eight veterinary schools in the United States and it is highly recommended that students visit the websites of the schools they are interested in. The prerequisites for each school vary slightly. There are eight advisors in the program and students should work closely with the advisor they connect best with.

Admission to veterinary school is competitive and requires a good undergraduate GPA in addition to shadowing or working with a veterinarian. Students are encouraged to work in a clinical practice, volunteer in an animal shelter, or work at a zoo or rehabilitation facility while completing their undergraduate courses. Students currently in high school should continue to take sciences courses and, if available, be involved in 4H or FFA. Advisors recommend that students do not use AP credit to fill prerequisites for veterinary school since most do not accept them.

Being a resident of a state that has a veterinary school is also a major advantage to being accepted since most schools take few out-of-state applicants. If the student's home state does not have a veterinary school, hopefully the state "buys" seats from a veterinary school in a neighboring state for its residents. The WICHE program in the western United States allows out-of-state students to attend veterinary school at Colorado State University at Fort Collins, Oregon State University, Washington State University or the University of California at Davis veterinary schools for in-state tuition.

Many veterinary schools require students to take the general test of the Graduate Record Examination (GRE). It is offered monthly and is often taken in the junior year of undergrad. The majority of first-year veterinary student have completed their bachelor's degree at a four-year university.

The program at Oregon Institute of Technology offers the prerequisite courses (and more) for veterinary school including a full year of general biology, general chemistry, organic chemistry, biochemistry, advanced anatomy & physiology, and physics. All of these have year-long labs. In addition, health-specific courses in wildlife rehabilitation, cell biology, clinical pharmacology, medical genetics, medical microbiology, neuroscience, nutrition, pathophysiology, and immunology are taken along with calculus, humanities, psychology, English composition and public speaking courses. Business-related courses are also recommended.

For complete program requirements and a list of appropriate courses please see the Biology – Health Sciences Program. Completion of this program will lead to a Bachelor of Science in Biology – Health Sciences.

## **Applied Physics Minor**

Students wishing to pursue the minor in Applied Physics should consult with physics faculty in the Natural Sciences Department for advising.

The Minor in Applied Physics is available to any student and is especially recommended for individuals interested in pursuing careers or graduate studies in physical or applied sciences and engineering. The Minor in Applied Physics requires completion of 32 credits of coursework as outlined below. A grade of "C" or better is required in all courses applied toward the minor.

### **Required Coursework:**

- PHY 221 - General Physics with Calculus Credit Hours:4
- PHY 222 - General Physics with Calculus Credit Hours:4
- PHY 223 - General Physics with Calculus Credit Hours:4
- MATH 254 - Vector Calculus I Credit Hours: 4
- MATH 321 - Applied Differential Equations I Credit Hours:4
- At least 12 credits of upper-division physics Electives (PHY prefix)

### **Approved Upper-Division Electives:**

Up to six credits of the upper-division elective coursework may be satisfied by approved non-PHY electives that utilize the technical application of physics (see list below; other courses must be approved by the physics faculty and the chair of the Natural Sciences

department on a case-by-case basis). Of the 12 upper-division elective credits, six cannot be counted toward the student's major program.

Any course 300-level or higher that has a PHY prefix.

#### **Examples include:**

- PHY 311 - Introduction to Modern Physics Credit Hours: 3
- PHY 330 - Electricity and Magnetism Credit Hours: 3
- PHY 448 - Geometric Optics Credit Hours: 4
- PHY 449 - Radiometry & Optical Detection Credit Hours: 4
- PHY 450 - Physical Optics Credit Hours: 4
- PHY 451 - Lasers Credit Hours: 4
- PHY 452 - Waveguides and Fiber Optics Credit Hours: 4
- PHY 453 - Optical Metrology Credit Hours: 4
- PHY 410 - Mathematical Methods: Fourier Optics Credit Hours: 3

#### **Approved non-PHY Electives:**

- EE 341 - Electricity and Magnetism with Transmission Lines Credit Hours: 4
- EE 343 - Solid-State Electronic Devices Credit Hours: 3
- REE 344 - Nuclear Energy Credit Hours: 3
- REE 345 - Wind Power Credit Hours: 3
- REE 347 - Hydroelectric Power Credit Hours: 3
- MECH 312 - Dynamics II Credit Hours: 3
- MECH 318 - Fluid Mechanics I Credit Hours: 4
- MECH 323 - Heat Transfer I Credit Hours: 3
- MECH 417 - Fluid Mechanics II Credit Hours: 3
- MECH 480 - Mechanical Vibrations Credit Hours: 3
- MECH 313 - Thermodynamics II Credit Hours: 3

**Note:** Not all courses are offered every year or on every campus. Additional prerequisites may be required; see catalog descriptions and recent course schedules for details.

## **Biology Minor**

For advising, see Kerry Byrne

The biology minor is open to all majors except Biology-Health Sciences majors. It is especially recommended for students who want to further their knowledge in biology as it relates to their chosen field. The minor offers specialized courses in biology and will document student proficiency in specific areas of biology. A minimum of 24 credits is required to complete the minor. Any substitution for elective courses must be approved by an advisor in the Natural Sciences Department. Students are advised to pay strict attention to prerequisites when selecting courses for the biology minor.

### **Requirements of Minor**

#### **Required Core Courses:**

BIO 211 - Principles of Biology Credit Hours: 4

- BIO 212 - Principles of Biology Credit Hours: 4
- BIO 213 - Principles of Biology Credit Hours: 4

**And a minimum of 12 credits upper-division course work from the following list:**

<sup>a</sup> Courses offered in alternating years.

- BIO 313 - Botany Credit Hours: 4<sup>a</sup>
- BIO 331 - Human Anatomy and Physiology I Credit Hours: 5
- BIO 332 - Human Anatomy and Physiology II Credit Hours: 5
- BIO 333 - Human Anatomy and Physiology III Credit Hours: 5
- BIO 337 - Aquatic Ecology Credit Hours: 4<sup>a</sup>
- BIO 341 - Medical Genetics Credit Hours: 3
- BIO 342 - Cell Biology Credit Hours: 4
- BIO 345 - Medical Microbiology Credit Hours: 5
- BIO 352 - Developmental Biology Credit Hours: 4
- BIO 357 - Introduction to Neuroscience Credit Hours: 3
- BIO 426 - Evolutionary Biology Credit Hours: 3
- BIO 436 - Immunology Credit Hours: 4

## Biology-Health Sciences, BS

### Degree Requirements

The minimum graduation requirement is 181 credit hours of prescribed coursework. Students must meet the general education requirements, as stated elsewhere in this catalog, and satisfactorily complete the courses listed in this curriculum to obtain a Bachelor of Science degree in Biology-Health Sciences. Biology-Health Sciences students must complete every science course with a minimum grade of "C" and must maintain a minimum grade point average of 2.5 in lower division science courses to advance to upper-division science courses in the major.

Because the prerequisite requirements and recommended courses for entry into health professions and graduate schools differ, some upper-division courses may be substituted for others, with approval of your academic advisor.

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- BIO 211 - Principles of Biology Credit Hours: 4
- MATH 111 - College Algebra Credit Hours: 4
- WRI 121 - English Composition Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 14 Credit Hours**

##### Winter

- BIO 109 - Introduction to the Medical Sciences Credit Hours: 2
- BIO 212 - Principles of Biology Credit Hours: 4
- MATH 112 - Trigonometry Credit Hours: 4
- WRI 122 - Argumentative Writing Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Spring

- BIO 213 - Principles of Biology Credit Hours: 4
- MATH 361 - Statistical Methods I Credit Hours: 4<sup>a</sup>
- Health Biology Elective Credit Hours: 2 (lower-division)<sup>b</sup>
- Humanities Elective Credit Hours: 3

**Total: 13 Credit Hours**

#### Sophomore Year

##### Fall

- BIO 345 - Medical Microbiology Credit Hours: 5
- CHE 221 - General Chemistry I Credit Hours: 5
- MATH 251 - Differential Calculus Credit Hours: 4
- SPE 111 - Public Speaking Credit Hours: 3

**Total: 17 Credit Hours**

##### Winter

- BIO 209 - Current Research Topics in Medical Sciences I Credit Hours: 1
- CHE 222 - General Chemistry II Credit Hours: 5
- MATH 252 - Integral Calculus Credit Hours: 4
- SPE 321 - Small Group and Team Communication Credit Hours: 3
- Health Biology Elective Credit Hours: 3 (upper-division)<sup>c</sup>

**Total: 16 Credit Hours**

#### Spring

- CHE 223 - General Chemistry III Credit Hours: 5
- WRI 227 - Technical Report Writing Credit Hours: 3
- Health Biology Elective Credit Hours: 4 (upper-division)<sup>c</sup>
- Humanities Elective Credit Hours: 3

**Total: 15 Credit Hours**

#### Junior Year

##### Fall

- BIO 331 - Human Anatomy and Physiology I Credit Hours: 5
- CHE 331 - Organic Chemistry I Credit Hours: 4
- PHY 221 - General Physics with Calculus Credit Hours: 4<sup>d</sup>

**Total: 13 Credit Hours**

##### Winter

- BIO 332 - Human Anatomy and Physiology II Credit Hours: 5
- CHE 332 - Organic Chemistry II Credit Hours: 4
- PHY 222 - General Physics with Calculus Credit Hours: 4<sup>d</sup>
- Humanities Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Spring

- BIO 333 - Human Anatomy and Physiology III Credit Hours: 5
- CHE 333 - Organic Chemistry III Credit Hours: 4
- PHY 223 - General Physics with Calculus Credit Hours: 4<sup>d</sup>
- WRI 327 - Advanced Technical Writing Credit Hours: 3

**Total: 16 Credit Hours**

#### Senior Year

##### Fall

- CHE 450 - Biochemistry I Credit Hours: 4
- Health Biology Elective Credit Hours: 3 (upper-division)<sup>c</sup>
- Social Science Elective Credit Hours: 3
- Elective Credit Hours: 3<sup>e</sup>
- Elective Credit Hours: 3<sup>e</sup>

**Total: 16 Credit Hours**

**Winter**

- BIO 346 - Pathophysiology I Credit Hours: 3
- BIO 409 - Current Research Topics in Medical Sciences II Credit Hours: 2
- CHE 451 - Biochemistry II Credit Hours: 4
- Social Science Elective Credit Hours: 3
- Elective Credit Hours: 3

**Total: 15 Credit Hours****Spring**

- Health Biology Elective Credit Hours: 3 (upper-division)<sup>c</sup>
- Health Biology Elective Credit Hours: 4 (upper-division)<sup>c</sup>
- Health Biology Elective Credit Hours: 4 (upper-division)<sup>c</sup>
- Elective Credit Hours: 3<sup>c</sup>

**Total: 14 Credit Hours****Health Biology Electives (lower-division):**

- BIO 200 - Medical Terminology Credit Hours: 2
- BIO 205 - Nutrition Credit Hours: 3
- BIO 216 - Biology of Companion Animals Credit Hours: 4
- BIO 226 - Introduction to Wildlife Rehabilitation Credit Hours: 3

**Health Biology Electives (upper-division):**

- BIO 341 - Medical Genetics Credit Hours: 3
- BIO 342 - Cell Biology Credit Hours: 4
- BIO 347 - Pathophysiology II Credit Hours: 3
- BIO 352 - Developmental Biology Credit Hours: 4
- BIO 357 - Introduction to Neuroscience Credit Hours: 3
- BIO 426 - Evolutionary Biology Credit Hours: 3
- BIO 436 - Immunology Credit Hours: 4
- BIO 461 - Human Cadaver Dissection Credit Hours: 1
- BIO 462 - Human Cadaver Dissection Credit Hours: 1
- CHE 360 - Clinical Pharmacology for the Health Professions Credit Hours: 3
- CHE 452 - Biochemistry III Credit Hours: 4
- STAT 414 - Statistical Methods in Epidemiology Credit Hours: 4

**Total for a B.S. in Biology-Health Sciences: 181 Credit Hours**

<sup>a</sup> MATH 243 may be substituted with advisor consent.

<sup>b</sup> Minimum of 2 credits of lower-division health biology elective must be completed, chosen from the lower-division list above. Alternately, an additional elective from the upper-division list may be taken, in which case a total of at least 23 credits of upper-division health biology electives are required.

<sup>c</sup> Minimum of 21 credits of upper-division health biology electives must be completed, chosen from the upper-division list above.

<sup>d</sup> PHY 201, PHY 202, PHY 203 may be substituted with advisor consent.

<sup>e</sup> Advisor approval of all elective choices is required. Additional courses from the health biology lists above, and/or suitable courses from BUS, MATH, or PSY are recommended.

When choosing electives or substituting courses, students are responsible for completing a minimum of 60 credits of upper-division work before a degree will be awarded. Upper-division work is defined as 300 and 400 level classes at a bachelor's degree granting institution.

## Chemistry Minor

For advising, see Seth Anthony

Oregon Tech offers a minor in chemistry to students in all majors interested in deepening their knowledge of chemistry, the "central science". A minor in chemistry allows students the opportunity to gain understanding of chemical phenomena, become proficient in techniques, and develop their abilities applying fundamental chemistry concepts to more complex problems in fields from medicine to renewable energy to materials science. A chemistry minor can help prepare students for graduate school, medical school, or professional laboratory or research work.

The minor includes a required core of one year of general chemistry and one term of organic chemistry. Students must then choose 16 credits of chemistry electives to complete the minor. Of these electives, 12 must be upper-division and at least 8 must be CHE courses. A minimum of 16 credits applied towards the minor must be earned at Oregon Tech.

Students wishing to pursue the minor in chemistry should consult with both their primary academic advisor and a chemistry minor advisor.

### Requirements of Minor

#### Required Core Courses (17 - 19 credits):

- CHE 201 - General Chemistry I Credit Hours: 3
- CHE 204 - General Chemistry I Laboratory Credit Hours: 1  
or
- CHE 221 - General Chemistry I Credit Hours: 5
  
- CHE 202 - General Chemistry II Credit Hours: 3
- CHE 205 - General Chemistry II Laboratory Credit Hours: 1  
or
- CHE 222 - General Chemistry II Credit Hours: 5
  
- CHE 203 - General Chemistry III Credit Hours: 3
- CHE 206 - General Chemistry Laboratory Credit Hours: 1  
or
- CHE 223 - General Chemistry III Credit Hours: 5
  
- CHE 331 - Organic Chemistry I Credit Hours: 4

### Elective Courses

(16 credits required; at least 12 must be upper division (300-level or higher) and at least 8 must be CHE courses) At least 6 elective credits must not be counted towards a major (or another minor or program) as required courses or technical electives:

- CHE 260 - Electrochemistry for Renewable Energy Applications Credit Hours: 4
  
- CHE 305 - Nanoscience and Nanotechnology Credit Hours: 4  
• or
- ENGR 305 - Nanoscience and Nanotechnology Credit Hours: 4  
• or
- PHY 305 - Nanoscience and Nanotechnology Credit Hours: 4
  
- CHE 315 - Environmental Chemistry and Toxicology Credit Hours: 3
- CHE 332 - Organic Chemistry II Credit Hours: 4
- CHE 333 - Organic Chemistry III Credit Hours: 4
- CHE 450 - Biochemistry I Credit Hours: 4
- CHE 451 - Biochemistry II Credit Hours: 4
- CHE 452 - Biochemistry III Credit Hours: 4
- CHE 465 - Fate and Transport of Pollutants Credit Hours: 4
- EE 343 - Solid-State Electronic Devices Credit Hours: 3
- ENGR 355 - Thermodynamics Credit Hours: 3
- MECH 360 - Engineering Materials II Credit Hours: 3
- MECH 260 - Engineering Materials I Credit Hours: 3
- MLS 415 - Clinical Chemistry I
- MLS 416 - Clinical Chemistry II
- MLS 417 - Clinical Chemistry III
- PHY 311 - Introduction to Modern Physics Credit Hours: 3

- REE 331 - Fuel Cells Credit Hours: 3
- REE 333 - Batteries Credit Hours: 3
- REE 335 - Hydrogen Credit Hours: 3
- REE 337 - Materials for RE Applications Credit Hours: 3
- REE 346 - Biofuels and Biomass Credit Hours: 3
- Any other CHE course at the 200-level or higher, except for pharmacology courses (CHE 210, CHE 350, CHE 360)
- Other electives approved by the Natural Sciences department.

## Sustainability Minor

For advising, see Michael Hughes, Environmental Science

The sustainability minor is available to all students in all majors and is recommended for any student who wants to develop sustainability literacy and gain credit for a breadth of study encompassing the three primary cores of sustainability education: natural sciences, humanities and social sciences, and engineering and technology. The minor in sustainability acknowledges the completion of 18 credits as outlined below. Introductory and capstone courses are included and at least one course must be taken in each of the three core areas. At least 12 of the 18 credits must be upper division. Advising for the minor is performed by a primary advisor with support from secondary advisors representing each of the three core areas.

### Requirements of Minor

#### Required Core Courses (7 credits):

- ENV 484 - Sustainable Human Ecology Credit Hours: 4
- SOC 235 - Introduction to Sustainability Credit Hours: 3

#### Elective Courses

(At least 11 credits required with at least one course taken from each area: natural sciences, humanities and social sciences, and engineering and technology):

#### Natural Sciences

ENV 111 - Introduction to Environmental Sciences Credit Hours: 4

- BIO 337 - Aquatic Ecology Credit Hours: 4
- CHE 260 - Electrochemistry for Renewable Energy Applications Credit Hours: 4
- CHE 315 - Environmental Chemistry and Toxicology Credit Hours: 3
- CHE 465 - Fate and Transport of Pollutants Credit Hours: 4
- ENV 265 - Field Methods in Environmental Sciences Credit Hours: 3
- ENV 314 - Environmental Management and Restoration Credit Hours: 3
- ENV 336 - Environmental Hydrology Credit Hours: 4
- ENV 365 - Advanced Field Methods in Environmental Sciences Credit Hours: 3
- ENV 427 - Greenhouse Gas Accounting/Footprints Credit Hours: 3
- ENV 469 - Treatment Wetlands Credit Hours: 3
- GEOG 105 - Physical Geography Credit Hours: 4
- Other courses as approved by the advisory team

#### Humanities and Social Sciences

- ANTH 335 - The Built Environment Credit Hours: 3
- ANTH 452 - Globalization Credit Hours: 3
- COM 205 - Intercultural Communication Credit Hours: 3
- COM 365 - Electronic Communication and Society Credit Hours: 3
- ECO 357 - Energy Economics and Policy Credit Hours: 3
- GEOG 106 - Cultural Geography I Credit Hours: 3
- GEOG 107 - Cultural Geography II Credit Hours: 3
- GEOG 108 - Cultural Geography III Credit Hours: 3
- HIST 225 - Technology and the Rise of the West Credit Hours: 3
- HIST 226 - Technology and the Modern World Credit Hours: 3
- HIST 356 - A History of Energy Credit Hours: 3
- HIST 357 - History of the Electric Grid Credit Hours: 3
- HUM 125 - Introduction to Technology, Society and Values Credit Hours: 3
- PHIL 331 - Ethics in the Professions Credit Hours: 3
- PHIL 342 - Business Ethics Credit Hours: 3
- PSY 334 - Behavior Modification I Credit Hours: 4
- Other courses as approved by advisory team

**Engineering and Technology**

- BUS 385 - Ecotourism Credit Hours: 3
- CE 405 - Sustainability and Infrastructure Credit Hours: 3
- CE 457 - Transportation and Land Development Credit Hours: 3
- CE 481 - Environmental Engineering I Credit Hours: 3
- CE 489 - Treatment Wetlands Credit Hours: 3
- CE 586 - Water and Wastewater Treatment Credit Hours: 4
- GIS 134 - Geographic Information Systems Credit Hours: 3
- GIS 103 - The Digital Earth Credit Hours: 3
- MET 416 - Energy Systems Credit Hours: 3
- REE 201 - Introduction to Renewable Energy Credit Hours: 3
- REE 253 - Electromechanical Energy Conversion Credit Hours: 3
- REE 331 - Fuel Cells Credit Hours: 3
- REE 346 - Biofuels and Biomass Credit Hours: 3
- REE 427 - Greenhouse Gas Accounting/Footprints Credit Hours: 3
- Other courses as approved by the advisory team

## Nursing

Susan Bakewell-Sachs, *School of Nursing Dean and Vice President for Nursing Affairs for OHSU*

Tamara Rose, *Campus Associate Dean*

*Instructors:* S. Brandsness, L. Callahan, M. Gran-Moravec, B. Hunter, D. Mize, C. Neubauer, M. Pappas, V. Powers

This program is offered at Oregon Institute of Technology by the Oregon Health & Science University School of Nursing, in cooperation with Oregon Tech.

### Degree Offered

- Bachelor of Science with a major in Nursing

The OHSU School of Nursing is a health professions leader in academic productivity and innovative educational programming. It is recognized as a model in educating students for careers in nursing at both the graduate and undergraduate levels. In July 1993, the Nursing Program at Oregon Tech became a member of the Statewide Integrated Nursing Education System for Oregon. Campuses are located in: Ashland, at Southern Oregon University; Klamath Falls, at Oregon Institute of Technology; La Grande, at Eastern Oregon University; Monmouth, at Western Oregon University; and Portland, at Oregon Health & Science University. In addition to a basic baccalaureate degree in nursing, the statewide program offers opportunities for RNs seeking B.S. degrees.

Non-nursing coursework may be taken at Oregon Institute of Technology, a community college, or other accredited institutions of higher learning. Pre-nursing majors must apply and be accepted by the OHSU School of Nursing in order to progress into the nursing major. Admission is dependent on a point system which includes academic performance and a proctored essay.

The baccalaureate in Nursing Program provides the essential foundation for professional nursing licensure and practice. The Nursing Program, as of fall 2006, includes one year (if courses are begun in summer term, or having transfer credits) or two years of pre-nursing courses and then, after acceptance into the program, three years of professional nursing courses and general courses, as well. Selection into the professional program is competitive.

Nursing courses build upon and complement the liberal arts and science foundation required for professional practice. The graduate of the B.S. program is eligible to complete the registered nursing licensure examination and is prepared to assume responsibility for providing professional nursing care.

### Options for Registered Nurses to Obtain a B.S.

There is a process in place for assisting RNs to complete coursework to obtain a B.S. This is an online degree and is not offered on the Oregon Tech campus. Please contact the School of Nursing for information at (866) 223-1811.

### Approval and Accreditation

The Nursing Program is approved by the Oregon State Board of Nursing (OSBN) and accredited by the Commission on Collegiate Nursing Education (CCNE) through 2013.

### Admission

To be considered for admission to the School of Nursing, a student must submit an online application and official transcripts ([www.ohsu.edu/son](http://www.ohsu.edu/son)). The application process begins October 1 through February 15. The minimum criteria to apply are:

- have 30 credits completed by the end of fall term
- have completed the Human Anatomy and Physiology I
- be at the Intermediate Algebra math level
- have a minimum 3.0 GPA for your prerequisite courses

### Transfer Credits

Transfer credits are accepted subject to review by OHSU Registrar's office for comparability and number of credits which may be granted.

### Requirements for Major

Students with a baccalaureate degree in another discipline should see a nursing advisor for requirements with the nursing major.

## Nursing, BS

### Curriculum

Courses and terms during which they may be taken.

#### Pre-Nursing

##### Freshman Year

###### Summer

- SPE 111 - Public Speaking Credit Hours: 3<sup>c</sup>
- WRI 121 - English Composition Credit Hours: 3
- Humanities Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3
- Elective Credit Hours: 3

**Total: 15 Credit Hours**

###### Fall

- BIO 231 - Human Anatomy and Physiology I Credit Hours: 4
- MATH 100 - Intermediate Algebra Credit Hours: 4<sup>a</sup>
- PSY 201 - Psychology Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3
- Elective Credit Hours: 1-3

**Total: 15+ Credit Hours**

###### Winter

- BIO 105 - Microbiology Credit Hours: 4
- BIO 232 - Human Anatomy and Physiology II Credit Hours: 4
- PSY 311 - Human Growth and Development I Credit Hours: 3
- WRI 123 - Research Writing Credit Hours: 3
- or
- WRI 227 - Technical Report Writing Credit Hours: 3

**Total: 14 Credit Hours**

###### Spring

- BIO 205 - Nutrition Credit Hours: 3
- BIO 233 - Human Anatomy and Physiology III Credit Hours: 4
- PSY 312 - Human Growth and Development II Credit Hours: 3
- Elective Credit Hours: 3

**Total: 13 Credit Hours**

<sup>a</sup>The math competency may be demonstrated by a math placement test or by successful completion of MATH 95/MATH 100 Intermediate Algebra or higher

<sup>b</sup>Introductory Statistics is a nursing degree requirement

<sup>c</sup>SPE 111 is a prerequisite to the third writing (WRI 123 or WRI 227) course which is a degree requirement

#### Professional Courses

##### Sophomore Year

###### Fall

- NRS 210A - Foundations of Nursing - Health Promotion Credit Hours: 4
- NRS 210B - Foundations Practicum Credit Hours: 5

**Total: 9 Credit Hours**

###### Winter

- NRS 211 - Foundations of Nursing in Chronic Illness I Credit Hours: 6
- NRS 230 - Pharmacology I Credit Hours: 3
- NRS 232 - Pathophysiology I Credit Hours: 3

**Total: 12 Credit Hours**

###### Spring

- NRS 212 Foundations of Nursing in Acute Care I Credit Hours: 6
- NRS 231 Pharmacology II Credit Hours: 3
- NRS 233 Pathophysiology II Credit Hours: 3

**Total: 12 Credit Hours**

##### Junior Year

###### Fall

- BIO 235 - Human Genetics Credit Hours: 3
- NRS 322 - Nursing in Acute Care II and End-of-Life Credit Hours: 9

**Total: 12 Credit Hours**

###### Winter

- MATH 243 - Introductory Statistics Credit Hours: 4<sup>a</sup>
- NRS 321 - Nursing in Chronic Illness II and End-of-Life Credit Hours: 9

**Total: 13 Credit Hours**

###### Spring

- NRS 410 - Population-Based Chronic Illness and Health Promotion Credit Hours: 9
- NRS 411 - Epidemiology Credit Hours: 3

**Total: 12 Credit Hours**

##### Senior Year

###### Fall

- NRS 412 - Leadership, Outcome Management in Nursing Credit Hours: 10
- Elective Credit Hours: varies

**Total: 10+ Credit Hours**

###### Winter

- NRS 424 - Integrative Practicum I Credit Hours: 9
- NRS 424J - "J" Course Credit Hours: 1
- Elective Credit Hours: varies

**Total: 10+ Credit Hours**

###### Spring

- NRS 425 - Integrative Practicum II Credit Hours: 9
- NRS 425J - "J" Course Credit Hours: 1
- Elective Credit Hours: varies

**Total: 10+ Credit Hours**

<sup>a</sup>MATH 243 may be taken any term

## Physical Education and Health Education

### Physical Education Philosophy and Courses

At Oregon Institute of Technology, the physical education philosophy is that every man and woman can achieve and maintain fitness through a sound program based on varied developmental, sport, and recreational activities. The physical education courses provide basic instruction in vigorous activities.

Course offerings include fitness training, weight lifting, aerobics activities, archery, ice skating, rugby, recreational basketball, tai chi, Zumba, yoga, kick boxing, core strength & balance, Pilates, rowing, belly dance, scuba, swim classes, relaxation & flexibility, varsity sports and major sports seminars, including weight loss and weight loss management. Other offerings include wilderness navigation, cross country skiing and snowshoeing.

### Health Education Philosophy and Courses

Selected courses in health education are provided to assist students to prevent physical and mental health disorders and to promote well-being.

### Course Policy

Physical education courses are currently offered as elective credits only. Some courses may require an additional course fee depending on facility and special equipment needs. There is no limit on the number of times a physical education course can be repeated.

### Coaching Minor

The Coaching Minor offers Oregon Tech students the opportunity to gain knowledge and skills in coaching. The Coaching Minor features study in the basics of sports medicine, team communication and psychology, and coaching theory. It also includes an opportunity to apply that knowledge to coaching in practical ways. Students who obtain the minor will document their preparation to coach in any sport or situation. For advising or for more information contact the head of the Coaching Minor Committee, currently, Dr. Kevin Brown.

### Career Opportunities

The Coaching Minor represents a credential that documents the student's academic and practical preparation to coach. For students interested in coaching, this should give them an advantage over others without documented training and experience.

### Requirements of the Minor

It is strongly recommended that students interested in obtaining this minor see a Coaching Minor advisor prior to taking courses.

- HED 275 - Introduction to Sports Medicine Credit Hours: 3
- PSY 376 - Foundations of Sport Psychology Credit Hours: 3
- SPE 321 - Small Group and Team Communication Credit Hours: 3
- PHED 255 - Introduction to Coaching Theory Credit Hours: 3
- PHED 355 - Coaching in Application Credit Hours: 3
- PHED 455 - Coaching Practicum Credit Hours: 3

### And six credits of PHED practice courses:

#### Athletic Conditioning

Choose 3 credits from the following courses:

- PHED 102 - Zumba Credit Hours: 1
- PHED 110 - Boot Camp/Kick Boxing Credit Hours: 1
- PHED 111 - Core Strength and Balance Credit Hours: 1
- PHED 112 - Intro to Cardio and Core Credit Hours: 1
- PHED 113 - Super Circuit and Cardio Training Credit Hours: 1
- PHED 120 - Pilates and Body Pump Credit Hours: 1
- PHED 121 - Total Fitness Conditioning I Credit Hours: 1
- PHED 122 - Total Fitness Conditioning II Credit Hours: 1
- PHED 123 - Dancercise/Step Aerobics Credit Hours: 1
- PHED 125 - Weight Management Fitness Credit Hours: 1
- PHED 126 - Body Pump and Core Ball Pilates Credit Hours: 1
  
- PHED 146 - Yoga Credit Hours: 1
- or
- PHED 188 - Varsity Sport Strength/Conditioning Credit Hours: 1

**Sport Activity**

Choose 3 credits from the following courses:

- PHED 100 - Belly Dance: Beginning Credit Hours: 1
- PHED 101 - Belly Dance: Intermediate Credit Hours: 1
- PHED 125 - Weight Management Fitness Credit Hours: 1
- PHED 130 - Rowing Credit Hours: 1
- PHED 131 - Scuba: Beginning Credit Hours: 2
- PHED 132 - Scuba: Advanced Credit Hours: 2
- PHED 141 - Tai Chi for Circulation Credit Hours: 1
- PHED 142 - Tai Chi for Internal Organs Credit Hours: 1
- PHED 143 - Tai Chi and Qigong: Health, Bones, Muscle Credit Hours: 1
- PHED 144 - Tai Chi and Qigong: Neck/Back Strength Credit Hours: 1
- PHED 145 - Relaxation and Flexibility Credit Hours: 1
- PHED 150 - Aikido Credit Hours: 1
- PHED 151 - Karate Credit Hours: 1
- PHED 160 - Cross Country Skiing: Beginning Credit Hours: 1
- PHED 161 - Snowshoeing: Beginning Credit Hours: 1
- PHED 162 - Ice Skating Credit Hours: 1
- PHED 163 - Wilderness Navigation Credit Hours: 1
- PHED 170 - Golf Credit Hours: 1
- PHED 171 - Archery: Beginning Credit Hours: 1
- PHED 172 - Archery: Intermediate Credit Hours: 1
- PHED 174 - Recreational Basketball Credit Hours: 1
- PHED 175 - Rugby Credit Hours: 1
- PHED 180 - Varsity Cross Country Credit Hours: 1
- PHED 181 - Varsity Soccer Credit Hours: 1
- PHED 182 - Varsity Track/Field Credit Hours: 1
- PHED 183 - Varsity Men's Baseball Credit Hours: 1
- PHED 184 - Varsity Men's Basketball Credit Hours: 1
- PHED 185 - Varsity Women's Basketball Credit Hours: 1
- PHED 186 - Varsity Women's Softball Credit Hours: 1
- PHED 187 - Varsity Women's Volleyball Credit Hours: 1
- PHED 201 - Sports Seminar - Officiating Credit Hours: 2

**Note:** Requirements constitute 24 credits, of which 12 credits are upper division.

# Population Health Management

Sophia Lyn Nathenson, *Program Director*

Sophia Lyn Nathenson, *Externship Coordinator*

*Participating Faculty:* K. Chapman

*Instructor:* S. Machado

## Degree Offered

- Bachelor of Science in Population Health Management

The Population Health Management (PHM) professions are auxiliary or complementary to clinical health care. The PHM B.S. degree program includes core courses in applied and medical sociology, in addition to electives in applied psychology, management, mathematics, communication, and health sciences. Students may choose one of three emphases: Health Counseling/Outreach, Care Management and Coordination, and Applied Health Data Analytics.

The PHM program begins with a foundation in sociological theory, methods and research.

PHM graduates will gain competence in social theory, research methods, statistics, program planning and evaluation, and training in working with diverse and under-served populations.

## Mission Statement

The mission of the PHM program is to provide students with the best possible training for careers that improve health and well-being. As the United States health care system changes to adapt to a new demographic and health landscape, increasing emphasis is placed on preventative medicine and health maintenance. PHM graduates will help fill this pressing need, providing much needed health resources to hospitals, schools, governmental and non-profit organizations, and local communities. Such work empowers individuals through health programs and policy, to create a healthier future for our nation.

## Career Opportunities

Students who graduate from the PHM program may work in a wide variety of settings, all with the intent of improving the health and well-being of individuals and communities. Careers include health coaching, health research, community health program and evaluation, education, and patient advocacy. The PHM degree is an ideal preparation for graduate study in sociology, epidemiology, public health and medicine.

## Population Health Management, Applied Health Data Analytics Emphasis, BS

### Degree Requirements

Students must meet the general education requirements, as stated elsewhere in this catalog, and satisfactorily complete the courses listed in this curriculum to obtain the Bachelor of Science in Population Health Management. A total of 181 credits are required for the degree. Students must complete a core program; in addition, students must complete an emphasis area (listed below). A total of 18 credits are needed for an emphasis; a minimum of 9 upper division credits are needed. Credits taken for externship or senior project do not count toward the emphasis. Students electing to take externship are restricted to a maximum of 32 credits. All core and emphasis courses must be completed with a minimum grade of "C" in order to earn the degree.

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- HIST 275 - Introduction to the History of Medicine Credit Hours: 3
- PHM 105 - Intro to Population Health Management Credit Hours: 3
- SOC 204 - Introduction to Sociology Credit Hours: 3
- WRI 121 - English Composition Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 15 Credit Hours**

##### Winter

- MATH 111 - College Algebra Credit Hours: 4
- SOC 201 - Classical Sociological Theory Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3
- Communication Elective Credit Hours: 3
- Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Spring

- SOC 206 - Social Problems Credit Hours: 3
- SOC 225 - Medical Sociology Credit Hours: 3
- SPE 111 - Public Speaking Credit Hours: 3
- Communication Elective Credit Hours: 3<sup>a</sup>
- Humanities Elective Credit Hours: 3

**Total: 15 Credit Hours**

#### Sophomore Year

##### Fall

- MIS 255 - Health Informatics Concepts and Practices Credit Hours: 3
- PSY 201 - Psychology Credit Hours: 3
- SOC 205 - Current Health Issues Credit Hours: 3
- Laboratory Science Elective Credit Hours: 4
- Communication Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Winter

- MATH 243 - Introductory Statistics Credit Hours: 4
- PSY 202 - Psychology Credit Hours: 3  
or
- PSY 203 - Psychology Credit Hours: 3
- SOC 202 - Contemporary Sociological Theory Credit Hours: 3
- Elective Credit Hours: 3
- Laboratory Science Elective Credit Hours: 4

**Total: 17 Credit Hours**

##### Spring

- MATH 361 - Statistical Methods I Credit Hours: 4
- MIS 275 - Introduction to Relational Databases Credit Hours: 3
- SOC 305 - Rural Health Credit Hours: 3
- Laboratory Science Elective Credit Hours: 4

**Total: 14 Credit Hours**

#### Junior Year

##### Fall

- BUS 313 - Health Care Systems and Policy Credit Hours: 3
- MIS 103 - The Digital Earth Credit Hours: 3
- SOC 301 - Social Science Research Methods Credit Hours: 4
- SOC 325 - Global Population Health Credit Hours: 3

**Total: 13 Credit Hours**

##### Winter

- GIS 134 - Geographic Information Systems Credit Hours: 3
- PHM 345 - Community Health Grant Writing Credit Hours: 3
- PHM 435 - Research Center Credit Hours: 3
- SOC 302 - Social Science Research Methods II Credit Hours: 4
- STAT 414 - Statistical Methods in Epidemiology Credit Hours: 4

**Total: 17 Credit Hours**

**Spring**

- PHIL 305 - Medical Ethics Credit Hours: 3
- PHM 321 - Community Program Planning Credit Hours: 3
- PHM 435 - Research Center Credit Hours: 3
- SOC 335 - Health Inequality and Cultural Competency  
Credit Hours: 3
- Emphasis Elective Credit Hours: 3 <sup>a</sup>

**Total: 15 Credit Hours****Senior Year****Fall**

- Externship Credit Hours: 15 <sup>c</sup>  
or
- Emphasis Electives Credit Hours: 15 <sup>a</sup>

**Total: 15 Credit Hours****Winter**

- Externship Credit Hours: 15 <sup>c</sup>  
or
- Emphasis Electives Credit Hours: 15 <sup>a</sup>

**Total: 15 Credit Hours****Spring**

- Externship Credit Hours: 15 <sup>c</sup>  
or
- Emphasis Electives Credit Hours: 15 <sup>a</sup>

**Total: 15 Credit Hours****Emphasis Requirements**

Students completing the Applied Health Data Analytics emphasis must complete the following courses:

- BUS 316 - Total Quality in Health Care Credit Hours: 3
- MATH 362 - Statistical Methods II Credit Hours: 4
- MATH 465 - Mathematical Statistics Credit Hours: 4
- MIS 344 - Business Intelligence Credit Hours: 3
- MIS 357 - Information and Communication Systems in Health Care Credit Hours: 3
- MIS 445 - Legal, Ethical and Social Issues in Health Care Technology Credit Hours: 3
- PSY 339 - Biopsychology Credit Hours: 3
- SOC 405 - Program Planning and Evaluation Credit Hours: 3
- WRI 123 - Research Writing Credit Hours: 3
- WRI 227 - Technical Report Writing Credit Hours: 3
- WRI 410 - Proposal and Grant Writing Credit Hours: 3

**Total for a B.S. in Population Health Management, Applied Health Data Analytics  
Emphasis: 181 Credit Hours**

<sup>a</sup> See advisor or consult emphasis elective list above for appropriate courses

<sup>b</sup> To complete an emphasis, students must take courses from the appropriate list that follows. Credits taken for externship or senior project do not count as emphasis electives. A total of 18 credits are needed for an emphasis; a minimum of 9 upper division credits are needed

<sup>c</sup> Externship site and/or senior projects are coordinated in SOC 421. No more than 32 credits of externship allowed for graduation without departmental approval

## Population Health Management, BS

### Degree Requirements

Students must meet the general education requirements, as stated elsewhere in this catalog, and satisfactorily complete the courses listed in this curriculum to obtain the Bachelor of Science in Population Health Management. A total of 181 credits are required for the degree. Students must complete a core program; in addition, students must complete an emphasis area (listed below). A total of 18 credits are needed for an emphasis; a minimum of 9 upper division credits are needed. Credits taken for externship or senior project do not count toward the emphasis. Students electing to take externship are restricted to a maximum of 32 credits. All core and emphasis courses must be completed with a minimum grade of "C" in order to earn the degree.

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- HIST 275 - Introduction to the History of Medicine Credit Hours: 3
- PHM 105 - Intro to Population Health Management Credit Hours: 3
- SOC 204 - Introduction to Sociology Credit Hours: 3
- WRI 121 - English Composition Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 15 Credit Hours**

##### Winter

- MATH 111 - College Algebra Credit Hours: 4
- SOC 201 - Classical Sociological Theory Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3
- Communication Elective Credit Hours: 3
- Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Spring

- SOC 206 - Social Problems Credit Hours: 3
- SOC 225 - Medical Sociology Credit Hours: 3
- SPE 111 - Public Speaking Credit Hours: 3
- Communication Elective Credit Hours: 3<sup>a</sup>
- Humanities Elective Credit Hours: 3

**Total: 15 Credit Hours**

#### Sophomore Year

##### Fall

- MIS 255 - Health Informatics Concepts and Practices Credit Hours: 3
- PSY 201 - Psychology Credit Hours: 3
- SOC 205 - Current Health Issues Credit Hours: 3
- Laboratory Science Elective Credit Hours: 4
- Communication Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Winter

- MATH 243 - Introductory Statistics Credit Hours: 4
- PSY 202 - Psychology Credit Hours: 3  
or
- PSY 203 - Psychology Credit Hours: 3
- SOC 202 - Contemporary Sociological Theory Credit Hours: 3
- Elective Credit Hours: 3
- Laboratory Science Elective Credit Hours: 4

**Total: 17 Credit Hours**

##### Spring

- MATH 361 - Statistical Methods I Credit Hours: 4
- MIS 275 - Introduction to Relational Databases Credit Hours: 3
- SOC 305 - Rural Health Credit Hours: 3
- Laboratory Science Elective Credit Hours: 4

**Total: 14 Credit Hours**

#### Junior Year

##### Fall

- BUS 313 - Health Care Systems and Policy Credit Hours: 3
- GIS 103 - The Digital Earth Credit Hours: 3
- SOC 301 - Social Science Research Methods Credit Hours: 4
- SOC 325 - Global Population Health Credit Hours: 3

**Total: 13 Credit Hours**

##### Winter

- GIS 134 - Geographic Information Systems Credit Hours: 3
- PHM 345 - Community Health Grant Writing Credit Hours: 3
- PHM 435 - Research Center Credit Hours: 3
- SOC 302 - Social Science Research Methods II Credit Hours: 4
- STAT 414 - Statistical Methods in Epidemiology Credit Hours: 4

**Total: 17 Credit Hours**

**Spring**

- PHIL 305 - Medical Ethics Credit Hours: 3
- PHM 321 - Community Program Planning Credit Hours: 3
- PHM 435 - Research Center Credit Hours: 3
- SOC 335 - Health Inequality and Cultural Competency  
Credit Hours: 3
- Emphasis Elective Credit Hours: 3 <sup>a</sup>

**Total: 15 Credit Hours****Senior Year****Fall**

- Externship Credit Hours: 15 <sup>c</sup>  
or
- Emphasis Electives Credit Hours: 15 <sup>a</sup>

**Total: 15 Credit Hours****Winter**

- Externship Credit Hours: 15 <sup>c</sup>  
or
- Emphasis Electives Credit Hours: 15 <sup>a</sup>

**Total: 15 Credit Hours****Spring**

- Externship Credit Hours: 15 <sup>c</sup>  
or
- Emphasis Electives Credit Hours: 15 <sup>a</sup>

**Total: 15 Credit Hours****Total for a B.S. in Population Health Management: 183 Credit Hours**<sup>a</sup> See advisor<sup>b</sup> To complete an emphasis, students must take courses from the appropriate list that follows. Credits taken for externship or senior project do not count as emphasis electives. A total of 18 credits are needed for an emphasis; a minimum of 9 upper division credits are needed<sup>c</sup> Externship site and/or senior projects are coordinated in SOC 421. No more than 32 credits of externship allowed for graduation without departmental approval

# Population Health Management, Care Coordination/Pre-Health Professions Emphasis, BS

## Degree Requirements

Students must meet the general education requirements, as stated elsewhere in this catalog, and satisfactorily complete the courses listed in this curriculum to obtain the Bachelor of Science in Population Health Management. A total of 181 credits are required for the degree. Students must complete a core program; in addition, students must complete an emphasis area (listed below). A total of 18 credits are needed for an emphasis; a minimum of 9 upper division credits are needed. Credits taken for externship or senior project do not count toward the emphasis. Students electing to take externship are restricted to a maximum of 32 credits. All core and emphasis courses must be completed with a minimum grade of "C" in order to earn the degree.

## Curriculum

Required courses and recommended terms during which they should be taken:

### Freshman Year

#### Fall

- HIST 275 - Introduction to the History of Medicine Credit Hours: 3
- PHM 105 - Intro to Population Health Management Credit Hours: 3
- SOC 204 - Introduction to Sociology Credit Hours: 3
- WRI 121 - English Composition Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 15 Credit Hours**

#### Winter

- MATH 111 - College Algebra Credit Hours: 4
- SOC 201 - Classical Sociological Theory Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3
- Communication Elective Credit Hours: 3
- Elective Credit Hours: 3

**Total: 16 Credit Hours**

#### Spring

- SOC 206 - Social Problems Credit Hours: 3
- SOC 225 - Medical Sociology Credit Hours: 3
- SPE 111 - Public Speaking Credit Hours: 3
- Communication Elective Credit Hours: 3<sup>a</sup>
- Humanities Elective Credit Hours: 3

**Total: 15 Credit Hours**

### Sophomore Year

#### Fall

- MIS 255 - Health Informatics Concepts and Practices Credit Hours: 3
- PSY 201 - Psychology Credit Hours: 3
- SOC 205 - Current Health Issues Credit Hours: 3
- Laboratory Science Elective Credit Hours: 4
- Communication Elective Credit Hours: 3

**Total: 16 Credit Hours**

### Winter

- MATH 243 - Introductory Statistics Credit Hours: 4
- PSY 202 - Psychology Credit Hours: 3  
or
- PSY 203 - Psychology Credit Hours: 3
- SOC 202 - Contemporary Sociological Theory Credit Hours: 3
- Elective Credit Hours: 3
- Laboratory Science Elective Credit Hours: 4

**Total: 17 Credit Hours**

### Spring

- MATH 361 - Statistical Methods I Credit Hours: 4
- MIS 275 - Introduction to Relational Databases Credit Hours: 3
- SOC 305 - Rural Health Credit Hours: 3
- Laboratory Science Elective Credit Hours: 4

**Total: 14 Credit Hours**

### Junior Year

#### Fall

- BUS 313 - Health Care Systems and Policy Credit Hours: 3
- GIS 103 - The Digital Earth Credit Hours: 3
- SOC 301 - Social Science Research Methods Credit Hours: 4
- SOC 325 - Global Population Health Credit Hours: 3

**Total: 13 Credit Hours**

#### Winter

- GIS 134 - Geographic Information Systems Credit Hours: 3
- PHM 345 - Community Health Grant Writing Credit Hours: 3
- PHM 435 - Research Center Credit Hours: 3
- SOC 302 - Social Science Research Methods II Credit Hours: 4
- STAT 414 - Statistical Methods in Epidemiology Credit Hours: 4

**Total: 17 Credit Hours**

**Spring**

- PHIL 305 - Medical Ethics Credit Hours: 3
- PHM 321 - Community Program Planning Credit Hours: 3
- PHM 435 - Research Center Credit Hours: 3
- SOC 335 - Health Inequality and Cultural Competency  
Credit Hours: 3
- Emphasis Elective Credit Hours: 3 <sup>a</sup>

**Total: 15 Credit Hours****Senior Year****Fall**

- Externship Credit Hours: 15 <sup>c</sup>  
or
- Emphasis Electives Credit Hours: 15 <sup>a</sup>

**Total: 15 Credit Hours****Winter**

- Externship Credit Hours: 15 <sup>c</sup>  
or
- Emphasis Electives Credit Hours: 15 <sup>a</sup>

**Total: 15 Credit Hours****Spring**

- Externship Credit Hours: 15 <sup>c</sup>  
or
- Emphasis Electives Credit Hours: 15 <sup>a</sup>

**Total: 15 Credit Hours****Emphasis Requirements**

Students completing the Care Coordination/Pre-Health Professions emphasis must complete the following courses:

- ANTH 103 - Introduction to Cultural Anthropology Credit Hours: 3
- BIO 200 - Medical Terminology Credit Hours: 2
- BIO 231 - Human Anatomy and Physiology I Credit Hours: 4
- BIO 232 - Human Anatomy and Physiology II Credit Hours: 4
- BIO 233 - Human Anatomy and Physiology III Credit Hours: 4
- BUS 313 - Health Care Systems and Policy Credit Hours: 3
- BUS 316 - Total Quality in Health Care Credit Hours: 3
- COM 205 - Intercultural Communication Credit Hours: 3
- COM 345 - Organizational Communication I Credit Hours: 3
- PSY 347 - Organizational Behavior Credit Hours: 3
- PSY 360 - Organizational Psychology Credit Hours: 3
- PSY 410 - Organizational Change and Development Credit Hours: 3
- SOC 305 - Rural Health Credit Hours: 3
- SOC 315 - Juvenile Delinquency Credit Hours: 3
- SOC 405 - Program Planning and Evaluation Credit Hours: 3

**Total for a B.S. in Population Health Management, Care Coordination/Pre-Health Professions Emphasis: 181 Credit Hours**

<sup>a</sup> See advisor or consult emphasis elective list above for appropriate courses

<sup>b</sup> To complete an emphasis, students must take courses from the appropriate list that follows. Credits taken for externship or senior project do not count as emphasis electives. A total of 18 credits are needed for an emphasis; a minimum of 9 upper division credits are needed

<sup>c</sup> Externship site and/or senior projects are coordinated in SOC 421. No more than 32 credits of externship allowed for graduation without departmental approval

## Population Health Management, Health Promotion Emphasis, BS

### Degree Requirements

Students must meet the general education requirements, as stated elsewhere in this catalog, and satisfactorily complete the courses listed in this curriculum to obtain the Bachelor of Science in Population Health Management. A total of 181 credits are required for the degree. Students must complete a core program; in addition, students must complete an emphasis area (listed below). A total of 18 credits are needed for an emphasis; a minimum of 9 upper division credits are needed. Credits taken for externship or senior project do not count toward the emphasis. Students electing to take externship are restricted to a maximum of 32 credits. All core and emphasis courses must be completed with a minimum grade of "C" in order to earn the degree.

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- HIST 275 - Introduction to the History of Medicine Credit Hours: 3
- PHM 105 - Intro to Population Health Management Credit Hours: 3
- SOC 204 - Introduction to Sociology Credit Hours: 3
- WRI 121 - English Composition Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 15 Credit Hours**

##### Winter

- MATH 111 - College Algebra Credit Hours: 4
- SOC 201 - Classical Sociological Theory Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3
- Communication Elective Credit Hours: 3
- Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Spring

- SOC 206 - Social Problems Credit Hours: 3
- SOC 225 - Medical Sociology Credit Hours: 3
- SPE 111 - Public Speaking Credit Hours: 3
- Communication Elective Credit Hours: 3<sup>a</sup>
- Humanities Elective Credit Hours: 3

**Total: 15 Credit Hours**

#### Sophomore Year

##### Fall

- MIS 255 - Health Informatics Concepts and Practices Credit Hours: 3
- PSY 201 - Psychology Credit Hours: 3
- SOC 205 - Current Health Issues Credit Hours: 3
- Laboratory Science Elective Credit Hours: 4
- Communication Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Winter

- MATH 243 - Introductory Statistics Credit Hours: 4
- PSY 202 - Psychology Credit Hours: 3  
or
- PSY 203 - Psychology Credit Hours: 3
- SOC 202 - Contemporary Sociological Theory Credit Hours: 3
- Elective Credit Hours: 3
- Laboratory Science Elective Credit Hours: 4

**Total: 17 Credit Hours**

##### Spring

- MATH 361 - Statistical Methods I Credit Hours: 4
- MIS 275 - Introduction to Relational Databases Credit Hours: 3
- SOC 305 - Rural Health Credit Hours: 3
- Laboratory Science Elective Credit Hours: 4

**Total: 14 Credit Hours**

#### Junior Year

##### Fall

- BUS 313 - Health Care Systems and Policy Credit Hours: 3
- GIS 103 - The Digital Earth Credit Hours: 3
- SOC 301 - Social Science Research Methods Credit Hours: 4
- SOC 325 - Global Population Health Credit Hours: 3

**Total: 13 Credit Hours**

##### Winter

- GIS 134 - Geographic Information Systems Credit Hours: 3
- PHM 345 - Community Health Grant Writing Credit Hours: 3
- PHM 435 - Research Center Credit Hours: 3
- SOC 302 - Social Science Research Methods II Credit Hours: 4
- STAT 414 - Statistical Methods in Epidemiology Credit Hours: 4

**Total: 17 Credit Hours**

**Spring**

- PHIL 305 - Medical Ethics Credit Hours: 3
- PHM 321 - Community Program Planning Credit Hours: 3
- PHM 435 - Research Center Credit Hours: 3
- SOC 335 - Health Inequality and Cultural Competency  
Credit Hours: 3
- Emphasis Elective Credit Hours: 3 <sup>a</sup>

**Total: 15 Credit Hours****Senior Year****Fall**

- Externship Credit Hours: 15 <sup>c</sup>  
or
- Emphasis Electives Credit Hours: 15 <sup>a</sup>

**Total: 15 Credit Hours****Winter**

- Externship Credit Hours: 15 <sup>c</sup>  
or
- Emphasis Electives Credit Hours: 15 <sup>a</sup>

**Total: 15 Credit Hours****Spring**

- Externship Credit Hours: 15 <sup>c</sup>  
or
- Emphasis Electives Credit Hours: 15 <sup>a</sup>

**Total: 15 Credit Hours****Emphasis Requirements**

Students completing the Health Promotion emphasis must complete the following courses:

- COM 205 - Intercultural Communication Credit Hours: 3
- COM 336 - Nonverbal Communication Credit Hours: 3
- PSY 215 - Abnormal Psychology I Credit Hours: 3
- PSY 216 - Abnormal Psychology II Credit Hours: 3
- PSY 220 - Community Psychology Credit Hours: 3
- PSY 301 - Basic Counseling Techniques Credit Hours: 4
- PSY 330 - Social Psychology I Credit Hours: 3
- PSY 331 - Social Psychology II Credit Hours: 3
- PSY 334 - Behavior Modification I Credit Hours: 4
- PSY 335 - Behavior Modification II Credit Hours: 4
- PSY 341 - Psychoactive Drugs I: Psychiatric Drugs Credit Hours: 3
- PSY 342 - Psychoactive Drugs II: Abused Drugs Credit Hours: 3
- SOC 305 - Rural Health Credit Hours: 3
- SOC 315 - Juvenile Delinquency Credit Hours: 3
- SOC 405 - Program Planning and Evaluation Credit Hours: 3

**Total for a B.S. in Population Health Management, Health Promotion Emphasis: 181  
Credit Hours**

<sup>a</sup> See advisor or consult emphasis elective list above for appropriate courses

<sup>b</sup> To complete an emphasis, students must take courses from the appropriate list that follows. Credits taken for externship or senior project do not count as emphasis electives. A total of 18 credits are needed for an emphasis; a minimum of 9 upper division credits are needed

<sup>c</sup> Externship site and/or senior projects are coordinated in SOC 421. No more than 32 credits of externship allowed for graduation without departmental approval

# Respiratory Care and Sleep Health

Jeff Pardy, *Department Chair*

Jeff Pardy, *Program Director, Respiratory Care*

Jane Perri, *Program Director, Sleep Health*

David Panossian, *Medical Director*

Sarah Woodman, *Clinical Education Director*

*Participating Faculty:* P. Cabrera, K. Christensen, L. McLaughlin, K. Rabe, M. Schwartz, J. Shinn, A. Venes

## Degree Offered

- Associate of Applied Science in Sleep Health

## Certificate Offered

- Polysomnographic Technology

Students must successfully complete the core courses required to sit for a national exam. Computer and Internet access is required. Successful completion of the certificate curriculum leads to eligibility to sit for the national Registered Polysomnographic Technologists examination (RPSGT).

## Associate of Applied Science in Sleep Health – Polysomnographic Technology Option

Students must successfully complete the courses in one of the certificate programs for Polysomnographic Technology or Clinical Sleep Health and other general education courses. The degree completion courses can be taken from Oregon Tech or transferred from another college. A minimum of 30 credit hours must be taken from Oregon Tech. Computer and Internet access are required.

Students who have completed the RPSGT or CCSH exams may pursue a Health Care Management, Clinical Option, BS. Students complete health management classes offered through the Oregon Tech Management Department either in the classroom or via the online education program while working in their hometown. See the Management Department for more information regarding this degree.

## Accreditation

The Polysomnographic Technology Program is fully accredited by the Commission on Accreditation of Allied Health Education Programs (CAAHEP). The curriculum follows the guidelines suggested by the Board of Registered Polysomnographic Technologists. Inquiries regarding accreditation should be directed (CAAHEP). Commission on Accreditation of Allied Health Education Programs, (CoPSG) is a specialized accrediting body recognized by the Council for Higher Education Accreditation and/or the Secretary of the U.S., Department of Education. CAAHEP contact information: 1361 Park Street, Clearwater, FL 33756, Phone: (727) 210-2350

## Career Opportunities

Registered Polysomnographic technologists, under medical direction, conduct diagnostic testing and evaluation of sleep disorder patients. Their duties involve the use of highly advanced technology and compassionate patient care. Graduates are employed by hospitals, out-patient testing facilities and bio-medical equipment manufacturers. Currently, there is a severe nationwide shortage of Registered Polysomnographic Technologists.

## Licensure

Students are eligible to sit for the national RPSGT exam administered by the Board of Registered Polysomnographic Technologists following the completion of the courses in the certificate program.

## Student Preparation

A science background is beneficial to those entering any health sciences profession. It is recommended that the student considering a career in Polysomnography take a college bound course of study in high school that includes algebra, chemistry and biology or human anatomy and physiology. It is recommended that students take courses in Microsoft Word, Excel and PowerPoint in high school. Students are required to provide proof of completion either Cardio Pulmonary Resuscitation (CPR) or Basic Cardiac Life Support (BCLS) prior to admission.

## Computer Proficiency Requirement

Demonstrated computer proficiency is required by the Board of Registered Polysomnographic Technologists to be eligible to sit for the national exam. The PSG Program is an online education program requiring basic computer proficiency to be successful. Successful completion of the program therefore, indicates basic computer proficiency.

## Degree Completion Program

The associate degree program offers a degree completion program for Registered Polysomnographic Technologists who lack a degree. The courses for this program can be taken through the Online Education Department or in the classroom. Two of the required courses are not available online and must be taken either in the Oregon Tech classroom or a local college and transferred. The communication courses are offered through the online education program of other colleges in the Oregon University System.

Upon receipt of the necessary documentation, specific college credits will be awarded to qualified applicants for having passed the Registered Polysomnographic Technologists examination.

## Clinical Requirements

All applicants must meet the general admissions requirements to enroll in the Polysomnographic Technology Program. To be eligible for admission into the Polysomnographic Technology Program, applicants must meet the following criteria:

1. Applicants for the certificate program must be high school graduates. If a prospective candidate is not currently employed in a sleep facility, an appropriate site must be found and a clinical agreement between Oregon Tech and that facility must be established prior to beginning classes.
2. Candidates must provide proof of completion of either a Cardio Pulmonary Resuscitation (CPR) course or a Basic Cardiac Life Support (BCLS) course prior to enrollment.
3. Candidates must submit immunization records prior to their clinical placement.
4. Criminal background clearance is required prior to acceptance and some clinical sites may require drug screening.
5. One full shift of job shadowing is required prior to applying to the program.
6. All Prospective candidates must speak with the program director Dr. Jane Perri, (937) 750-5416, prior to submitting their application

## Graduation Requirements

Minimum graduation requirements for the A.A.S are the successful completion of 43 credit hours of general education courses and 47 credit hours in the area of specialization with a GPA of 2.0 or better. In addition, a final grade of "C" or better must be earned in all professional courses (PSG, ECHO, and RCP), communication courses and science/mathematics course to continue in the program. This requirement also applies to the certificate program.

In order to prepare for the national registry exam, students are required to participate in a practical exam and a comprehensive written exam at the conclusion of the certificate program. Students are required to come either to Medford Oregon or to Dayton, Ohio for one day of residency. Passage of these exams is required to complete the certificate program. Associate degree students who have already obtained their national licensure are not required to complete this requirement.

## Clinical Sleep Health

### Degree Offered

- Associate of Applied Science in Sleep Health, Clinical Sleep Health Option
- Certificate Offered in Clinical Sleep Health

Students must successfully complete the core courses required to sit for a national exam. Computer and Internet access is required. Successful completion of the certificate curriculum (together with a completed Associate degree) leads to eligibility to sit for the national Certified Clinical Sleep Health examination (CCSH).

The program objectives and focus are to provide content knowledge in the following domains: Sleep Over the Lifespan; Clinical Evaluation and Management; Patient and Family Communication and Education; and Program Maintenance and Administration.

### Associate of Applied Science in Sleep Health – Clinical Sleep Health Options

Students must successfully complete the courses in the certificate program for Clinical Sleep Health and 46 other general education credits. The degree completion courses can be taken from Oregon Tech or transferred from another college, however at least 30 credits must be taken from Oregon Tech. Successful completion of the two year curriculum leads to eligibility to sit for the national Certified Clinical Sleep Health (CCSH) exam. Computer and Internet access is required.

Students who have completed the CCSH exam may pursue a Health Care Management, Clinical Option, BS. Students complete health management classes offered through the Oregon Tech Management Department either in the classroom or via the online education program while working in their hometown. See the Management Department section of this catalog for more information regarding this degree.

### Accreditation

The Clinical Sleep Health Program is accredited under the university accreditation by the Northwest Commission on Colleges and Universities (NWCCU), 8060 165th Avenue, N.E., Suite 100, Redmond, WA 98052-3981. NWCCU is an institutional accrediting

body recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education. As of this date, Commission on Accreditation of Allied Health Education Programs (CAAHEP) does not have an accrediting body for this degree.

### Career Opportunities

Certified Clinical Sleep Health specialists, under medical direction, conduct diagnostic testing, evaluation of sleep disorder patients, patient/community education, compliance certification, status evaluations, and coordination of patient care plans. Their duties involve the use of highly advanced technology and compassionate patient care. Graduates are employed by hospitals, out-patient testing facilities and bio-medical equipment manufacturers.

### Licensure

Students are eligible to sit for the national CCSH exam administered by the Board of Registered Polysomnographic Technologists following the completion of the courses in the certificate program.

### Student Preparation

The Certificate in Clinical Sleep Health is designed for those who have an approved medical license and at least an associate degree. Applicants must have one of the following credentials to be eligible for admission into the certificate program.

Polysomnographic Technologist (RPSGT) or  
Sleep Technologist (RST)

Respiratory Therapist (RRT, CRT)  
Neurodiagnostic Technologist (REEGT, CLTM)  
Health Educator (CHES)

Nurse (RN, LPN, MSN) or  
Nurse Practitioner (NP)

Physician (MD, DO)  
Physician Assistant (PA)  
Dentist (DDS)  
Doctor of Philosophy (PhD) in health, counseling, science

The AAS degree is for those who hold a current license in any of the above areas, but do not have an associate (or higher) degree. Candidates for the national registry exam must hold a minimum of an associate degree.

### Computer Proficiency Requirement

The CSH Program is an online education program requiring basic computer proficiency to be successful.

### Clinical Requirements

All applicants must meet the general admissions requirements to enroll in the Polysomnographic Technology Program. To be eligible for admission into the Polysomnographic Technology Program, applicants must meet the following criteria:

1. Applicants for the certificate program must be licensed in one of the medical fields listed above and hold at least an associate degree. **All prospective candidates must be currently employed in a facility that treats patients with sleep disorders, and the medical director or clinical manager must agree to allow the candidate to complete 400 hours of externship under his or her direction.**
2. Candidates must provide proof of completion of either a Cardio Pulmonary Resuscitation (CPR) course or a Basic Cardiac Life Support (BCLS) course prior to enrollment.

### Graduation Requirements

Minimum graduation requirements for the A.A.S are the successful completion of 46 credit hours of general education courses and 45 credit hours in the area of specialization with a GPA of 2.0 or better. In addition, a final grade of "C" or better must be earned in all professional courses (CSH, BUS, and BIO), communication courses and science/mathematics course to continue in the program. This requirement also applies to the certificate program.

# Respiratory Care Program

## Degree Offered

- Bachelor of Science in Respiratory Care

The Bachelor of Science degree program prepares the respiratory care student for entry into the respiratory care profession and eligibility for the National Board for Respiratory Care (NBRC) certificate examination (CRT) and registry examinations (RRT). Upon successful completion of the program, the graduate is eligible to apply for state licensure.

## Accreditation

The Respiratory Care Program is fully accredited by the Commission on Accreditation for Respiratory Care ([www.coarc.com](http://www.coarc.com)), 1248 Harwood Rd., Bedford, TX 76021, (817) 283-2835.

## Career Opportunities

Registered respiratory therapists are physician extenders who, under medical direction, administer cardiopulmonary care, evaluate and assess pulmonary patients, and administer medications and diagnostic tests when appropriate. Their duties involve the use of many of the latest advances in medical arts, sciences, and technology. Graduates are employed in hospitals, physician's offices, rehabilitation facilities, home-care agencies and health care promotion centers as caregivers, managers and educators.

## Licensure

Students, when applying for licensure, will be asked if they have ever been convicted of a criminal offense, or if they have a history of drug or alcohol abuse. Students with a concern in this area should immediately contact the Oregon Respiratory Therapist Licensing Board (ORTLB) prior to applying to this program.

## Program Objectives

Upon completion of the program, graduates will demonstrate:

1. Professional behavior consistent with employer expectations as advanced level respiratory therapists (affective domain).
2. The ability to comprehend, apply and evaluate clinical information relevant to their roles as advanced-level respiratory therapists (cognitive domain).
3. The technical proficiency in all the skills necessary to fulfill their roles as advanced level respiratory therapists (psychomotor domain).

## Expected Program Learning Outcomes

Students in the program will demonstrate:

- the ability to communicate effectively in oral, written and visual forms
- knowledge of the respiratory care code of ethics and ethical and professional conduct
- the ability to function effectively as a member of the health care team
- knowledge and application of mechanical ventilation and therapeutics
- knowledge and application of cardiopulmonary pharmacology and pathophysiology
- management of respiratory care plans for adult, neonatal and pediatric patients

## Pre-Respiratory Care Freshman Year

Enrollment is open to all students who meet the general entry requirements to Oregon Institute of Technology. Students will be listed as Pre-Respiratory Care students. Students will be selected into the professional curriculum based on cumulative grade-point average, non-smoking status, performance on an anatomy and physiology test and submission of a technical paper. Alternatively, students may be admitted based upon successful completion of a CoARC accredited associate degree program in respiratory care.

Students are strongly advised to complete all the general education courses in the freshman year curriculum before making application to the professional program.

Selections will be made at the end of the spring and summer terms of the Pre-Respiratory Care year. The number of students selected each year will be determined by the availability of clinical sites and other resources, which means that the number of qualified applicants may exceed the number of spaces available. When that is the case, students with the highest cumulative GPA are the first to be offered a position in the program.

## Degree Completion Program

The Respiratory Care Program offers a degree completion program for respiratory therapists who wish to pursue a bachelor's degree in their field. The program is offered online and requires collaborative learning. Admission is based on successful completion of a CoARC accredited associate degree in respiratory care. When students have completed RCP 442 and have submitted documentation of the Registered Respiratory Therapist credential college credit is granted. Students must participate in an orientation. Each prospective student's academic credits will be individually evaluated to determine acceptability of the non-professional coursework.

and the sequencing of the professional courses. Every student must meet the Oregon Tech general education requirements for graduation. The Respiratory Care Degree Program includes the presentation of a senior project.

## Graduation Requirements

All credits listed in the curriculum for the catalog year a student begins a program must be fulfilled. A minimum of 187 credits must be completed and students must maintain a 2.00 GPA to be eligible for graduation. In addition, a final grade of "C" or better must be earned in all professional courses (RCP), communication courses, and science/mathematics courses to continue in the program. All curricular requirements must be met within five academic years once the student is admitted into the professional program as a sophomore. Students must successfully pass the SAE examination as a condition of the BS degree completion.

## Clinical Sleep Health Certificate

### Curriculum

A certificate will be awarded to students completing 45 credit hours of course work in Clinical Sleep Health.

#### Required courses:

- BIO 200 - Medical Terminology Credit Hours: 2
- BUS 337 - Principles of Health Care Marketing Credit Hours: 3
- BUS 317 - Health Care Management Credit Hours: 3
- CSH 201 - Human Development and Behavioral Health Credit Hours: 3
- CSH 220 - Sleep Disorders and Co-Morbidities Credit Hours: 3
- CSH 225 - Impact of Neurologic Disorders on Sleep Credit Hours: 3
- CSH 236 - Pharmacology of Sleep Credit Hours: 3
- CSH 242 - Evaluation and Measurement Tools Credit Hours: 3
- CSH 233 - Sleep Therapies and Compliance Credit Hours: 3
- CSH 268 - Learning, Health Literacy, and Community Education Credit Hours: 3
- CSH 276 - Capstone Project Credit Hours: 3
- CSH 277 - Clinical Sleep Health Externship Credit Hours: 13 (400 contact hours)

**Total for a Certificate in Clinical Sleep Health: 45 Credit Hours**

## Polysomnographic Technology Certificate

### Curriculum

A certificate will be awarded to students completing 47 credit hours of course work in Polysomnography. This program is fully accredited by the Commission on Accreditation of Allied Health Education Programs (CAAHEP). Completion of the certificate will allow the graduate to sit for the national registry exam in Polysomnographic Technology.

#### Required Courses:

- BIO 200 - Medical Terminology Credit Hours: 2
- ECHO 227 - Basic ECG Recognition and Testing Credit Hours: 3
- PSG 211 - Fundamentals of PSG and Patient Care Credit Hours: 3
- PSG 221 - Physiology of Sleep Credit Hours: 3
- PSG 231 - Sleep Disorders Pathology Credit Hours: 4
- PSG 246 - Sleep Disorders in Women Credit Hours: 3
- PSG 264 - Pediatric/Neonatal Polysomnography Credit Hours: 4
  
- PSG 271A - Clinical Polysomnographic Technology Part A Credit Hours: 6
- PSG 271B - Clinical Polysomnographic Technology Part B Credit Hours: 6
- PSG 271C - Clinical Polysomnographic Technology Part C Credit Hours: 6
- or
- PSG 272 - Clinical Polysomnographic Technology I Credit Hours: 9
- PSG 273 - Clinical Polysomnographic Technology II Credit Hours: 9
  
- PSG 291 - Clinical Sleep Educator Credit Hours: 3
- RCP 120 - Interventions in Gas Exchange Credit Hours: 4

**Total for a Certificate in Polysomnographic Technology: 47 Credit Hours**

Demonstrated computer proficiency is required by the Board of RPGST. After completion of the Web-based program, the student will have demonstrated computer proficiency.

The clinical Polysomnographic technology courses require placement in clinical sites. Students are responsible for selecting an accredited sleep disorder facility prior to admission into the program. Site agreements between Oregon Tech and the accredited facility must be in place for the student to begin these courses. On-site preceptors will work in conjunction with Oregon Tech faculty to ensure an excellent training experience.

## Respiratory Care, BS

### Curriculum

Required courses and terms during which they may be taken.

#### Pre-Respiratory Care

##### Freshman Year

###### Fall

- BIO 231 - Human Anatomy and Physiology I Credit Hours: 4
- CHE 101 - Introduction to General Chemistry Credit Hours: 3
- CHE 104 - Introduction to General Chemistry Laboratory Credit Hours: 1
  
- MATH 111 - College Algebra Credit Hours: 4  
or
- MATH 243 - Introductory Statistics Credit Hours: 4
  
- WRI 121 - English Composition Credit Hours: 3

**Total: 15 Credit Hours**

###### Winter

- BIO 232 - Human Anatomy and Physiology II Credit Hours: 4
  
- PSY 201 - Psychology Credit Hours: 3  
or
- PSY 202 - Psychology Credit Hours: 3  
or
- PSY 203 - Psychology Credit Hours: 3
  
- WRI 122 - Argumentative Writing Credit Hours: 3
- Humanities Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 16 Credit Hours**

###### Spring

- BIO 200 - Medical Terminology Credit Hours: 2
- BIO 233 - Human Anatomy and Physiology III Credit Hours: 4
- SPE 111 - Public Speaking Credit Hours: 3
- Humanities Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 15 Credit Hours**

###### Summer

- COM 205 - Intercultural Communication Credit Hours: 3
- WRI 227 - Technical Report Writing Credit Hours: 3
- Humanities Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3
- Math/Science/Social Science Elective Credit Hours: 1

**Total: 13 Credit Hours**

#### Professional Courses

##### Sophomore Year

###### Fall

- BIO 336 - Essentials of Pathophysiology Credit Hours: 3
- CHE 360 - Clinical Pharmacology for the Health Professions Credit Hours: 3
- RCP 100 - Matriculation Credit Hours: 2
- RCP 231 - Pulmonary Physiology Credit Hours: 4

**Total: 12 Credit Hours**

###### Winter

- BIO 105 - Microbiology Credit Hours: 4
- RCP 235 - Arterial Blood Gases Credit Hours: 3
- RCP 236 - Cardiopulmonary Dynamics Credit Hours: 3
- RCP 241 - Respiratory Gas Therapeutics Credit Hours: 4

**Total: 14 Credit Hours**

###### Spring

- RCP 223 - Emergent Chest Radiographic Interpretation Credit Hours: 2
- RCP 252 - Cardiopulmonary Pharmacology Credit Hours: 4
- RCP 336 - Hyperinflation Therapies Credit Hours: 3
- SPE 321 - Small Group and Team Communication Credit Hours: 3

**Total: 12 Credit Hours**

##### Junior Year

###### Fall

- RCP 337 - Pulmonary Pathology Credit Hours: 4
- RCP 351 - Mechanical Ventilation I Credit Hours: 4
- RCP 388 - Advanced Neonatal Respiratory Care Credit Hours: 4

**Total: 12 Credit Hours**

###### Winter

- RCP 352 - Mechanical Ventilation II Credit Hours: 4
- RCP 375 - Pediatric Care Credit Hours: 4
- RCP 386 - Critical Care I Credit Hours: 4

**Total: 12 Credit Hours**

###### Spring

- RCP 326 - Disaster Preparedness Credit Hours: 2
- RCP 335 - Exercise Physiology and Education Credit Hours: 2
- RCP 345 - Cardiopulmonary Diagnosis and Monitoring Credit Hours: 3
- RCP 353 - Mechanical Ventilation III Credit Hours: 4
- RCP 387 - Critical Care II Credit Hours: 2

**Total: 13 Credit Hours**

**Senior Year**

**Summer**

- RCP 350 - Introduction to Clinical Credit Hours: 9
- RCP 366 - Clinical Simulation Credit Hours: 3
- RCP 440 - Case Management I Credit Hours: 3

**Total: 15 Credit Hours**

**Fall**

- RCP 441 - Case Management II Credit Hours: 3
- RCP 450 - Clinical Care I Credit Hours: 9

**Total: 12 Credit Hours**

**Winter**

- RCP 442 - Case Management III Credit Hours: 3
- RCP 451 - Clinical Care II Credit Hours: 9

**Total: 12 Credit Hours**

**Spring**

- RCP 452 - Clinical Care III Credit Hours: 12
- RCP 460 - Advanced Life Support Credit Hours: 2

**Total: 14 Credit Hours**

**Total for a B.S. in Respiratory Care: 187 Credit Hours**

## Respiratory Care, Degree Completion, BS

The Respiratory Care program offers a degree completion program for registered technologists in good standing, who wish to pursue a bachelor's degree in their field. The program is offered completely online. There is no on campus residency requirement.

### Curriculum

#### Courses granted for Registered Respiratory Therapist (RRT)

- RCP 223 - Emergent Chest Radiographic Interpretation Credit Hours:2
- RCP 231 - Pulmonary Physiology Credit Hours: 4
- RCP 235 - Arterial Blood Gases Credit Hours:3
- RCP 236 - Cardiopulmonary Dynamics Credit Hours:3
- RCP 241 - Respiratory Gas Therapeutics Credit Hours:4
- RCP 252 - Cardiopulmonary Pharmacology Credit Hours:4
- RCP 336 - Hyperinflation Therapies Credit Hours:3
- RCP 337 - Pulmonary Pathology Credit Hours: 4
- RCP 350 - Introduction to Clinical Credit Hours:9
- RCP 351 - Mechanical Ventilation I Credit Hours:4
- RCP 352 - Mechanical Ventilation II Credit Hours:4
- RCP 386 - Critical Care I Credit Hours: 4
- RCP 450 - Clinical Care I Credit Hours: 9
- RCP 451 - Clinical Care II Credit Hours:9
- RCP 452 - Clinical Care III Credit Hours:12
- RCP 460 - Advanced Life Support Credit Hours: 2

#### Oregon Tech Degree Completion Courses

- BIO 336 - Essentials of Pathophysiology Credit Hours:3
- CHE 360 - Clinical Pharmacology for the Health Professions Credit Hours:3
- COM 205 - Intercultural Communication Credit Hours:3
- RCP 100 - Matriculation Credit Hours:2
- RCP 326 - Disaster Preparedness Credit Hours:2
- RCP 335 - Exercise Physiology and Education Credit Hours:2
- RCP 345 - Cardiopulmonary Diagnosis and Monitoring Credit Hours:3
- RCP 353 - Mechanical Ventilation III Credit Hours:4
- RCP 366 - Clinical Simulation Credit Hours:3
- RCP 387 - Critical Care II Credit Hours:2
- RCP 388 - Advanced Neonatal Respiratory Care Credit Hours:4
- RCP 389 - International Neonatology Credit Hours:4
- RCP 440 - Case Management I Credit Hours:3
- RCP 441 - Case Management II Credit Hours:3
- RCP 442 - Case Management III Credit Hours:3
- SPE 321 - Small Group and Team Communication Credit Hours:3
- WRI 227 - Technical Report Writing Credit Hours:3
- Humanities Elective Credit Hours:6
- Social Science Elective Credit Hours:6

#### Prerequisite/Transfer Courses

- BIO 105 - Microbiology Credit Hours:4
- BIO 200 - Medical Terminology Credit Hours:2
- BIO 231 - Human Anatomy and Physiology I Credit Hours:4
- BIO 232 - Human Anatomy and Physiology II Credit Hours:4
- BIO 233 - Human Anatomy and Physiology III Credit Hours:4
- CHE 101 - Introduction to General Chemistry Credit Hours:3
- CHE 104 - Introduction to General Chemistry Laboratory Credit Hours:1
  
- MATH 111 - College Algebra Credit Hours:4
- or
- MATH 243 - Introductory Statistics Credit Hours:4
  
- PSY 201 - Psychology Credit Hours:3

- or
- PSY 202 - Psychology Credit Hours: 3
- or
- PSY 203 - Psychology Credit Hours: 3
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 121 - English Composition Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3
- Humanities Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3
- MATH/SCI/SS Elective Credit Hours: 1

## Sleep Health, Clinical Sleep Health Option, AAS

### Curriculum

**All courses in the Certificate Program and all courses listed below are required to earn the A.A.S. degree:**

- BIO 231 - Human Anatomy and Physiology I Credit Hours: 4
- BIO 232 - Human Anatomy and Physiology II Credit Hours: 4
- BIO 233 - Human Anatomy and Physiology III Credit Hours: 4
- MATH 243 - Introductory Statistics Credit Hours: 4
- PSY 201 - Psychology Credit Hours: 3
- or
- PSY 202 - Psychology Credit Hours: 3
- or
- PSY 203 - Psychology Credit Hours: 3
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 121 - English Composition Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3
- WRI 227 - Technical Report Writing Credit Hours: 3
- Math/Science/Social Science Elective Credit Hours: 6
- Humanities Elective Credit Hours: 3
- Electives Credit Hours: 6

**Total: 46 Credit Hours**

## Total for an A.A.S. Degree in Sleep Health, Option: Clinical Sleep Health: 91 Credit Hours

Clinical Sleep Health Certificate Courses Credit Hours: 45

Additional Courses Credit Hours: 46

## Sleep Health, Polysomnographic Technology Option, AAS

### Curriculum

All courses in the Certificate Program and all courses listed below are required to earn the A.A.S. degree:

#### Required Courses:

- BIO 231 - Human Anatomy and Physiology I Credit Hours: 4
- BIO 232 - Human Anatomy and Physiology II Credit Hours: 4
- BIO 233 - Human Anatomy and Physiology III Credit Hours: 4
- MATH 243 - Introductory Statistics Credit Hours: 4
- PSY 201 - Psychology Credit Hours: 3
- or
- PSY 202 - Psychology Credit Hours: 3
- or
- PSY 203 - Psychology Credit Hours: 3

- SPE 111 - Public Speaking Credit Hours: 3
- WRI 121 - English Composition Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3
- WRI 227 - Technical Report Writing Credit Hours: 3
- Math/Science/Social Science Elective Credit Hours: 6
- Humanities Elective Credit Hours: 3
- Electives Credit Hours: 3

**Total: 43 Credit Hours**

**Total for an A.A.S. Degree Sleep Health Polysomnographic Technology Option: 90 Credit Hours**

Polysomnographic Technology Certificate Courses Credit Hours: 45

Additional Courses Credit Hours: 43

# Engineering, Technology and Management

## Civil Engineering

Sean St. Clair, *Department Chair*

Roger Lindgren, *Program Director, Master of Science in Civil Engineering*

David Thaemert, *Curriculum Coordinator*

*Professors:* R. Lindgren, S. St. Clair

*Associate Professors:* C. Riley, D. Thaemert

*Assistant Professors:* M. Sleep

Civil engineers design infrastructure—transportation networks, bridges, buildings, dams, communities, and water and waste management systems—for the enhancement of human welfare and protection of our environment. Oregon Tech's freshman-to-master's Civil Engineering degree program, the first such program in the Pacific Northwest, equips students to meet industry needs identified by the American Society of Civil Engineers (ASCE). This unique pairing of degrees prepares future professionals for licensure requirements proposed in the ASCE Policy Statement 465.

### Degrees Offered

- Bachelor of Science in Civil Engineering
- Bachelor of Science and Master of Science in Civil Engineering (concurrent degree)
- Master of Science in Civil Engineering

### Career Opportunities

Upon completing the core curriculum, civil engineering students have a solid foundation in structural, transportation, water resources/environmental, and geotechnical engineering. In their fourth and fifth years of study, students can then target specific careers within the broad field of civil engineering. Graduates have career opportunities with consulting firms, government agencies, heavy construction and industry.

Geotechnical engineering involves the design and construction of projects built on and of the earth. These projects include foundations for structures, earth embankments of soil and rock, dams, levees, and tunnels. In addition geotechnical engineers predict reactions of the earth due to changes imposed by other engineered systems.

Structural engineering involves the planning, analysis and design of buildings and other structures using the principal construction materials of wood, steel, concrete and masonry. Graduates are familiar with current codes and standards, and are aware of trends in high-performance structures.

Transportation engineering is concerned with the planning, design, construction, operation, performance, evaluation and rehabilitation of transportation systems and facilities, such as streets, highways, railroads, mass transit, and air transportation systems.

Water resources and environmental engineering address the spectrum of water from supply to transport to use to discharge, and are at the junction of efforts to provide sustainable human and natural environments, in compliance with regulatory mandates. Graduates have opportunities in planning, design, and operation of hydraulic and water resource projects, floodplain management, or resource management issues.

Civil engineering graduates may consider a concurrent degree in environmental sciences to expand career opportunities with a broad spectrum of government agencies, consulting firms, and industry.

### Mission Statement

The mission of the Oregon Tech Civil Engineering program is to prepare students for professional practice. To be prepared to practice as professionals, engineers must be able to act responsibly and ethically, understand their limits and the limits of the tools they use, communicate effectively, work well in teams, and, amid the changing landscape of the field of civil engineering, be able to pursue graduate-level education.

### Objectives

Civil engineering graduates will be able to:

- Practice as a professional civil engineer.
- Pursue advanced education in civil engineering or related fields.
- Act as responsible, effective and ethical citizens.
- Understand and effectively communicate the realistic constraints of civil engineering.
- Perform effectively in a multi-disciplinary environment.

Students enjoy a close relationship with full-time faculty with advanced engineering degrees who are also licensed professionals with many years of practical experience. Course offerings promote education in theory relevant to our civil engineering technical areas, engineering design and principles of sustainable development. These concepts are emphasized and integrated throughout the curriculum in a sequential manner.

Early in the curriculum, elements of the creative design process are introduced as students complete first-year design projects. While most freshman and sophomore courses are intended to provide a solid background in mathematics, communications, basic sciences, and engineering mechanics, certain courses provide additional concepts and methodologies supporting more advanced topics in engineering and professional practice.

At the junior level, students develop a broad civil engineering base. Junior courses include core topics in structural, transportation, water resources and geotechnical engineering.

In the fourth year, students are required to complete an intensive engineering design project. This effort is focused on a professional-quality civil engineering design and includes essential elements of technical communications and group dynamics. The design project also involves realistic constraints including cost and sustainability considerations, socioeconomic concerns, aesthetic choices and ethical deliberations. Fourth-year students prepare for the Fundamentals of Engineering (FE) examination as a first step toward licensure as professional engineers. In this year, concurrent (BS/MS) degree-seeking students also begin their selected program of graduate-level coursework leading to selection of their graduate project.

Finally, in the fifth year, concurrent students complete coursework and individual graduate projects leading to the concurrent bachelor's and master's degrees.

To ensure graduates can become responsible, effective citizens and begin building a foundation for lifelong learning, students are required to satisfy Oregon Tech general education requirements in communication, humanities, social sciences, and science/mathematics.

### **Student Preparation**

Students interested in the field of civil engineering should emphasize mathematics and science in high school. Two years of algebra and one year each of geometry, trigonometry, chemistry and physics are preferred. Additional courses in mathematics and computer-aided drafting are desirable.

### **Accreditation**

The Civil Engineering Program is accredited by the Engineering Accreditation Commission (EAC) of ABET, Inc., 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, telephone: (410) 347-7700. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.

### **Graduation Requirements**

All courses listed in the curriculum for the current catalog year must be completed to be eligible for graduation, unless a student has already completed the requirements for a category that has changed. When changes are made to the curriculum, students who entered the program under a previous catalog will work with their academic advisors to transition to meet the requirements of the current catalog.

For the concurrent bachelor's and master's degrees in Civil Engineering, a minimum of 225 credits must be completed. Students must maintain a 3.0 GPA for progression to the fourth and fifth years of study. In addition, a final grade of "C" or better must be earned in all math and science courses and those with CE or CIV, ENGR, and GME prefixes, as well as all courses listed as prerequisites for these courses. At least 45 credits of graduate work must be completed.

For the bachelor's degree in Civil Engineering, a minimum of 180 credits must be completed and students must maintain a 2.0 GPA to be eligible for graduation. In addition, a final grade of "C" or better must be earned in all math and science courses and those with CE or CIV, ENGR, and GME prefixes as well as all listed prerequisites for these courses with a minimum GPA of 3.0 earned in 500-level courses.

The Master of Science in Civil Engineering requires completing 45 credits of graduate work with a final grade of "C" or better in all graduate courses.

## Civil Engineering, BS

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- CHE 221 - General Chemistry I Credit Hours: 5
- ENGR 101 - Introduction to Engineering I Credit Hours: 2
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 121 - English Composition Credit Hours: 3
- Humanities Elective Credit Hours: 3<sup>a</sup>

**Total: 16 Credit Hours**

##### Winter

- CHE 222 - General Chemistry II Credit Hours: 5
- ENGR 102 - Introduction to Engineering II Credit Hours: 2
- WRI 122 - Argumentative Writing Credit Hours: 3
- Literature Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Spring

- CE 203 - Engineering Graphics Credit Hours: 3
- GEOL 201 - Physical Geology Credit Hours: 4
- MATH 251 - Differential Calculus Credit Hours: 4
- Humanities Elective Credit Hours: 3<sup>a</sup>

**Total: 14 Credit Hours**

#### Sophomore Year

##### Fall

- CE 212 - Civil Engineering Materials Credit Hours: 4
- GME 161 - Plane Surveying I Credit Hours: 4
- MATH 252 - Integral Calculus Credit Hours: 4
- PHY 221 - General Physics with Calculus Credit Hours: 4

**Total: 16 Credit Hours**

##### Winter

- ENGR 211 - Engineering Mechanics: Statics Credit Hours: 4
- GIS 134 - Geographic Information Systems Credit Hours: 3
- MATH 254 - Vector Calculus I Credit Hours: 4
- PHY 222 - General Physics with Calculus Credit Hours: 4

**Total: 15 Credit Hours**

##### Spring

- CE 205 - Computational Methods Credit Hours: 2
- ENGR 213 - Engineering Mechanics: Strength of Materials Credit Hours: 4
- MATH 321 - Applied Differential Equations I Credit Hours: 4
- WRI 227 - Technical Report Writing Credit Hours: 3

**Total: 13 Credit Hours**

#### Junior Year

##### Fall

- CE 311 - Introduction to Geotechnical Engineering Credit Hours: 5
- CE 331 - Structural Analysis Credit Hours: 4
- ENGR 318 - Engineering Mechanics: Fluids Credit Hours: 4
- MATH 361 - Statistical Methods I Credit Hours: 4

**Total: 17 Credit Hours**

##### Winter

- CE 308 - Principles of Professional Practice Credit Hours: 4
- CE 341 - Elementary Structural Design Credit Hours: 5
- CE 351 - Introduction to Transportation Engineering Credit Hours: 4
- CE 371 - Closed Conduit Design Credit Hours: 4

**Total: 17 Credit Hours**

##### Spring

- CE 312 - Earth Pressures and Foundations Credit Hours: 3
- CE 354 - Traffic Engineering Credit Hours: 3
- CE 374 - Hydrology Credit Hours: 4

- CE 442 - Advanced Reinforced Concrete Design Credit Hours: 4

or

- CE 444 - Intermediate Steel Design Credit Hours: 4

**Total: 14 Credit Hours**

#### Senior Year

- ANTH 335 - The Built Environment Credit Hours: 3
- or
- HIST 335 - The Engineering Profession Credit Hours: 3

- ANTH 452 - Globalization Credit Hours: 3
- CE 401/COM 401 - Civil Engineering Project I Credit Hours: 5
- CE 402/SPE 321 Civil Engineering Project II Credit Hours: 6

- CE 405 - Sustainability and Infrastructure Credit Hours: 3
- Technical Electives Credit Hours: 15<sup>b</sup>
- Math/Science Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 42 Credit Hours**

## Total for a B.S. in Civil Engineering: 180 Credit Hours

<sup>a</sup>No more than 3 credits of Humanities courses may be skill- or performance based.

<sup>b</sup>Technical electives are generally 400- and 500-level CE courses. A maximum of 2 non-DE technical elective courses (specified below) may be applied to the BSCE degree.

**Allowed Non-CE Technical Electives**

- ENV 314 - Environmental Management and Restoration 3
- GME 351 - Construction and Engineering Surveying 3
- GME 372 - Subdivision Planning and Platting 3
- GME 425 - Remote Sensing 4
- MATH 341 - Linear Algebra I 4
- MATH 452 - Numerical Methods II 4
- MATH 465 - Mathematical Statistics 4

## Civil Engineering, BS/MS

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- CHE 221 - General Chemistry I Credit Hours: 5
- ENGR 101 - Introduction to Engineering I Credit Hours: 2
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 121 - English Composition Credit Hours: 3
- Humanities Elective Credit Hours: 3<sup>a</sup>

**Total: 16 Credit Hours**

##### Winter

- CHE 222 - General Chemistry II Credit Hours: 5
- ENGR 102 - Introduction to Engineering II Credit Hours: 2
- WRI 122 - Argumentative Writing Credit Hours: 3
- Literature Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Spring

- CE 203 - Engineering Graphics Credit Hours: 3
- GEOL 201 - Physical Geology Credit Hours: 4
- MATH 251 - Differential Calculus Credit Hours: 4
- Humanities Elective Credit Hours: 3<sup>a</sup>

**Total: 14 Credit Hours**

#### Sophomore Year

##### Fall

- CE 212 - Civil Engineering Materials Credit Hours: 4
- GME 161 - Plane Surveying I Credit Hours: 4
- MATH 252 - Integral Calculus Credit Hours: 4
- PHY 221 - General Physics with Calculus Credit Hours: 4

**Total: 16 Credit Hours**

##### Winter

- ENGR 211 - Engineering Mechanics: Statics Credit Hours: 4
- GIS 134 - Geographic Information Systems Credit Hours: 3
- MATH 254 - Vector Calculus I Credit Hours: 4
- PHY 222 - General Physics with Calculus Credit Hours: 4

**Total: 15 Credit Hours**

##### Spring

- CE 205 - Computational Methods Credit Hours: 2
- ENGR 213 - Engineering Mechanics: Strength of Materials Credit Hours: 4
- MATH 321 - Applied Differential Equations I Credit Hours: 4
- WRI 227 - Technical Report Writing Credit Hours: 3

**Total: 13 Credit Hours**

#### Junior Year

##### Fall

- CE 311 - Introduction to Geotechnical Engineering Credit Hours: 5
- CE 331 - Structural Analysis Credit Hours: 4
- ENGR 318 - Engineering Mechanics: Fluids Credit Hours: 4
- MATH 361 - Statistical Methods I Credit Hours: 4

**Total: 17 Credit Hours**

##### Winter

- CE 308 - Principles of Professional Practice Credit Hours: 4
- CE 341 - Elementary Structural Design Credit Hours: 5
- CE 351 - Introduction to Transportation Engineering Credit Hours: 4
- CE 371 - Closed Conduit Design Credit Hours: 4

**Total: 17 Credit Hours**

##### Spring

- CE 312 - Earth Pressures and Foundations Credit Hours: 3
- CE 354 - Traffic Engineering Credit Hours: 3
- CE 374 - Hydrology Credit Hours: 4

- CE 442 - Advanced Reinforced Concrete Design Credit Hours: 4

or

- CE 444 - Intermediate Steel Design Credit Hours: 4

**Total: 14 Credit Hours**

#### Fourth Year

- ANTH 335 - The Built Environment Credit Hours: 3
- or
- HIST 335 - The Engineering Profession Credit Hours: 3

- CE 401/COM 401 - Civil Engineering Project I Credit Hours: 5
- CE 402/SPE 321 Credit Hours: 6
- CE 405 - Sustainability and Infrastructure Credit Hours: 3
- CE 501 - Civil Engineering Graduate Seminar Credit Hours: 1
- MATH 4XX - Math/Science Elective Credit Hours: 3
- WRI 521 - Writing at the Graduate Level Credit Hours: 3
- Technical Electives Credit Hours: 3<sup>b</sup>
- Graduate Technical Electives Credit Hours: 12<sup>c</sup>
- Social Science Elective Credit Hours: 3

**Year Total: 43 Credit Hours**

#### Fifth Year

- ANTH 452 - Globalization Credit Hours: 3
- CE 590 - Civil Engineering Graduate Project Credit Hours: (Vary 1-9)
- Technical Electives Credit Hours: 12<sup>b</sup>
- Graduate technical electives Credit Hours: 20-29<sup>c</sup>

**Year Total: 44 Credit Hours**

**Total Required for BS/MSCE: 225 Credit Hours**

<sup>a</sup>No more than 3 credits of Humanities courses may be skill- or performance based.

<sup>b</sup>Technical electives are generally 400- and 500-level CE courses. A maximum of 2 non-CE technical elective courses (specified below) may be applied to the concurrent BSCE/MSCE degrees.

<sup>c</sup>Graduate technical electives are generally 500-level CE courses. Up to 9 credits may be selected from 400-level CE and non-CE courses. At the discretion of the graduate advisor, other 500-level non-CE courses may be chosen as electives.

### **Allowed Non-CE Technical Electives**

- GME 351 - Construction and Engineering Surveying Credit Hours: 3  
or
- GME 372 - Subdivision Planning and Platting Credit Hours: 3
  
- GME 425 - Remote Sensing Credit Hours: 4
- MATH 341 - Linear Algebra I Credit Hours: 4
- MATH 451 - Numerical Methods I Credit Hours: 4
- MATH 465 - Mathematical Statistics Credit Hours: 4

## Civil Engineering, MS

### Curriculum

For students who have previously completed a BSCE degree. <sup>e</sup>

- ANTH 452 - Globalization Credit Hours: 3
- CE 501 - Civil Engineering Graduate Seminar Credit Hours: 1
- CE 590 - Civil Engineering Graduate Project Credit Hours: (Vary 1-9)
- MATH 4XX Credit Hours: 3
- WRI 521 - Writing at the Graduate Level Credit Hours: 3
- Graduate Technical Electives Credit Hours: 26-35<sup>f</sup>

### Total for a M.S. in Civil Engineering: 45 Credit Hours

<sup>e</sup> Students with a BS degree in a closely-related field of study may be considered. These students will generally be required to complete additional course work.

<sup>f</sup> Graduate technical electives are generally 500-Level CE courses. Up to 9 credits may be selected from 400-level CE and non-CE courses. At the discretion of the graduate advisor, other 500-level non-CE courses may be chosen as electives.

## Civil Engineering/Environmental Sciences, BS

### Curriculum

Civil Engineering students have the opportunity to earn dual degrees in Civil Engineering and Environmental Sciences. The additional degree requires 53 credits in Environmental Sciences courses, which can be taken concurrent to Civil Engineering courses or as an add-on year. The dual degree in Environmental Sciences places engineering projects in the context of environmental impacts and environmental regulations, and expands the range of job opportunities for Oregon Tech Civil Engineering graduates. The purpose of the concurrent programs is to challenge motivated students to become even better prepared for the engineering and environmental job markets. To obtain both degrees, students must complete the following listed courses along with the courses required for the Bachelor of Science in Civil Engineering.

- BIO 211 - Principles of Biology Credit Hours: 4
- BIO 212 - Principles of Biology Credit Hours: 4
- BIO 213 - Principles of Biology Credit Hours: 4
- BIO 225 - Riparian Assessment Methods Credit Hours: 1
- BIO 337 - Aquatic Ecology Credit Hours: 4
- CHE 223 - General Chemistry III Credit Hours: 5<sup>a</sup>
- CHE 331 - Organic Chemistry I Credit Hours: 4
- ENV 111 - Introduction to Environmental Sciences Credit Hours: 4
- ENV 314 - Environmental Management and Restoration Credit Hours: 3
  
- ENV 434 - Advanced Data Analysis Credit Hours: 4  
or
- MATH 362 - Statistical Methods II Credit Hours: 4
  
- ENV 484 - Sustainable Human Ecology Credit Hours: 4
- GEOG 105 - Physical Geography Credit Hours: 4<sup>a</sup>
- GIS 134 - Geographic Information Systems Credit Hours: 3
- Technical Emphasis Elective Credit Hours: 3<sup>b</sup>

### Total Needed: 53 Credit Hours

<sup>a</sup> CHE 223 and GEOG 105 should be taken as Civil Engineering Math/Science electives

<sup>b</sup> This technical emphasis elective must have a CHE prefix; different courses are offered every year

# Computer Systems Engineering Technology Department

Todd Breedlove, *Department Chair*

Sherry Yang, *Portland-Metro Operations Program Director, Software Engineering Technology and Embedded Systems Engineering Technology.*

Phil Howard, *Program Director, Software Engineering Technology*

Kevin Pintong, *Program Director, Computer Engineering Technology*

Troy Scevers, *Program Director, Embedded Systems Engineering Technology*

Sherry Yang, *Curriculum Coordinator, Software Engineering Technology*

Phong Nguyen, *Curriculum Coordinator, Embedded Systems*

*Professors:* T. Breedlove, C. Caldwell, D. Lynn, S. Yang

*Associate Professors:* P. Nguyen

*Assistant Professors:* M. Besser, J. Chaney, L. Cordova, P. Howard, M. Healy, K. Pintong, T. Scevers

## Degrees Offered

- Bachelor of Science in Computer Engineering Technology
- Bachelor of Science in Software Engineering Technology
- Bachelor of Science in Embedded Systems Engineering Technology
- Associate of Engineering in Computer Engineering Technology
- Associate of Engineering in Software Engineering Technology

## Common First-Year Curriculum

The Bachelor of Science in Computer Engineering Technology, Bachelor of Science in Software Engineering Technology, Bachelor of Science in Embedded Systems Engineering Technology, the Associate of Engineering in Computer Engineering Technology and the Associate of Engineering in Software Engineering Technology all share a common first-year curriculum.

## Curriculum

Required courses and recommended terms during which they should be taken:

### Freshman Year

#### Fall

- CST 116 - C++ Programming I Credit Hours: 4
- CST 162 - Digital Logic I Credit Hours: 4
- MATH 111 - College Algebra Credit Hours: 4
- WRI 121 - English Composition Credit Hours: 3

**Total: 15 Credit Hours**

#### Winter

- CST 126 - C++ Programming II Credit Hours: 4
- CST 130 - Computer Organization Credit Hours: 3
- MATH 112 - Trigonometry Credit Hours: 4
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3

**Total: 17 Credit Hours**

#### Spring

- CST 120 - Embedded C Credit Hours: 4
- CST 131 - Computer Architecture Credit Hours: 3
- CST 136 - Object-Oriented Programming with C++ Credit Hours: 4
- MATH 251 - Differential Calculus Credit Hours: 4

**Total: 15 Credit Hours**

# Computer Engineering Technology

## Degrees Offered

- Bachelor of Science in Computer Engineering Technology
- Associate of Engineering in Computer Engineering Technology

## Bachelor of Science and Associate of Engineering Degrees

All students who complete the curriculum requirements in Computer Engineering Technology will be knowledgeable in the theory and applications of both computer hardware and software.

## Required Student Equipment

Successful completion of this degree requires intensive, hands-on use of computers. Therefore, all students are required to own their own computer. To ensure compatibility with campus-wide computers and networks, students should consult a department faculty member for a specification sheet. Financial aid may be available to help defray the cost of this equipment. Please consult the Financial Aid Office at Oregon Tech.

## Career Opportunities

Work in the field of computer engineering technology includes: application specific integrated circuit development, firmware development, embedded systems design, software development, testing and applications of technology.

Computer engineering technology graduates will be involved in development of hardware, software and embedded applications that adapt digital logic and computer systems to solve problems in a wide range of industries from industrial manufacturing to consumer electronics. In addition, they may be involved in product testing and qualification or in application engineering, customer support, sales and public relations.

The associate's degree curriculum gives the student a strong foundation in both hardware and software aspects of computing, while also furnishing a solid background in general education subjects including mathematics, physics and communication. The associate degree graduate qualifies as a technician who is productive immediately upon entering the work force. The associate's degree also provides a way for students who obtain degrees in related disciplines to add breadth to their education.

The bachelor's curriculum goes beyond the associate's degree curriculum providing the greater depth and breadth of technical capability necessary for an engineering technologist. The graduate is qualified to assume a responsible position in business or industry. Graduates may be responsible for the development, use and the maintenance of computing systems, and for the supervision of personnel.

New careers are constantly evolving in both the hardware and software branches of this field. A diversified study allows the graduate to quickly adapt to changing market conditions.

## Curriculum Mission and Objectives

The mission of the Computer Engineering Technology (CET) Degree program in the Computer Systems Engineering Technology (CSET) Department at Oregon Institute of Technology is to provide an excellent education incorporating industry-relevant, applied laboratory-based design and analysis to our students. The program is to serve a constituency consisting of its Alumni, employers in the high-technology industry and the members of our IAB. Major components of the CET program's mission in the CSET department are to:

- educate computer engineering technology students to meet current and future industrial challenges
- promote a sense of scholarship, leadership and professional service among our graduates
- enable students to create, develop, and disseminate knowledge for the applied engineering environment
- expose students to a cross-disciplinary educational program
- provide high tech industry employers with graduates in the computer engineering technology profession

## CET Bachelor of Science Program Educational Objectives

Alumni of the Computer Engineering Technology (CET) Bachelor Degree program may be employed in a wide range of high tech industries from industrial manufacturing to consumer electronics where they will be involved in solving problems through the development of hardware, software and embedded applications. Alumni may be involved in product design, testing and qualification, application engineering, customer support, sales, or public relations.

1. Alumni will demonstrate technical competency through success in computer engineering technology positions and/or pursuit of engineering or engineering technology graduate studies if desired.
2. Alumni will demonstrate competencies in communication and teamwork skills by assuming increasing levels of responsibility and/or leadership or managerial roles.
3. Alumni will develop professionally, pursue continued learning and practice responsibly and ethically.

## CET Associate Degree Program Education Objectives

Alumni of the Computer Engineering Technology (CET) Associate Degree program may be employed as technicians or in support roles in a wide range of high tech industries from industrial manufacturing to consumer electronics. Alumni may be involved in product testing and qualification, customer support, sales, or public relations.

1. Alumni will demonstrate technical competence through success in computer engineering technician positions.
2. Alumni will demonstrate competencies in communication and teamwork skills through positive contributions to team based engineering projects.
3. Alumni will develop professionally, pursue continued learning and practice responsibly and ethically.

According to current statistics, one third of students who obtain the CET Associate degree also obtain a bachelor degree in a related discipline, most often a bachelor degree in Software. In this case, the Associate degree adds breadth to their education. Alumni in this category would be expected to perform at a level consistent with the bachelor degree program educational objectives.

## Cooperative Field Experience

The cooperative program includes work experience during the junior and senior years. The co-op period is an employment arrangement with an employer in the area of the student's major field with normal salary and academic credit. These arrangements are made on an individual basis and the student is under no obligation to accept permanent employment with any previous co-op employer.

A student must have junior standing in their degree program to be considered for this program.

## Accreditation

All of our programs are accredited by the Engineering Technology Accreditation Commission (ETAC) of ABET, Inc. (<http://www.abet.org>). ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.

## Degree Requirements

Associate of engineering technology degree students must complete 94 credit hours as prescribed by the curriculum outline. The Bachelor of Science in Computer Engineering Technology degree requires 94 additional credit hours, for a total of 188 credits, as prescribed by the curriculum outline.

## Embedded Systems Engineering Technology

### Degree Offered

- Bachelor of Science in Embedded Systems Engineering Technology

### Mission

The mission of the Embedded Systems Engineering Technology (ESET) bachelor's degree program within the Computer Systems Engineering Technology (CSET) Department at Oregon Institute of Technology is to prepare our students for productive careers in industry and government by providing an excellent education incorporating industry relevant, applied laboratory-based instruction in both the theory and application of embedded systems engineering. Our focus is educating students to meet the growing workforce demand in Oregon and elsewhere for graduates prepared in both hardware and software aspects of embedded systems. Major components of the ESET program's mission in the CSET Department are:

- to educate a new generation of ESET students to meet current and future industrial challenges and emerging embedded systems engineering trends
- to promote a sense of scholarship, leadership, and professional service among our graduates
- to enable our students to create, develop, apply, and disseminate knowledge within the embedded systems development environment
- to expose our students to cross-disciplinary educational programs
- to provide government and high tech industry employers with graduates in embedded systems engineering and related professions

### Accreditation

The Embedded Systems Engineering Technology Programs are accredited by the Engineering Technology Accreditation Commission (ETAC), Inc., <http://www.abet.org>. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education. Required Student Equipment Successful completion of this degree requires intensive, hands-on use of computers. Therefore, all students are required to own their own computer. To ensure compatibility with campus-wide computers and networks, students should consult a department faculty member for a specification sheet. Financial aid may be available to help defray the cost of this equipment. Please consult the Financial Aid Office at Oregon Tech.

## Career Opportunities

The Department of Computer Systems Engineering Technology offers a Bachelor of Science degree in Embedded Systems Engineering Technology (ESET) designed to build and enhance student's knowledge and skills in this high demand field. Embedded systems play an important role in society. They are the products that contain computing capabilities which are found throughout a wide spectrum of applications. Examples of embedded systems can be found in areas ranging from the entertainment industry to office systems; health care to telecommunications. Embedded systems encompass such diverse products as interactive multimedia, printers, medical equipment, avionics equipment, kitchen appliances, mobile phones, and automotive engine management units. Engineering and technological challenges abound in the design and development of such innovative products due to the high level integration of hardware and software. As they become more complex and time to market shrinks there is increasing need for skill and creativity on the part of the Embedded System Engineering Technology graduate.

### If you want to:

- develop skills in design and implementation of firmware for embedded systems
- expand knowledge and apply new ideas in practical design
- gain hands-on experience in embedded system design
- bridge the gap between software and hardware design
- enhance your career opportunities in a variety of high demand areas of industrial applications, then the Embedded Systems Engineering Technology Program is the place for you

## Objective of the Curriculum

The goal of the Embedded Systems Program is to prepare students with the skills demanded by real-world industrial applications. Key to this process is the direct involvement of the embedded systems industries. Specific areas of preparation include:

- embedded systems design methods—methods and techniques specific to the creation of an embedded system that integrates both software and hardware to fulfill a set of requirements
- software engineering methods—methods specific to development of software for embedded systems, including implementation, maintenance and testing
- systems software development—device driver development, multiprocessing control systems, and the software necessary to directly access and manipulate hardware
- architectural elements of embedded systems—methods and techniques for designing and implementing hardware components for embedded systems such as application-specific integrated circuits and System-On-a-Chip (SoC) technology
- real-time high-reliability and high availability processing—methods and techniques necessary for understanding, evaluating and addressing quality attributes most often associated with embedded systems such as real-time deadlines, high availability, survivability, and safety
- data communications—methods and techniques for developing distributed systems within embedded environments that use physical or wireless networking

## Cooperative Field Experience

The cooperative program includes work experience during the junior and senior years. The co-op period is an employment arrangement with an employer in the area of the student's major field with normal salary and academic credit. These arrangements are made on an individual basis and the student is under no obligation to accept permanent employment with any previous co-op employer.

## Software Engineering Technology

### Degrees Offered

- Bachelor of Science in Software Engineering Technology
- Associate of Engineering in Software Engineering Technology

Students who complete the curriculum requirements in Software Engineering Technology will be qualified and knowledgeable in the establishment and use of sound engineering principles (methods) in order to create software of all types that is reliable and works on real machines.

### Required Student Equipment

Successful completion of this degree requires intensive, hands-on use of computers. Therefore, all students are required to own a computer. To ensure compatibility with campus-wide computers and networks, students should consult a department faculty member for a specification sheet. Financial aid may be available to help defray the cost of this equipment. Please consult the Financial Aid Office at Oregon Tech.

**Note:** The Portland-Metro campus is a laptop-required campus with resources like laptop specifications, financial aid, and helpful instructions found at <http://www.oit.edu/portland-metro/college-costs/bring-your-own-device>.

## Career Opportunities

Bachelor of Science in Software Engineering Technology degree graduates find employment as software engineers, systems engineers, systems analysts, programmer/analysts, researchers and assistants, consultants, customer engineers, etc., responsible for the application, design, development, and implementation of software in all areas of industry, government and education.

Software engineering technologists' career paths will be many and varied. They may concentrate on hardware-support activities such as new design/development, testing, customer service and the like. They may concentrate on software specification, design, construction and testing through implementation and maintenance.

Graduates may get involved with administrative or project management by beginning as a member of an applications development team and progressing into management. They may pursue careers in product development, marketing, sales, design, and support. Students completing the requirements for the Associate of Engineering degree should consider themselves as entry-level trainees in the careers mentioned.

## High School Preparation

Coursework in computer science, mathematics, and physical science will aid students in their progress in this program.

## Bachelor Program Mission

The mission of the Software Engineering Technology (SET) Bachelor's Degree Program within Computer Systems Engineering Technology (CSET) Department at Oregon Institute of Technology is to prepare our students for productive careers in industry and government by providing an excellent education incorporating industry-relevant, applied laboratory-based instruction in both the theory and application of software engineering. The program is to serve a constituency consisting of our alumni, our employers and our Industrial Advisory Board. Major components of the SET Program's mission in the CSET Department are:

- to educate a new generation of Software Engineering Technology students to meet current and future industrial challenges and emerging software trends
- to promote a sense of scholarship, leadership and professional service among our graduates
- to enable our students to create, develop, apply and disseminate knowledge within the software development environment
- to expose our students to cross-disciplinary educational programs
- to provide government and high tech industry employers with graduates in software engineering and related professions

## Bachelor Program Educational Objectives

The Program Educational Objectives of Oregon Tech's Software Engineering Technology Program are to produce graduates that:

- use their knowledge of engineering to creatively and innovatively solve difficult computer systems problems
- regularly engage in exploring, learning and applying state-of-the-art hardware and software technologies to the solution of computer systems problems
- will be an effective software development team member that contributes innovative software design solutions to the resolution of business, scientific or government computer systems problems
- will communicate effectively and successfully, both individually and within multi-disciplinary teams

## Associate Program Mission

The mission of the Software Engineering Technology (SET) Associate Degree program within the Computer Systems Engineering Technology (CSET) Department at Oregon Institute of Technology is to prepare our students for entry level careers in the software industry and government by providing applied laboratory based instruction. The program is to serve a constituency consisting of our alumni, our employers and our Industrial Advisory Board. Major components of the SET program's mission in the CSET Department are:

- to provide a new generation of Software Engineering Technology students with a solid background in computer programming
- to enable our students to create, develop and apply knowledge within a technical software environment
- to provide government and high tech industry employers with entry level graduates in computer programming and related professions

## Associate Program Educational Objectives

The Program Educational Objectives of Oregon Tech's Software Engineering Technology program are to produce graduates that:

- assist in solving computer systems problems using their knowledge of computer programming
- regularly engage in learning and applying state-of-the-art hardware and software technologies to the solution of computer systems problems
- will communicate effectively and successfully in the workplace

## Cooperative Field Experience

The cooperative program includes work experience usually during the junior and senior years. The co-op period would be an employment arrangement with an employer in the area of the student's major field with normal salary and academic credit. These

arrangements are made on an individual basis, and the student is under no obligation to accept permanent employment with any previous cooperating employer. A student must be ready to enter the sophomore year in Software Engineering Technology to be considered for this program

**Accreditation**

The Software Engineering Technology Programs are accredited by the Engineering Technology Accreditation Commission (ETAC) of ABET, Inc., <http://www.abet.org>. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.

## Computer Engineering Technology, AE

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- CST 116 - C++ Programming I Credit Hours: 4
- CST 162 - Digital Logic I Credit Hours: 4
- MATH 111 - College Algebra Credit Hours: 4
- WRI 121 - English Composition Credit Hours: 3

**Total: 15 Credit Hours**

##### Winter

- CST 126 - C++ Programming II Credit Hours: 4
- CST 130 - Computer Organization Credit Hours: 3
- MATH 112 - Trigonometry Credit Hours: 4
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3

**Total: 17 Credit Hours**

##### Spring

- CST 120 - Embedded C Credit Hours: 4
- CST 131 - Computer Architecture Credit Hours: 3
- CST 136 - Object-Oriented Programming with C++ Credit Hours: 4
- MATH 251 - Differential Calculus Credit Hours: 4

**Total: 15 Credit Hours**

#### Sophomore Year

##### Fall

- CST 133 - Digital Logic II Credit Hours: 4
- CST 134 - Instrumentation Credit Hours: 1
- CST 250 - Computer Assembly Language Credit Hours: 4
- MATH 252 - Integral Calculus Credit Hours: 4
- WRI 227 - Technical Report Writing Credit Hours: 3

**Total: 16 Credit Hours**

##### Winter

- CST 204 - Introduction to Microcontrollers Credit Hours: 4
- CST 231 - Digital Systems Design I Credit Hours: 4
- EE 221 - Circuits I Credit Hours: 4
- PHY 221 - General Physics with Calculus Credit Hours: 4

**Total: 16 Credit Hours**

##### Spring

- CST 240 - Linux Programming Credit Hours: 4
- EET 237 - AC Circuits, Filters and Signals Credit Hours: 3
- EET 238 - AC Circuits, Filters and Signals Laboratory Credit Hours: 1
- PHY 222 - General Physics with Calculus Credit Hours: 4
- Humanities or Social Science Elective Credit Hours: 3

**Total: 15 Credit Hours**

**Total Required for an Associate of Engineering in Computer Engineering Technology: 94 Credit Hours**

## Computer Engineering Technology, BS

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- CST 116 - C++ Programming I Credit Hours: 4
- CST 162 - Digital Logic I Credit Hours: 4
- MATH 111 - College Algebra Credit Hours: 4
- WRI 121 - English Composition Credit Hours: 3

**Total: 15 Credit Hours**

##### Winter

- CST 126 - C++ Programming II Credit Hours: 4
- CST 130 - Computer Organization Credit Hours: 3
- MATH 112 - Trigonometry Credit Hours: 4
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3

**Total: 17 Credit Hours**

##### Spring

- CST 120 - Embedded C Credit Hours: 4
- CST 131 - Computer Architecture Credit Hours: 3
- CST 136 - Object-Oriented Programming with C++ Credit Hours: 4
- MATH 251 - Differential Calculus Credit Hours: 4

**Total: 15 Credit Hours**

#### Sophomore Year

##### Fall

- CST 133 - Digital Logic II Credit Hours: 4
- CST 134 - Instrumentation Credit Hours: 1
- CST 250 - Computer Assembly Language Credit Hours: 4
- MATH 252 - Integral Calculus Credit Hours: 4
- WRI 227 - Technical Report Writing Credit Hours: 3

**Total: 16 Credit Hours**

##### Winter

- CST 204 - Introduction to Microcontrollers Credit Hours: 4
- CST 231 - Digital Systems Design I Credit Hours: 4
- EE 221 - Circuits I Credit Hours: 4
- MATH 254 - Vector Calculus I Credit Hours: 4

**Total: 16 Credit Hours**

##### Spring

- CST 240 - Linux Programming Credit Hours: 4
- EET 237 - AC Circuits, Filters and Signals Credit Hours: 3
- EET 238 - AC Circuits, Filters and Signals Laboratory Credit Hours: 1
- SPE 321 - Small Group and Team Communication Credit Hours: 3
- Advanced Math Elective Credit Hours: 4<sup>b</sup>

**Total: 15 Credit Hours**

#### Junior Year

##### Fall

- CST 337 - Embedded System Architecture Credit Hours: 5
- CST 315 - Embedded Sensor Interfacing and I/O Credit Hours: 4
- CST 371 - Embedded Systems Development I Credit Hours: 4
- PHY 221 - General Physics with Calculus Credit Hours: 4

**Total: 17 Credit Hours**

##### Winter

- CST 331 - Microprocessor Peripheral Interfacing Credit Hours: 5
- CST 372 - Embedded Systems Development II Credit Hours: 3
- PHY 222 - General Physics with Calculus Credit Hours: 4
- Social Science Elective Credit Hours: 3

**Total: 15 Credit Hours**

##### Spring

- CST 351 - Digital Systems Design II Credit Hours: 3
- CST 373 - Embedded Systems Development III Credit Hours: 2
- CST 374 - Embedded Project Proposal Credit Hours: 1
- PHY 223 - General Physics with Calculus Credit Hours: 4
- WRI 327 - Advanced Technical Writing Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 16 Credit Hours**

#### Senior Year

##### Fall

- BUS 304 - Engineering Management Credit Hours: 3
- CST 418 - Data Communications and Networks Credit Hours: 3
- CST 471 - Embedded Senior Project Credit Hours: 3
- PHIL 331 - Ethics in the Professions Credit Hours: 3
- Technical Elective Credit Hours: 3<sup>a</sup>

**Total: 15 Credit Hours**

##### Winter

- CST 344 - Intermediate Computer Architecture Credit Hours: 3
- CST 472 - Embedded Senior Project Credit Hours: 3
- MGT 345 - Engineering Economy Credit Hours: 3
- Social Science Elective Credit Hours: 3
- Technical Elective Credit Hours: 3

**Total: 15 Credit Hours**

**Spring**

- ANTH 452 - Globalization Credit Hours: 3
- CST 473 - Embedded Senior Project Credit Hours: 2
- CST 442 - Advanced Computer Architecture Credit Hours: 3
- Humanities Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 15 Credit Hours**

**Total for a B.S. in Computer Engineering Technology: 187 Credit Hours**

<sup>a</sup> See your advisor for acceptable technical electives

<sup>b</sup> Electives: MATH 253, MATH 465, MATH 341 or MATH 321

## Computer Engineering Technology/Software Engineering Technology, BS

### Concurrent Degree

The CSET Department provides the opportunity for the interested student to earn a bachelor's degree in computer engineering technology and software engineering technology concurrently. Such concurrent degree holders are highly sought after in industry since they know and understand both the hardware and software aspects of computers. The purpose of the concurrent CET/SET Degree Program is to challenge the brightest and most motivated students to become even better prepared for the job market, extending their time in college by an additional year. To obtain both degrees, students must complete the following listed courses along with the courses required for the Bachelor of Science degree in Computer Engineering Technology with the exception of WRI 327, the CST elective and the MATH elective.

### Curriculum

- CST 136 - Object-Oriented Programming with C++ Credit Hours: 4
- CST 211 - Data Structures Credit Hours: 4
- CST 229 - Introduction to Grammars Credit Hours: 3
- CST 236 - Engineering for Quality Software Credit Hours: 4
- CST 238 - Graphical User Interface Programming Credit Hours: 4
- CST 276 - Software Design Patterns Credit Hours: 4
- CST 320 - Compiler Methods Credit Hours: 4
- CST 324 - Database Systems and Design Credit Hours: 4
- CST 334 - Project Proposal Credit Hours: 1
- CST 352 - Operating Systems Credit Hours: 4
- CST 412 - Senior Development Project Credit Hours:
- CST 422 - Senior Development Project Credit Hours: 3
- CST 432 - Senior Development Project Credit Hours: 2
- CST 415 - Computer Networks Credit Hours: 4
- CST Technical Electives Credit Hours: 9<sup>a</sup>
- MATH Elective Credit Hours: 3/4<sup>b</sup>
- MATH 465 - Mathematical Statistics Credit Hours: 4
  
- WRI 327 - Advanced Technical Writing Credit Hours: 3  
or
- WRI 350 - Documentation Development Credit Hours: 3

**Note:** <sup>a</sup> One Elective must be a CET hardware technical elective—a Hardware CST 407, or CST 456 **OR** one Elective must be a SET software technical elective—CST 346, CST 356, CST 405, a Software CST 407, CST 426, or CST 465

<sup>b</sup> MATH 321, MATH 322, MATH 327, MATH 341, MATH 342, or MATH 451

## Embedded Systems Engineering Technology, BS

### Degree Requirements

The Bachelor of Science in Embedded Systems Engineering Technology requires 189 credit hours as prescribed by the curriculum outline.

**Note:** The Portland-Metro campus is a laptop-required campus with resources like laptop specifications, financial aid, and helpful instructions found at <http://www.oit.edu/portland-metro/college-costs/bring-your-own-device>.

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- CST 116 - C++ Programming I Credit Hours: 4
- CST 162 - Digital Logic I Credit Hours: 4
- MATH 111 - College Algebra Credit Hours: 4
- WRI 121 - English Composition Credit Hours: 3

**Total: 15 Credit Hours**

##### Winter

- CST 126 - C++ Programming II Credit Hours: 4
- CST 130 - Computer Organization Credit Hours: 3
- MATH 112 - Trigonometry Credit Hours: 4
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3

**Total: 17 Credit Hours**

##### Spring

- CST 120 - Embedded C Credit Hours: 4
- CST 131 - Computer Architecture Credit Hours: 3
- CST 136 - Object-Oriented Programming with C++ Credit Hours: 4
- MATH 251 - Differential Calculus Credit Hours: 4

**Total: 15 Credit Hours**

#### Sophomore Year

##### Fall

- CST 133 - Digital Logic II Credit Hours: 4
- CST 134 - Instrumentation Credit Hours: 1
- CST 250 - Computer Assembly Language Credit Hours: 4
- CST 276 - Software Design Patterns Credit Hours: 4
- MATH 252 - Integral Calculus Credit Hours: 4

**Total: 17 Credit Hours**

##### Winter

- CST 204 - Introduction to Microcontrollers Credit Hours: 4
- CST 231 - Digital Systems Design I Credit Hours: 4
- EE 221 - Circuits I Credit Hours: 4
- MATH 254 - Vector Calculus I Credit Hours: 4

**Total: 16 Credit Hours**

##### Spring

- CST 211 - Data Structures Credit Hours: 4
- CST 240 - Linux Programming Credit Hours: 4
- PSY 201 - Psychology Credit Hours: 3
- SPE 321 - Small Group and Team Communication Credit Hours: 3

**Total: 14 Credit Hours**

#### Junior Year

##### Fall

- CST 315 - Embedded Sensor Interfacing and I/O Credit Hours: 4
- CST 337 - Embedded System Architecture Credit Hours: 5
- CST 371 - Embedded Systems Development I Credit Hours: 4
- PHY 221 - General Physics with Calculus Credit Hours: 4

**Total: 17 Credit Hours**

##### Winter

- CST 347 - Real-Time Embedded Operating Systems Credit Hours: 4
- CST 372 - Embedded Systems Development II Credit Hours: 3
- PHY 222 - General Physics with Calculus Credit Hours: 4
- MATH 465 - Mathematical Statistics Credit Hours: 4

**Total: 15 Credit Hours**

##### Spring

- CST 373 - Embedded Systems Development III Credit Hours: 2
- CST 374 - Embedded Project Proposal Credit Hours: 1
- CST 417 - Embedded Networking Credit Hours: 4
- WRI 227 - Technical Report Writing Credit Hours: 3
- Laboratory Science Elective Credit Hours: 4
- Humanities Elective Credit Hours: 3

**Total: 17 Credit Hours**

#### Senior Year

##### Fall

- BUS 304 - Engineering Management Credit Hours: 3
- CST 455 - System on a Chip Design Credit Hours: 4
- CST 471 - Embedded Senior Project Credit Hours: 3
- Humanities Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Winter

- CST 456 - Embedded System Testing Credit Hours: 4
- CST 472 - Embedded Senior Project Credit Hours: 3
- MGT 345 - Engineering Economy Credit Hours: 3
- WRI 350 - Documentation Development Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 16 Credit Hours**

**Spring**

- ANTH 452 - Globalization Credit Hours: 3
- CST 466 - Embedded System Security Credit Hours: 3
- CST 473 - Embedded Senior Project Credit Hours: 2
- Humanities Elective Credit Hours: 3
- Technical Elective Credit Hours: 3 <sup>a</sup>

**Total: 14 Credit Hours**

**Total for a B.S. in Embedded Systems Engineering Technology: 189 Credit Hours**

<sup>a</sup>One additional CST upper division course

## Software Engineering Technology, AE

### Degree Requirements

Associate of Engineering Technology degree students must complete 96 credit hours as prescribed by the curriculum outline.

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- CST 116 - C++ Programming I Credit Hours: 4
- CST 162 - Digital Logic I Credit Hours: 4
- MATH 111 - College Algebra Credit Hours: 4
- WRI 121 - English Composition Credit Hours: 3

**Total: 15 Credit Hours**

##### Winter

- CST 126 - C++ Programming II Credit Hours: 4
- CST 130 - Computer Organization Credit Hours: 3
- MATH 112 - Trigonometry Credit Hours: 4
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3

**Total: 17 Credit Hours**

##### Spring

- CST 120 - Embedded C Credit Hours: 4
- CST 131 - Computer Architecture Credit Hours: 3
- CST 136 - Object-Oriented Programming with C++ Credit Hours: 4
- MATH 251 - Differential Calculus Credit Hours: 4

**Total: 15 Credit Hours**

#### Sophomore Year

##### Fall

- CST 276 - Software Design Patterns Credit Hours: 4
- MATH 252 - Integral Calculus Credit Hours: 4
- PSY 201 - Psychology Credit Hours: 3
- WRI 227 - Technical Report Writing Credit Hours: 3
- Technical Elective Credit Hours: 3 <sup>a</sup>

**Total: 17 Credit Hours**

##### Winter

- CST 211 - Data Structures Credit Hours: 4
- CST 240 - Linux Programming Credit Hours: 4
- PHY 221 - General Physics with Calculus Credit Hours: 4
- Humanities Elective Credit Hours: 3

**Total: 15 Credit Hours**

##### Spring

- CST 223 - Concepts of Programming Languages Credit Hours: 3
- CST 236 - Engineering for Quality Software Credit Hours: 4
- CST 238 - Graphical User Interface Programming Credit Hours: 4
- Social Science Elective Credit Hours: 3
- Elective Credit Hours: 3

**Total: 17 Credit Hours**

**Total for an Associate of Engineering in Software Engineering Technology: 96 Credit Hours**

<sup>a</sup> See your advisor for acceptable elective classes

## Software Engineering Technology, BS

### Degree Requirements

The Bachelor of Science in Software Engineering Technology degree requires 187 credit hours as prescribed by the curriculum outline.

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- CST 116 - C++ Programming I Credit Hours: 4
- CST 162 - Digital Logic I Credit Hours: 4
- MATH 111 - College Algebra Credit Hours: 4
- WRI 121 - English Composition Credit Hours: 3

**Total: 15 Credit Hours**

##### Winter

- CST 126 - C++ Programming II Credit Hours: 4
- CST 130 - Computer Organization Credit Hours: 3
- MATH 112 - Trigonometry Credit Hours: 4
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3

**Total: 17 Credit Hours**

##### Spring

- CST 120 - Embedded C Credit Hours: 4
- CST 131 - Computer Architecture Credit Hours: 3
- CST 136 - Object-Oriented Programming with C++ Credit Hours: 4
- MATH 251 - Differential Calculus Credit Hours: 4

**Total: 15 Credit Hours**

#### Sophomore Year

##### Fall

- CST 250 - Computer Assembly Language Credit Hours: 4
- CST 276 - Software Design Patterns Credit Hours: 4
- MATH 252 - Integral Calculus Credit Hours: 4
- WRI 227 - Technical Report Writing Credit Hours: 3

**Total: 15 Credit Hours**

##### Winter

- CST 211 - Data Structures Credit Hours: 4
- CST 240 - Linux Programming Credit Hours: 4
- MATH 254 - Vector Calculus I Credit Hours: 4
- PSY 201 - Psychology Credit Hours: 3

**Total: 15 Credit Hours**

##### Spring

- CST 223 - Concepts of Programming Languages Credit Hours: 3
- CST 236 - Engineering for Quality Software Credit Hours: 4
- CST 238 - Graphical User Interface Programming Credit Hours: 4
- MATH 327 - Discrete Mathematics Credit Hours: 4

**Total: 15 Credit Hours**

#### Junior Year

##### Fall

- CST 229 - Introduction to Grammars Credit Hours: 3
- CST 316 - Junior Team-Based Project Development I Credit Hours: 4
- CST 324 - Database Systems and Design Credit Hours: 4
- PHY 221 - General Physics with Calculus Credit Hours: 4
- SPE 321 - Small Group and Team Communication Credit Hours: 3

**Total: 18 Credit Hours**

##### Winter

- CST 320 - Compiler Methods Credit Hours: 4
- CST 326 - Junior Team-Based Project Development II Credit Hours: 4
- PHY 222 - General Physics with Calculus Credit Hours: 4
- WRI 350 - Documentation Development Credit Hours: 3

**Total: 15 Credit Hours**

##### Spring

- CST 334 - Project Proposal Credit Hours: 1
- CST 336 - Junior Team-Based Project Development III Credit Hours: 4
- CST 352 - Operating Systems Credit Hours: 4
- PHY 223 - General Physics with Calculus Credit Hours: 4
- Social Science Elective Credit Hours: 3

**Total: 16 Credit Hours**

#### Senior Year

##### Fall

- BUS 304 - Engineering Management Credit Hours: 3
- CST 412 - Senior Development Project Credit Hours: 3
- CST 415 - Computer Networks Credit Hours: 4
- Humanities Elective Credit Hours: 3
- Technical Elective Credit Hours: 3<sup>a</sup>

**Total: 16 Credit Hours**

##### Winter

- CST 422 - Senior Development Project Credit Hours: 3
- MATH 465 - Mathematical Statistics Credit Hours: 4
- Humanities Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3
- Technical Elective Credit Hours: 3<sup>a</sup>

**Total: 16 Credit Hours**

**Spring**

- ANTH 452 - Globalization Credit Hours: 3
- CST 432 - Senior Development Project Credit Hours: 2
- MGT 345 - Engineering Economy Credit Hours: 3
- Humanities Elective Credit Hours: 3
- Technical Elective Credit Hours: 3 <sup>a</sup>

**Total: 14 Credit Hours**

**Total for a B.S. in Software Engineering Technology: 187 Credit Hours**

<sup>a</sup> Three additional CST upper division courses. One CST upper division elective course may be exchanged for an upper division MATH course

## Electrical Engineering and Renewable Energy Department

Hope Cosair, *Department Chair*

Eve Klopff, *Program Director, B.S. Electrical Engineering (Klamath Falls)*

Mason Terry, *Program Director, B.S. Renewable Energy Engineering (Klamath Falls)*

Aaron Scher, *Program Director, B.S. Electrical Engineering and B.S. Electronics Engineering Technology (Portland-Metro)*

Scott Prahll, *Program Director, Optical Engineering (Portland-Metro)*

Teshome Jiru, *Program Director, B.S. Renewable Energy Engineering (Portland-Metro)*

Mateo Aboy, *Program Director, M.S. Engineering (Portland-Metro, Online)*

Teshome Jiru, *Program Director, M.S. Renewable Energy Engineering (Portland-Metro)*

Robert F. Melendy, *Program Director, Automation, Robotics, and Control Engineering (Portland-Metro)*

*Professors:* M. Aboy, S. Prahll, S. Petrovic

*Associate Professors:* H.J. Cosair, C. Crespo, P. Dingman, T. Jiru, M. Terry, C. Torres Garibay

*Assistant Professors:* A. Douglas, J. Eastham, E. Hossain, E. Klopff, R.F. Melendy, F. Shi, A. Scher

### Degrees Offered

- Bachelor of Science in Electrical Engineering (Klamath Falls and Portland-Metro)
- Bachelor of Science in Electronics Engineering Technology (Portland-Metro)
- Bachelor of Science in Renewable Energy Engineering (Klamath Falls and Portland-Metro)
- Master of Science in Engineering - Multiple Specialties (Portland-Metro and Online)
- Master of Science in Renewable Energy Engineering (Portland-Metro)

### Dual Majors Offered

- Automation, Robotics, and Control Engineering (Portland-Metro)
- Optical Engineering (Portland-Metro)
- Systems Engineering and Technical Management (Portland-Metro)

## Electrical Engineering

### Degrees Offered

- Bachelor of Science in Electrical Engineering
- Bachelor of Science in Electrical Engineering and Automation, Robotics, and Control Engineering (dual major)
- Bachelor of Science in Electrical Engineering and Optical Engineering (dual major)
- Bachelor of Science in Electrical Engineering and Systems Engineering & Technical Management (dual major)
- Bachelor of Science in Electrical Engineering and Bachelor of Science in Renewable Energy Engineering (concurrent degree)
- Bachelor of Science in Electrical Engineering and Master of Science in Engineering - Automation, Robotics & Control
- Bachelor of Science in Electrical Engineering and Master of Science in Engineering - Electrical Engineering
- Bachelor of Science in Electrical Engineering and Master of Science in Engineering - Embedded Engineering
- Bachelor of Science in Electrical Engineering and Master of Science in Engineering - Optical Engineering
- Bachelor of Science in Electrical Engineering and Master of Science in Engineering - Multiple Disciplines (4+1 or concurrent degree)
- Bachelor of Science in Electrical Engineering and Master of Science in Renewable Energy Engineering (4+1 concurrent degree)

**Note:** The BS Electrical Engineering is offered at both the Klamath Falls and Portland-Metro campuses. The different degree options (technical emphases, dual majors, etc.) may vary by campus.

### Career Opportunities

The Bachelor of Science in Electrical Engineering (BSEE) at Oregon Tech is designed to prepare professionals to meet the needs of the growing Electrical Engineering industry. Electrical engineering is concerned with the use of electricity to transmit electric power, or to process information. Electrical engineers design, develop, test, and integrate electrical power systems and electrical machines, as well as electronic systems, including portable electronic devices, medical equipment, communication systems, radar and navigation systems, control and autonomous systems, to include robotics.

The program is designed around a set of core courses which provide a classical electrical engineering foundation, and a number of elective courses that allow students some flexibility to specialize in the areas that interest them most, such as electronics, electrical power, optical engineering, renewable energy, etc. Emphasis is placed on practical application of engineering knowledge. The BSEE program at Oregon Tech can accommodate full-time students, transfer students, and working professionals, and provides a solid preparation for industry or graduate school.

Graduates of the Electrical Engineering Program are prepared to fulfill a wide range of functions within industry. Employers of electrical engineering graduates include research and development laboratories, electronic equipment manufacturers, public utilities, colleges and universities, government agencies, medical laboratories and hospitals, electronic equipment distributors, and semiconductor companies, among others.

The program also provides a solid preparation for students intending to continue to graduate school to pursue master's degrees in engineering, engineering management, MBAs, and JDs.

### **Program Mission and Objectives**

The mission of the BS Electrical Engineering program is to provide a comprehensive program of instruction that will enable graduates to obtain the knowledge and skills necessary for immediate employment and continued advancement in the field of electrical engineering.

Graduates of the BSEE program will:

1. Possess a strong technical background as well as analytical, critical-thinking, and problem-solving skills that enable them to excel as professionals contributing to a variety of engineering roles within the various fields of Electrical Engineering and the high-tech industry;
2. Be employed in Electrical Engineering positions including (but not limited to) design engineers, test engineers, characterization engineers, applications engineers, field engineers, hardware engineers, process engineers, control engineers, and power engineers;
3. Be committed to professional development and lifelong learning by engaging in professional or graduate education in order to stay current in their field and achieve continued professional growth;
4. Be working as effective team members possessing excellent oral and written communication skills, and assuming technical and managerial leadership roles throughout their career.

### **Student Preparation**

Students entering the Electrical Engineering program from high school should have a minimum of: 1) Two years of high-school algebra and one year of high-school geometry and trigonometry. 2) Two years of a physical science (physics, chemistry preferred). 3) Three years of English composition. Additional mathematics, science, English, electronics, and computer languages are very helpful.

Students entering the Electrical Engineering program by transfer are requested to contact the department concerning transfer of technical coursework.

**Note:** The Portland-Metro campus is a laptop-required campus with resources like laptop specifications, financial aid, and helpful instructions found at <http://www.oit.edu/portland-metro/college-costs/bring-your-own-device>.

### **Accreditation**

The BSEE program is accredited by the Engineering Accreditation Commission (EAC) of ABET, Inc., <http://www.abet.org>. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.

### **Bachelor of Science in Electrical Engineering (Post-Baccalaureate)**

Oregon Tech Bachelor of Science in Electronics Engineering Technology graduates may complete 36 additional credits to receive a Bachelor of Science in Electrical Engineering (post-baccalaureate). Students will receive two diplomas: a BSEET degree (upon completion of the BSEET degree requirements), and a BSEE degree (upon completion of the BSEE degree requirements, which include a minimum of 36 credits from Oregon Tech beyond the BSEET requirements).

Students who have completed an ABET accredited BS degree in Electronics Engineering Technology from another university must complete a minimum of 45 Oregon Tech credits to receive the BS in Electrical Engineering from Oregon Tech. Students pursuing this option should contact an academic advisor to draft an academic plan that ensures all BSEE curriculum requirements are met.

### **Bachelor of Science in Electrical Engineering with a Dual Major**

Students completing the BSEE program have the option of selecting a dual major. The EERE department currently offers a dual major in Automation, Robotics and Controls Engineering, a dual major in Optical Engineering, and a dual major in Systems Engineering & Technical Management. Students completing a BSEE degree with a dual major will receive a single BS degree with both majors listed on their diploma and transcript. The degree is issued upon completion of the requirements for each major (some courses may be used to meet the requirements for both majors). The requirements for the dual major in Optical Engineering, as well as the dual major in Systems Engineering & Technical Management are listed under the corresponding sections of the catalog.

## Concurrent Degree in Electrical Engineering and Renewable Energy Engineering

The EERE Department provides the opportunity for interested and motivated students to earn two Bachelor of Science degrees concurrently: a BS in Electrical Engineering & BS in Renewable Energy Engineering. The purpose of this dual degree is to provide the top students with a challenging academic program that will prepare them for career opportunities in the electronics, electrical engineering, power, and energy industries. The students receive a BS degree in a classical engineering discipline (Electrical Engineering), as well as an emerging high growth discipline (Renewable Energy Engineering). This dual degree program takes approximately an additional year beyond the BSEE degree program (or 4.5 years total by taking courses in Summer term).

## Concurrent Accelerated BSEE/MSREE

Students may earn both BSEE and MSREE degrees, awarded simultaneously upon completion of this curriculum. Students enrolled in the BSEE program who have proven record of academic excellence have the option of completing the MSREE with one additional year of coursework.

To be eligible for this option, students must have a cumulative GPA of 3.0, and must contact the MSREE Program Director for admission into the graduate program by the end of Spring term of their junior year. Students will receive both their BSEE and MSREE degrees at the end of their fifth year. Students at the Klamath Falls campus are eligible to participate in this program, but must transfer to the Portland-Metro campus for their final year. REE 599 requirement must be met by a design project supervised and approved by both EE and REE advisors. Students should contact their academic advisors for details.

## Electronics Engineering Technology

### Degree Offered

- Bachelor of Science in Electronics Engineering Technology (Portland-Metro)

Oregon Institute of Technology offers an ABET accredited Bachelor of Science degree in Electronics Engineering Technology (BSEET). The program is conveniently offered at the Oregon Tech Portland-Metro campus, as well as the Willow Creek Center, in order to accommodate degree seeking professionals working for high-tech companies in the Portland Westside area. The Willow Creek Center is located in Hillsboro (OR), at the heart of the Portland Westside high-tech industry cluster (Silicon Forest), minutes away from companies such as Intel, Tektronix, MAXIM, Credence, Synopsis, Quorvo, and others. Some of the core and technical elective courses for the degree are also available online and at the Oregon Tech Portland-Metro campus.

### Career Opportunities

Electronics Engineering Technology is concerned with theory, concepts, and practice of applied electronics engineering. Emphasis is placed on the practical application of engineering knowledge. As a result, the Electronics Engineering Technology graduate possesses a combination of theoretical and practical understanding and requires minimal on-the-job training.

The BSEET program is designed to prepare graduates to assume engineering and technology positions in the electronics industry. Graduates of the BSEET program fulfill a wide range of functions within industry, typically assuming positions such as component and system design, test engineering, product engineering, field engineering, manufacturing engineering, sales or market engineering, quality control engineering, and other similar roles. The program also provides a solid preparation for students intending to continue to graduate school to pursue master's degrees in engineering, engineering management, and MBAs.

Employers of Electronics Engineering Technology graduates include research and development laboratories, electronic equipment manufacturers, public utilities, colleges and universities, government agencies, medical laboratories and hospitals, electronic equipment distributors, semiconductor companies, and automated electronic controlled processing companies. Recent graduates have been employed at companies such as MAXIM, Tektronix, Quorvo, MSEI/Biotronik, and Intel.

### Program Mission and Objectives

The mission of the BSEET Program is to provide a comprehensive program of instruction that will enable graduates to obtain the knowledge and skills necessary for immediate employment and continued advancement in the field of electronics.

Graduates of the BSEET program will:

1. Possess a strong technical background as well as analytical and problem solving skills, and will contribute in a variety of technical roles within the electronics and high-tech industry. Within three years of graduation, BSEET graduates are expected to be employed as test engineers, characterization engineers, applications engineers, field engineers, hardware engineers, process engineers, and similar engineering technology positions within this industry.
2. Be working as effective team members with excellent oral and written communication skills, assuming technical and managerial leadership roles throughout their career.
3. Be committed to professional development and lifelong learning by engaging in professional and/or graduate education in order to stay current in their field and achieve continued professional growth.

## Student Preparation

The BSEET degree at Oregon Tech is designed to accommodate working professionals with evening delivery of upper-division and custom bridging courses. It is especially suited for working professionals with an associate degree in Electronics Engineering Technology, Microelectronics Technology, or equivalent coursework. Students entering the BSEET program by transfer are requested to contact the BSEET Program Director concerning transfer of technical coursework. The BSEET program has articulation and transfer agreements with the Electronics, Microelectronics, and Renewable Energy Technology programs at various community colleges in Oregon. Students transferring to Oregon Tech with an AAS degree from these programs will not be required to take any lower-division electronics coursework. It is recommended (but not required) that students who are transferring with an AAS degree have completed Calculus II prior to transferring to the BSEET program at Oregon Tech, since Integral Calculus is a prerequisite for most upper-division BSEET courses.

We encourage transfer students to start the advising process with Oregon Tech upon completion of the first year of their AAS degree.

**Note:** The Portland-Metro campus is a laptop-required campus with resources like laptop specifications, financial aid, and helpful instructions found at <http://www.oit.edu/portland-metro/college-costs/bring-your-own-device>.

## Accreditation

The Electronics Engineering Technology program is accredited by the Engineering Technology Accreditation Commission (ETAC) of ABET, Inc., <http://www.abet.org>. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.

# Renewable Energy Engineering

## Degrees Offered

- Bachelor of Science in Renewable Energy Engineering
- Bachelor of Science in Renewable Energy Engineering and Automation, Robotics, and Controls Engineering (dual major)
- Bachelor of Science in Renewable Energy Engineering and Optical Engineering (dual major)
- Bachelor of Science in Renewable Energy Engineering and Systems Engineering & Technical Management (dual major)
- Bachelor of Science in Renewable Energy Engineering and Bachelor of Science in Electrical Engineering (concurrent degree)
- Bachelor of Science in Renewable Energy Engineering and Bachelor of Science in Environmental Science (concurrent degree)
- Bachelor of Science in Renewable Energy Engineering and Master of Science in Engineering (4+1 or concurrent degree)
- Bachelor of Science in Renewable Energy Engineering and Master of Science in Renewable Energy Engineering (4+1 or concurrent degree)
- Master of Science in Renewable Energy Engineering

**Note:** The BS Renewable Energy Engineering is offered in both the Klamath Falls and Portland-Metro campuses. The different degree options (dual majors, concurrent degrees, etc.) may vary by campus. The MS Renewable Energy Engineering is offered at the Portland-Metro campus.

## Career Opportunities

Program graduates will enter energy careers as power engineers, PV/semiconductor processing engineers, facilities and energy managers, energy system integration engineers, HVAC and M/E/P engineers, design and modeling engineers for net-zero energy buildings, biofuels plant and operations engineers, energy systems control engineers, power electronics engineers, utility program managers, as well as renewable energy planners and policy makers. Graduates of the program will be able to pursue a wide range of career opportunities, not only within the emerging field of renewable energy, but within more traditional areas of energy engineering as well.

Employers of Renewable Energy Engineering graduates include consulting engineering firms, fuel cell manufacturers, power converter manufacturers, public utilities, government agencies, photovoltaic manufacturers, and energy developers. Recent graduates have been employed at companies such as Advanced Energy, Jacobs Engineering, Power Engineers, and Iberdrola Renewables.

## Bachelor of Science in Renewable Energy Engineering

The Bachelor of Science in Renewable Energy Engineering (BSREE) prepares students for the challenges of designing, promoting and implementing renewable energy engineering in society's rapidly-changing energy-related industries. Energy, in its many abundant forms, is the driving physical factor upon which industrial societies are founded. As geopolitical, environmental and geological factors act to constrain traditional resources, societies have been forced to re-think and redevelop their energy infrastructures. Renewable energy resources include solar thermal collectors, photovoltaics, ground-source heat pumps, geothermal resources, hydroelectric power, wind power, tidal and wave power, biofuels and fuel cells. Oregon Tech's Bachelor of Science in Renewable Energy Engineering prepares students for success in these rapidly developing fields.

The BSREE program is built upon a solid foundation in physics, chemistry, mathematics and communications. Added to this foundation are courses in electrical and mechanical engineering that establish a firm understanding of the fundamentals of energy. The engineering coursework prepares students for renewable energy-specific courses such as photovoltaics, wind power, biofuels, hydroelectric, fuel cells and solar thermal systems. These courses are then integrated into system-wide senior level courses such as energy system design, energy-efficient building systems, renewable energy transportation systems, energy management and energy systems control.

### **Program Mission and Objectives**

The mission of the Bachelor of Science in Renewable Energy Engineering program is to prepare students for the challenges of designing, promoting and implementing renewable energy solutions within society's rapidly changing energy-related industry cluster, particularly within Oregon and the Pacific Northwest. Graduates will have a fundamental understanding of energy engineering and a sense of social responsibility for the implementation of sustainable energy solutions.

Graduates from the BSREE program will:

1. Excel as professionals in the various fields of energy engineering.
2. Be known for their commitment to lifelong learning, social responsibility, and professional and ethical responsibilities in implementing sustainable engineering solutions.
3. Excel in critical thinking, problem solving and effective communication.

### **Student Preparation**

High school students should be prepared to start their college academic work with at least college calculus and Freshman English composition. Typically, this means the successful new student has completed:

1. Four years of high school mathematics including algebra I and II, geometry and trigonometry
2. Four years of English composition/writing
3. Four years of science including physics and chemistry

Students entering the program by transfer are requested to contact the program director for evaluation of REE-related transfer courses.

**Note:** The Portland-Metro campus is a laptop-required campus with resources like laptop specifications, financial aid, and helpful instructions found at <http://www.oit.edu/portland-metro/college-costs/bring-your-own-device>.

### **Accreditation**

The Renewable Energy Engineering baccalaureate program is accredited by the Engineering Accreditation Commission (EAC) of ABET, Inc., <http://www.abet.org>. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.

### **Bachelor of Science in Renewable Energy Engineering with a Dual Major**

Students completing the BSREE program have the option of selecting a dual major. The EERE department currently offers a dual major in Automation, Robotics and Controls Engineering, a dual major in Optical Engineering, and a dual major in Systems Engineering & Technical Management. Students completing a BSREE degree with a dual major will receive a single BS degree with both majors listed on their diploma and transcript. The degree is issued upon completion of the requirements for each major (some courses may be used to meet the requirements for both majors). The requirements for the dual major in Optical Engineering, as well as the dual major in Systems Engineering & Technical Management are listed under the corresponding sections of the catalog.

### **Concurrent Degree in Renewable Energy Engineering and Electrical Engineering**

The EERE Department provides the opportunity for interested and motivated students to earn two Bachelor of Science degrees: a BS in Renewable Energy Engineering and a BS in Electrical Engineering. The purpose of this dual degree is to provide the top students with a challenging academic program that will prepare them for career opportunities in the electronics, electrical engineering, power and energy industries. The students receive a BS degree in a classical engineering discipline (Electrical Engineering), as well as an emerging high-growth discipline (Renewable Energy Engineering). The degree program will take an additional year beyond the BSREE degree program (or 4.5 years total by taking courses in Summer term.)

### **Concurrent Degree in Renewable Energy Engineering and Environmental Sciences**

Renewable Energy Engineering students have the opportunity to earn a dual degree: a BS in Renewable Energy Engineering and a BS in Environmental Sciences. The additional degree requires 54 credits in Environmental Sciences courses, which can be taken concurrent to Renewable Energy Engineering courses or in an add-on year. A second degree in Environmental Sciences places engineering projects in the context of environmental impacts and environmental regulations, and greatly increases job opportunities for Oregon Tech Renewable Energy Engineering graduates. The purpose of the concurrent programs is to challenge motivated students to become even better prepared for the engineering and environmental job markets.

### **Concurrent Accelerated BSREE/MSE Program**

Students enrolled in the BSREE program with a record of academic excellence have the option of earning both a BSREE and a MS Engineering (MSE) degree with an additional year of study. The MSE is a flexible multidisciplinary master's degree which is highly customizable to adapt to students' interests and industry needs. Students can select between different tracks or specialties, with the possibility of obtaining a more classical or more specialized graduate degree based on the track selected.

The accelerated and 4+1 options provide efficiency by allowing students to start their graduate level coursework in their senior year, and use some of these courses to simultaneously meet degree requirements for both the BS and MS programs. In the accelerated/concurrent program, students are awarded the BS and MSE degree concurrently at the end of their fifth year of study. On the other hand, in the 4+1 program, the BS degree is awarded in the fourth year, and the MSE degree is awarded in the fifth year. The accelerated option offers the most efficiency in terms of overall credit requirements. To be eligible for the accelerated and 4+1 options, students must have a cumulative GPA of 3.0, and apply for admission into the graduate program by the end of Spring term of their junior year.

Students pursuing the accelerated or 4+1 options follow the standard BSREE curriculum for the first three years, start their graduate coursework in their senior year, and complete the MSE requirements during their fifth (graduate) year.

### **Concurrent Accelerated BSREE/MSREE Program**

Students may earn both BSREE and MSREE degrees, awarded simultaneously upon completion of this curriculum. Students who enrolled in the BSREE program who have a proven record of academic excellence have the option of completing the MSREE with one additional year of coursework.

To be eligible for this option, students must have a cumulative GPA of 3.0, and must contact the MSREE Program Director for admission into the graduate program by the end of Spring term of their junior year. Students at the Klamath Falls campus are eligible to participate in this program but must transfer to the Portland-Metro campus for their final year. Students will receive both their BSREE and MSREE degrees at the end of their fifth year. REE 599 requirement must be met by a design project supervised and approved by an REE advisor. Students should contact their academic advisors for details.

### **Master of Science in Engineering - Multiple Disciplines**

Depending on their interest and career goals students can choose a multidisciplinary MSE, a specialized MSE, or a more classical MSE program such as the MSE in Electrical Engineering.

The multidisciplinary MSE program is designed as a highly customizable and modular MS engineering degree, which enables students to choose coursework from multiple disciplines to design specialties typically not available in the classical engineering MS degrees.

The flexibility in the MS in Engineering degree ensures a relevant, up-to-date educational experience, and the ability to meet urgent industry needs in multidisciplinary technical fields. The program is designed to provide maximum flexibility while maintaining academic rigor.

### **Program Design**

The MSE is designed as a "Flexible/Multidisciplinary Engineering Degree." As such, the students have the flexibility to customize the MSE to be highly relevant to their professional interests. The flexibility to design specialized or multidisciplinary degree programs is the defining element of the program and is what makes it such a close match to the interdisciplinary environment in today's fast changing industries. Through a faculty advisory committee, coursework is personally customized for the student or industry partner company to best match the desired outcomes based on a thorough needs assessment.

### **Program Mission and Objectives**

The MSE at Oregon Tech is designed to prepare engineering professionals with advanced knowledge and skills in high-demand multidisciplinary engineering fields who are ready to assume a broad range of technical and leadership roles.

**Note:** The Portland-Metro campus is a laptop-required campus with resources like laptop specifications, financial aid, and helpful instructions found at <http://www.oit.edu/portland-metro/college-costs/bring-your-own-device>.

### **BS/MSE Concurrent Fast Track Degree (5 year Program)**

Students enrolled in the EERE BS programs are eligible to apply for the concurrent Fast Track BS/MSE program. This enables students to potentially obtain both the BS and MS degrees in 5 years.

### **MSE Coursework & Specialties**

Students can complete a multidisciplinary program by taking courses in Systems Engineering, Research Methods & Innovation (covering peer-reviewed research, IP fundamentals, and technology commercialization), and one or more engineering disciplines including Electrical & Computer Engineering.

*Multidisciplinary MSE Program*

MSE (Multidisciplinary)

MSE in Systems Engineering

*Engineering Discipline MSE Program*

MSE in Electrical Engineering

*Specialized MSE Programs*

MSE in Automation, Robotics &amp; Control

MSE in Embedded Systems

MSE in Optical Engineering

MSE in Power Engineering

**Accreditation**

Oregon Institute of Technology is accredited by the Northwest Commission on Colleges and Universities, 8060 165th Ave. NE, Suite 100, Redmond, WA 98052-3981, an institutional accrediting body recognized by the Council for Higher Education Accreditation and/or the Secretary of the U.S. Department of Education.

**Master of Science in Renewable Energy Engineering (MSREE)**

The Master of Science in Renewable Energy Engineering (MSREE) program is offered at Oregon Tech Portland-Metro campus. The MSREE program accommodates both full-time students and working professionals. The program is designed to prepare graduates to be energy engineering professionals who have advanced knowledge and skills that enable them to assume a broad range of technical leadership roles.

The MSREE curriculum is built upon core tracks in research methods & innovation and advanced energy engineering. These courses provide the foundation for three required specialized course sequences in renewable energy technologies and nine credits of thesis or graduate R&D project work.

**Student Preparation**

Students should be prepared to start graduate academic work. Typically, this means the successful new student has the following: A baccalaureate degree in engineering, the physical sciences (e.g., physics, chemistry), or a related technical discipline  
Evidence of potential for graduate academic work, success or potential for success in industry, and demonstrated interest in energy engineering

**Accreditation**

Oregon Institute of Technology is accredited by the Northwest Commission on Colleges and Universities, 8060 165th Ave. NE, Suite 100, Redmond, WA 98052-3981, an institutional accrediting body recognized by the Council for Higher Education Accreditation and/or the Secretary of the U.S. Department of Education.

**Automation, Robotics, and Control Engineering, BS Dual Major****Degree Offered**

- Automation, Robotics, and Controls Engineering (Dual major)

The major in Automation, Robotics, and Controls Engineering is designed as a dual major option for students with an ABET accredited primary major in an engineering discipline offered at Oregon Tech. Students first choose a primary ABET accredited major (e.g., Electrical Engineering, Renewable Energy Engineering, Mechanical Engineering), and complete additional specialized coursework to earn a second major in Automation, Robotics, and Controls Engineering. The program is designed so that both majors in the degree can be completed in 4 years by taking summer courses. ABET ETAC degree students may also pursue the dual major with departmental approval.

**Career Opportunities**

Automation, Robotics, and Control is a rich multidisciplinary engineering field concerned with the modeling, simulation, design, and control of automated machines, systems, and processes. Automated systems typically contain an assemblage of components, equipment, hardware, software, and humans. The discipline requires knowledge and an understanding of elements of electrical engineering, mechanical engineering, process engineering, coding, software programming, physics, and mathematics. Due to the multidisciplinary nature of the topics that make up the curriculum, graduates of the program are furnished with the necessary skills to design or manage systems that integrate diverse components and technologies. Engineers working in this field design solutions to address problems in areas such as factory automation, building automation, process control, motion control and robotics and mechanics, flight control systems, or autonomous vehicles.

## Student Preparation

Students interested in the Automation, Robotics, and Controls Engineering dual major should contact the Automation, Robotics, and Controls Engineering program director for an advising appointment early in their primary major programs to ensure timely completion of both majors.

## Accreditation

Completion of a dual major in Automation, Robotics, and Controls Engineering is contingent upon finishing a primary major in an ABET accredited program.

## Optical Engineering, BS Dual Major

### Degree Offered

- Optical Engineering (Dual major)

The major in Optical Engineering is designed as a dual major degree option for students with an ABET-accredited primary major in an engineering discipline offered at Oregon Tech (e.g., Electrical Engineering, Mechanical Engineering). Students choose a primary ABET accredited engineering major and complete the additional specialized coursework to earn a second major in Optical Engineering. The Optical Engineering dual major is offered at the Portland-Metro campus.

### Program Objectives

Graduates of the Optical Engineering program will:

1. Have a strong technical background in addition to the analytical, critical-thinking, and problem-solving skills needed as engineering and science professionals.
2. Be employed as optical engineers, optomechanical engineers, optoelectronics engineers, laser engineers, and similar positions in the engineering industry.
3. Understand the value of and show a commitment to professional development and lifelong learning.
4. Be effective team members with excellent oral and written communication skills, which lead to technical and managerial leadership roles.

## Career Opportunities

Optical Engineering is the branch of engineering that incorporates the production, modification, and detection of light into devices and processes. Graduates of the Optical Engineering program are employed as optical engineers, illumination engineers, metrology engineers, optomechanical engineers, optoelectronics engineers, laser engineers, and similar positions in the engineering industry. A dual major in Optical Engineering provides students with the opportunity to combine engineering disciplines. This provides a competitive advantage for graduates entering the workforce because optical subsystems are now common in many engineering applications. For example, a student seeking to become an optomechanical engineer might combine with mechanical engineering; an optoelectronics engineer would combine with electrical engineering; a solar energy engineer with renewable energy engineering.

Employers of Optical Engineering graduates include more than eighty Oregon companies that encompass a diverse range of applications. These include semiconductor inspection, infrared imaging, automation, surface coatings, laser manufacture, lighting, camera design, optical fiber communication, and colorimetry.

## Student Preparation

Students considering the Optical Engineering major must first select a primary engineering major and complete the freshman engineering coursework including calculus and calculus-based physics. Upon completion of the freshman primary major requirements, students interested in the Optical Engineering dual major should contact the Optical Engineering program director for an advising appointment. Students entering the Optical Engineering program by transfer are requested to contact their primary major department concerning transfer of technical coursework. Completing a year of calculus-based physics is mandatory before any optical engineering classes can be taken.

## Accreditation

Completion of a dual major in Optical Engineering is contingent upon finishing primary major in an ABET accredited program.

## Systems Engineering & Technical Management, BS Dual Major

### Degree Offered

- Systems Engineering & Technical Management (Dual major)

The major in Systems Engineering & Technical Management is designed as a dual major option for students with an ABET accredited primary major in an engineering discipline offered at Oregon Tech. Students first choose a primary ABET accredited major (e.g., Electrical Engineering, Renewable Energy Engineering, Mechanical Engineering, Civil Engineering), and complete additional

specialized coursework to earn a second major in Systems Engineering & Technology Management. The program is designed so that both majors in the degree can be completed in 4 years by taking summer courses. ABET ETAC degree students may also pursue the dual major with departmental approval.

### Career Opportunities

Systems engineers address complex problems in areas such as electrical & electronic systems, information systems, renewable energy systems, economic and financial systems, telecommunications, transportation, project management, and manufacturing. Systems engineering is not about specific technologies, but how to put heterogeneous technologies together to formulate system solutions to complex problems. As such, systems engineering is a multidisciplinary engineering discipline concerned with the design, modeling, analysis, and management of technological systems that employ a combination of devices, software, hardware, firmware, materials, and humans for such diverse purposes as communications, energy engineering, health care, transportation or manufacturing. The dual major curriculum provides engineering students with design viewpoints and methodologies that emphasize system integration, and with subject matter and tools for modeling and analysis especially appropriate for large complex systems including system theory, simulation, computational data analysis and statistics, and engineering management. This dual major is designed to address the need for both systems engineering and T-shape individuals at the BS level. After 4 years, graduates of the dual degree program are technically competent in an engineering discipline and ready to enter the workforce as functional engineers but also have formal education, training and skills in systems engineering, project management, product development, strategy and innovation, and engineering management to assume functional managerial positions, such as project managers and technical team leaders.

### Student Preparation

Students considering the dual major in Systems Engineering & Technical Management must first select a primary engineering major and complete the freshman engineering coursework including calculus and calculus based physics. Upon completion of the freshman primary major requirements, students interested in the Systems Engineering & Technical Management dual major should contact the department chair for an advising appointment. Students who are planning to complete this dual major are encouraged to contact the department chair upon completion of the freshman year.

### Accreditation

Completion of a dual major in Systems Engineering & Technical Management is contingent upon finishing a primary major in an ABET accredited program.

## Automation, Robotics, and Controls Engineering, BS Dual Major

### Degree Requirements

A dual major in Automation, Robotics, and Controls Engineering requires 92 credits in automation and other engineering coursework. Many of these course credits may be used to meet requirements in the primary major; depending upon selection of primary major it is estimated that only 28-36 additional credits will be needed beyond the primary major requirements. The capstone project required in the student's primary major is expected to incorporate elements from both the primary and the Automation, Robotics, and Controls Engineering majors. Since the required courses for Automation, Robotics, and Controls Engineering must be taken along with those for the primary major, a full curriculum map is not provided. Students should carefully plan each term in consultation with their primary major advisor and with their Automation, Robotics, and Controls Engineering advisor. To obtain a dual major in Automation, Robotics, and Controls Engineering, students must complete the courses required for the Bachelor of Science degree in their primary engineering major as well as the following list of specialized Automation, Robotics, and Controls Engineering courses:

#### Automation, Robotics, and Controls Engineering Major Core

- REE 463 - Energy Systems Instrumentation Credit Hours: 3
- ENGR 420 - Engineering Modeling and Simulation of Dynamic Systems Credit Hours: 4
- ENGR 421 - Automation for Robotics Credit Hours: 4
- ENGR 422 - Process Control Credit Hours: 4
- ENGR 423 - Motion Control in Mechanisms and Robotics Credit Hours: 4

**Total: 23 Credit Hours**

#### Electrical Engineering and Computer Science Requirements

- EE 131 - Digital Electronics I Credit Hours: 4
- EE 133 - Digital Electronics II Credit Hours: 4
- EE 221 - Circuits I Credit Hours: 4
- EE 223 - Circuits II Credit Hours: 4
- EE 225 - Circuits III Credit Hours: 4

- EE 333 - Introduction to Microcontrollers Credit Hours: 4
- EE 430 - Linear Systems and Digital Signal Processing Credit Hours: 5
- CST 116 - C++ Programming I Credit Hours: 4
- ENGR 267 - Engineering Programming Credit Hours: 3

**Total: 36 Credit Hours**

#### Supporting Engineering Requirements

- REE 243 - Electrical Power Credit Hours: 4
- REE 253 - Electromechanical Energy Conversion Credit Hours: 3
- ENGR 211 - Engineering Mechanics: Statics Credit Hours: 4
- ENGR 212 - Engineering Mechanics: Dynamics Credit Hours: 3
- ENGR 355 - Thermodynamics Credit Hours: 3
- MECH 318 - Fluid Mechanics I Credit Hours: 4
- MECH 323 - Heat Transfer I Credit Hours: 3
- SEM 421 - Systems Engineering Credit Hours: 4

- SEM 422 - Advanced Systems Engineering Credit Hours: 4      **Total: 32 Credit Hours**

## **Total for a B.S. Dual Degree in Automation, Robotics, and Controls Engineering: 91 Credit Hours**

**Note:** Many courses may be part of the primary major.

### **Concurrent Accelerated BSEE/MSE**

Students enrolled in the BSEE program with a record of academic excellence have the option of earning both a BSEE and a MS Engineering (MSE) degree with an additional year of study (e.g., MSE in Electrical Engineering). The MSE is a flexible multidisciplinary master's degree which is highly customizable to adapt to students' interests and industry needs. Students can select between different tracks or specialties, with the possibility of obtaining a more classical or more specialized graduate degree based on the track selected.

The accelerated and 4+1 options provide efficiency by allowing students to start their graduate level coursework in their senior year, and use some of these courses to simultaneously meet degree requirements for both the BS and MS programs. In the accelerated/concurrent program, students are awarded the BS and MSE degree concurrently at the end of their fifth year of study. On the other hand, in the 4+1 program, the BS degree is awarded in the fourth year, and the MSE degree is awarded in the fifth year. The accelerated option offers the most efficiency in terms of overall credit requirements. To be eligible for the accelerated and 4+1 options, students must have a cumulative GPA of 3.0, and apply for admission into the graduate program by the end of Spring term of their junior year.

Students pursuing the accelerated or 4+1 options follow the standard BSEE curriculum for the first three years, start their graduate coursework in their senior year, and complete the MSE requirements during their fifth (graduate) year.

### **Concurrent Accelerated BSEE/MSREE**

Students may earn both BSEE and MSREE degrees, awarded simultaneously upon completion of this curriculum. Students enrolled in the BSEE program who have a proven record of academic excellence have the option of completing the MSREE with one additional year of coursework.

To be eligible for this option, students must have a cumulative GPA of 3.0, and must contact the MSREE Program Director for admission into the graduate program by the end of Spring term of the junior year. Students will receive both their BSEE and MSREE degrees at the end of their fifth year. Students at the Klamath Falls campus are eligible to participate in this program, but must transfer to the Portland-Metro campus for their final year. REE 599 requirement must be met by a design project supervised and approved by both EE and REE advisors. Students should contact their academic advisors for details.

### **Concurrent Accelerated BSEE/MSREE Program**

Students pursuing this option follow the standard BSEE curriculum map during the first three years, start their graduate-level courses in the senior year, and complete the MSREE requirements during their fifth (graduate) year, according to the following guidelines:

To meet BSEE requirements:

- Replace 9 credits of engineering Electives with one graduate-level REE sequence in Electric Power (REE 529, REE 549, REE 569), PV Systems and Processing (REE 525, REE 545, REE 565), or another advisor-approved MSREE sequence.
- Replace 3 terms of ENGR 465 with 3 terms of Graduate Research or Project (REE 599, 599, 599)

To meet additional MSREE requirements:

- Research Methods and Innovation sequence (REE 511, REE 512, REE 513)
- Energy Engineering sequence (REE 515, REE 516, REE 517)
- Graduate-level REE specialization sequence (REE 5xx, 5xx, 5xx)
- Graduate-level REE specialization sequence (REE 5yy, 5yy, 5yy)

### **Concurrent Accelerated BSREE or BSREE/MSE**

Students enrolled in the BSEE or BSREE programs with a record of academic excellence have the option of earning both a BSEE/BSREE and a MS Engineering (MSE) degree with an additional year of study. The MSE is a flexible multidisciplinary master's degree which is highly customizable to adapt to students' interests and industry needs. Students can select between different tracks or specialties, with the possibility of obtaining a more classical or more specialized graduate degree based on the track selected.

The accelerated and 4+1 options provide efficiency by allowing students to start their graduate level coursework in their senior year, and use some of these courses to simultaneously meet degree requirements for both the BS and MS programs. In the accelerated/concurrent program, students are awarded the BS and MSE degree concurrently at the end of their fifth year of study. On the other hand, in the 4+1 program, the BS degree is awarded in the fourth year, and the MSE degree is awarded in the fifth year. The accelerated option offers the most efficiency in terms of overall credit requirements. To be eligible for the accelerated and 4+1 options, students must have a cumulative GPA of 3.0, and apply for admission into the graduate program by the end of Spring term of their junior year.

Students pursuing the accelerated or 4+1 options follow the standard BSEE/BSREE curriculum for the first three years, start their graduate coursework in their senior year, and complete the MSE requirements during their fifth (graduate) year.

## Concurrent Accelerated BSREE/MSREE Program

Students pursuing this option follow the standard BSREE curriculum map during the first three years, start their graduate-level courses in the senior year, and complete the MSREE requirements during their fifth (graduate) year, according to the following guidelines:

To meet BSREE requirements:

- Replace 9 credits of REE senior sequence with one graduate-level REE sequence.
- Replace 3 terms of ENGR 465 with 3 terms of Graduate Research or Project (REE 599, 599, 599).

To meet additional MSREE requirements:

- Research Methods and Innovation sequence (REE 511, REE 512, REE 513)
- Energy Engineering sequence (REE 515, REE 516, REE 517)
- Graduate-level REE specialization sequence (REE 5xx, 5xx, 5xx)
- Graduate-level REE specialization sequence (REE 5yy, 5yy, 5yy)

## Concurrent Degree in Electrical Engineering and Renewable Energy Engineering

To obtain both degrees (BSEE and BSREE) students must complete all of the courses required for the BSEE degree and the following BSREE courses. Consult with your advisor for details.

### Curriculum

<sup>a</sup> Can be used to meet BSEE degree requirements.

Students must complete a minimum of 36 credit hours in addition to the BSEE degree requirements in order to get a second degree.

- CHE 202 - General Chemistry II Credit Hours: 3 <sup>a</sup>
- CHE 205 - General Chemistry II Laboratory Credit Hours: 1 <sup>a</sup>
- CHE 260 - Electrochemistry for Renewable Energy Applications Credit Hours: 4
- EE 419 - Power Electronics Credit Hours: 4 <sup>a</sup>
- ENGR 211 - Engineering Mechanics: Statics Credit Hours: 4
- ENGR 355 - Thermodynamics Credit Hours: 3
- HIST 356 - A History of Energy Credit Hours: 3 <sup>a</sup>  
or
- HIST 357 - History of the Electric Grid Credit Hours: 3 <sup>a</sup>
- MECH 318 - Fluid Mechanics I Credit Hours: 4
- MECH 323 - Heat Transfer I Credit Hours: 3
- REE 243 - Electrical Power Credit Hours: 4 <sup>a</sup>
- REE 253 - Electromechanical Energy Conversion Credit Hours: 3
- REE 33X - REE Elective Credit Hours: 3
- REE 3XX - REE Elective Credit Hours: 3
- REE 412 - Photovoltaic Systems Credit Hours: 3 <sup>a</sup>
- REE 413 - Electric Power Conversion Systems Credit Hours: 3
- REE 463 - Energy Systems Instrumentation Credit Hours: 3
- REE 4XX - REE Elective Credit Hours: 3

## Concurrent Degree in Renewable Energy Engineering and Electrical Engineering

To obtain both degrees (BSREE and BSEE) students must complete all of the courses required for the BSREE degree and the following BSEE courses. Consult with your advisor for details.

### Courses

- CST 116 - C++ Programming I Credit Hours: 4
- EE 323 - Electronics II Credit Hours: 5
- EE 331 - Digital System Design with HDL Credit Hours: 4
- EE 333 - Introduction to Microcontrollers Credit Hours: 4<sup>b</sup>
- EE 341 - Electricity and Magnetism with Transmission Lines Credit Hours: 4<sup>b</sup>
- EE 343 - Solid-State Electronic Devices Credit Hours: 3<sup>a</sup>
- EE 347 - Digital Logic Credit Hours: 4<sup>c</sup>
- EE 430 - Linear Systems and Digital Signal Processing Credit Hours: 5
- EE 335 - Advanced Microcontrollers Credit Hours: 4
- MATH 253 - Sequences and Series Credit Hours: 4
- MATH 465 - Mathematical Statistics Credit Hours: 4<sup>a</sup>
- MGT 345 - Engineering Economy Credit Hours: 3

<sup>a</sup> MATH 465 can be used in place of MATH 361 to meet BSREE degree requirements. EE 343 can be used in place of REE 337 to meet BSREE degree requirements

<sup>b</sup> Can be used as Renewable Energy Engineering Electives

<sup>c</sup> Students can substitute with EE 131/EE 133 sequence

**Students must complete a minimum of 36 credit hours in addition to the BSREE degree requirements in order to get a dual degree.**

## Concurrent Degree in Renewable Energy Engineering and Environmental Sciences

To obtain both degrees, students must complete the following listed courses along with the courses required for the Bachelor of Science in Renewable Energy Engineering.

### Courses:

- BIO 211 - Principles of Biology Credit Hours: 4
- BIO 212 - Principles of Biology Credit Hours: 4
- BIO 213 - Principles of Biology Credit Hours: 4
- CHE 223 - General Chemistry III Credit Hours: 5<sup>a</sup>
- CHE 315 - Environmental Chemistry and Toxicology Credit Hours: 3
- CHE 331 - Organic Chemistry I Credit Hours: 4
- CHE 465 - Fate and Transport of Pollutants Credit Hours: 4
- Ecology Elective Credit Hours: 4
- ENV 111 - Introduction to Environmental Sciences Credit Hours: 4
- ENV 214 - Watershed Science & Technology Credit Hours: 3
- ENV 224 - Scientific Reasoning and Methodology Credit Hours: 3
- ENV 314 - Environmental Management and Restoration Credit Hours: 3
- ENV 484 - Sustainable Human Ecology Credit Hours: 4
- MATH 362 - Statistical Methods II Credit Hours: 4

**Total Additional Credits Needed: 53**

<sup>a</sup> CHE 223 may be taken as BS Civil Engineering math/science elective

## Electrical Engineering (Klamath Falls Campus), BS

### Degree Requirements

The Bachelor of Science in Electrical Engineering follows a rigorous curriculum, requiring a minimum of 184 credit hours, which takes approximately four years to complete. To be eligible for graduation, students must maintain a 2.0 GPA. In addition, a final grade of "C" or better must be earned in all EE courses that are prerequisites for another EE course.

All courses listed in the curriculum map for the catalog year of graduation must be completed to be eligible for graduation. Any deviations from the courses listed in the curriculum map require approval from the academic advisor, the department chair, and the Registrar's office. Approvals are not official until entered in the official student records. When changes are made to the curriculum, students who entered the program under a previous catalog will work with their academic advisors to transition to meet the requirements of the current catalog.

### Curriculum Klamath Falls Campus

Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- CHE 201 - General Chemistry I Credit Hours: 3<sup>a</sup>
- CHE 204 - General Chemistry I Laboratory Credit Hours: 1<sup>a</sup>
- ENGR 101 - Introduction to Engineering I Credit Hours: 2
- MATH 251 - Differential Calculus Credit Hours: 4
- SPE 111 - Public Speaking Credit Hours: 3

**Total: 13 Credit Hours**

##### Winter

- CHE 202 - General Chemistry II Credit Hours: 3<sup>a</sup>
- CHE 205 - General Chemistry II Laboratory Credit Hours: 1<sup>a</sup>
- ENGR 102 - Introduction to Engineering II Credit Hours: 2
- MATH 252 - Integral Calculus Credit Hours: 4
- PHY 221 - General Physics with Calculus Credit Hours: 4
- EE 131 - Digital Electronics I Credit Hours: 4

**Total: 18 Credit Hours**

##### Spring

- EE 133 - Digital Electronics II Credit Hours: 4
- MATH 254 - Vector Calculus I Credit Hours: 4
- PHY 222 - General Physics with Calculus Credit Hours: 4
- WRI 121 - English Composition Credit Hours: 3

**Total: 15 Credit Hours**

#### Sophomore Year

##### Fall

- EE 221 - Circuits I Credit Hours: 4
- PHY 223 - General Physics with Calculus Credit Hours: 4
- WRI 122 - Argumentative Writing Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 14 Credit Hours**

##### Winter

- CST 116 - C++ Programming I Credit Hours: 4
- EE 223 - Circuits II Credit Hours: 4
- MATH 321 - Applied Differential Equations I Credit Hours: 4
- MATH 341 - Linear Algebra I Credit Hours: 4

**Total: 16 Credit Hours**

##### Spring

- EE 225 - Circuits III Credit Hours: 4<sup>b</sup>
- MATH 253 - Sequences and Series Credit Hours: 4
- WRI 227 - Technical Report Writing Credit Hours: 3
- Humanities Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 17 Credit Hours**

#### Junior Year

##### Fall

- EE 321 - Electronics I Credit Hours: 5
- EE 331 - Digital System Design with HDL Credit Hours: 4
- EE 341 - Electricity and Magnetism with Transmission Lines Credit Hours: 4
- MGT 345 - Engineering Economy Credit Hours: 3

**Total: 16 Credit Hours**

##### Winter

- EE 323 - Electronics II Credit Hours: 5
- EE 333 - Introduction to Microcontrollers Credit Hours: 4
- EE 343 - Solid-State Electronic Devices Credit Hours: 3
- MATH 465 - Mathematical Statistics Credit Hours: 4

**Total: 16 Credit Hours**

##### Spring

- EE 335 - Advanced Microcontrollers Credit Hours: 4
- EE 461 - Control System Engineering Credit Hours: 4
- ENGR 267 - Engineering Programming Credit Hours: 3
- Engineering Elective Credit Hours: 4<sup>c</sup>

**Total: 15 Credit Hours**

#### Senior Year

##### Fall

- EE 430 - Linear Systems and Digital Signal Processing Credit Hours: 5
- ENGR 465 - Capstone Project Credit Hours: 2
- SPE 321 - Small Group and Team Communication Credit Hours: 3
- Engineering Elective Credit Hours: 4<sup>c</sup>
- Social Science Elective Credit Hours: 3

**Total: 17 Credit Hours**

**Winter**

- EE 401 - Communication Systems Credit Hours: 5
- ENGR 465 - Capstone Project Credit Hours: 2
- Engineering Elective Credit Hours: 3<sup>c</sup>
- Humanities Elective Credit Hours: 3
- Upper Division Writing Elective Credit Hours: 3<sup>d</sup>

**Total: 16 Credit Hours****Spring**

- ENGR 465 - Capstone Project Credit Hours: 2
- Engineering Elective Credit Hours: 3<sup>c</sup>
- Humanities Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 11 Credit Hours****Total for a B.S. in Electrical Engineering: 184 Credit Hours**

<sup>a</sup> CHE 201/CHE 204 and CHE 202/CHE 205 can be substituted with CHE 221 and CHE 222, respectively. CHE 202/CHE 205 can be substituted with an approved 4 credit Math/Science Elective.

<sup>b</sup> EE 225 can be substituted with EE 320.

<sup>c</sup> Upper division EE or REE courses (except EE 311, EE 320, or EE 347), or courses included in the list for a specific degree option can be used as an engineering elective (students must satisfy course pre- and co-requisites). Other courses may be used as engineering electives with advisor and department chair approval. Students must complete a minimum of 14 credits of engineering elective coursework.

<sup>d</sup> Choose from WRI 327, WRI 350, and WRI 410.

**Technical Emphases**

Students in the BSEE program may choose to specialize in a particular area by selecting at least three of their engineering technical elective courses from the appropriate list below. These lists of courses are provided only for guidance. Students are not required to select a technical emphasis, and technical emphases will not appear on the students' transcripts. Some technical elective courses in the emphases may not be available in both campuses. Check course offerings with your advisor.

**Automation, Robotics, and Control**

Choose at least three engineering elective courses from the following list:

- ENGR 420 - Engineering Modeling and Simulation of Dynamic Systems Credit Hours: 4
- ENGR 421 - Automation for Robotics Credit Hours: 4
- ENGR 422 - Process Control Credit Hours: 4
- ENGR 423 - Motion Control in Mechanisms and Robotics Credit Hours: 4
- REE 463 - Energy Systems Instrumentation Credit Hours: 3
- or other approved technical Electives

**Electrical Power**

Choose at least three engineering elective courses from the following list:

- EE 419 - Power Electronics Credit Hours: 4
- REE 243 - Electrical Power Credit Hours: 4
- REE 253 - Electromechanical Energy Conversion Credit Hours: 3
- REE 345 - Wind Power Credit Hours: 3
- REE 453 - Power System Analysis Credit Hours: 3
- REE 454 - Power System Protection and Control Credit Hours: 3
- or other approved technical Electives

**Microelectronics**

Choose at least three engineering elective courses from the following list:

- EE 325 - Electronics III Credit Hours: 5
- EE 421 - Analog Integrated - Circuit Design Credit Hours: 5
- EE 423 - CMOS Digital Integrated- Circuit Design Credit Hours: 5
- EE 432 - Advanced Digital System Design Credit Hours: 4
- or other approved technical Electives

**Renewable Energy**

Choose at least three engineering elective courses from the following list:

- EE 419 - Power Electronics Credit Hours: 4
- REE 243 - Electrical Power Credit Hours: 4
- REE 253 - Electromechanical Energy Conversion Credit Hours: 3
- REE 345 - Wind Power Credit Hours: 3
- REE 346 - Biofuels and Biomass Credit Hours: 3
- REE 412 - Photovoltaic Systems Credit Hours: 3
- REE 413 - Electric Power Conversion Systems Credit Hours: 3
- REE 425 - Electricity Markets and Modeling Credit Hours: 3
- REE 427 - Greenhouse Gas Accounting/Footprints Credit Hours: 3
- or other approved technical Electives

**Note:** Optical Engineering emphasis only available at the Portland-Metro campus.

## Electrical Engineering (Portland-Metro Campus), BS

### Degree Requirements

The Bachelor of Science in Electrical Engineering follows a rigorous curriculum, requiring a minimum of 184 credit hours, which takes approximately four years to complete. To be eligible for graduation, students must maintain a 2.0 GPA. In addition, a final grade of "C" or better must be earned in all EE courses that are prerequisites for another EE course.

All courses listed in the curriculum map for the catalog year of graduation must be completed to be eligible for graduation. Any deviations from the courses listed in the curriculum map require approval from the academic advisor, the department chair, and the Registrar's office. Approvals are not official until entered in the official student records. When changes are made to the curriculum, students who entered the program under a previous catalog will work with their academic advisors to transition to meet the requirements of the current catalog.

**Note:** The Portland-Metro campus is a laptop-required campus with resources like laptop specifications, financial aid, and helpful instructions found at <http://www.oit.edu/portland-metro/college-costs/bring-your-own-device>.

### Curriculum – Portland-Metro Campus

Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- CHE 201 - General Chemistry I Credit Hours: 3<sup>a</sup>
- CHE 204 - General Chemistry I Laboratory Credit Hours: 1<sup>a</sup>
- EE 131 - Digital Electronics I Credit Hours: 4
- MATH 251 - Differential Calculus Credit Hours: 4
- WRI 121 - English Composition Credit Hours: 3

**Total: 15 Credit Hours**

##### Winter

- CHE 202 - General Chemistry II Credit Hours: 3<sup>a</sup>
- CHE 205 - General Chemistry II Laboratory Credit Hours: 1<sup>a</sup>
- EE 133 - Digital Electronics II Credit Hours: 4
- MATH 252 - Integral Calculus Credit Hours: 4
- WRI 122 - Argumentative Writing Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 18 Credit Hours**

##### Spring

- MATH 321 - Applied Differential Equations I Credit Hours: 4
- MATH 254 - Vector Calculus I Credit Hours: 4
- MGT 345 - Engineering Economy Credit Hours: 3
- SPE 111 - Public Speaking Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 17 Credit Hours**

#### Sophomore Year

##### Fall

- CST 116 - C++ Programming I Credit Hours: 4
- EE 221 - Circuits I Credit Hours: 4
- PHY 221 - General Physics with Calculus Credit Hours: 4
- WRI 227 - Technical Report Writing Credit Hours: 3

**Total: 15 Credit Hours**

##### Winter

- EE 223 - Circuits II Credit Hours: 4
- ENGR 267 - Engineering Programming Credit Hours: 3
- MATH 341 - Linear Algebra I Credit Hours: 4
- PHY 222 - General Physics with Calculus Credit Hours: 4
- Humanities Elective Credit Hours: 3

**Total: 18 Credit Hours**

##### Spring

- EE 225 - Circuits III Credit Hours: 4<sup>b</sup>
- MATH 253 - Sequences and Series Credit Hours: 4
- PHY 223 - General Physics with Calculus Credit Hours: 4
- Social Science Elective Credit Hours: 3

**Total: 15 Credit Hours**

#### Junior Year

##### Fall

- EE 321 - Electronics I Credit Hours: 5
- EE 333 - Introduction to Microcontrollers Credit Hours: 4
- EE 341 - Electricity and Magnetism with Transmission Lines Credit Hours: 4
- SPE 321 - Small Group and Team Communication Credit Hours: 3

**Total: 16 Credit Hours**

##### Winter

- EE 323 - Electronics II Credit Hours: 5
- EE 331 - Digital System Design with HDL Credit Hours: 4
- EE 335 - Advanced Microcontrollers Credit Hours: 4
- Social Science Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Spring

- EE 343 - Solid-State Electronic Devices Credit Hours: 3
- EE 432 - Advanced Digital System Design Credit Hours: 4<sup>b</sup>
- Engineering Elective Credit Hours: 4<sup>c</sup>
- Upper Division Writing Elective Credit Hours: 3<sup>d</sup>

**Total: 14 Credit Hours**

**Senior Year****Fall**

- EE 461 - Control System Design Credit Hours: 4
- ENGR 465 - Capstone Project Credit Hours: 2
- MATH 465 - Mathematical Statistics Credit Hours: 4
- Engineering Elective Credit Hours: 4<sup>e</sup>

**Total: 14 Credit Hours****Winter**

- EE 430 - Linear Systems and Digital Signal Processing  
Credit Hours: 5
- ENGR 465 - Capstone Project Credit Hours: 2
- Engineering Elective Credit Hours: 3<sup>e</sup>
- Humanities Elective Credit Hours: 3

**Total: 13 Credit Hours****Spring**

- EE 401 - Communication Systems Credit Hours: 5
- ENGR 465 - Capstone Project Credit Hours: 2
- Engineering Elective Credit Hours: 3<sup>e</sup>
- Social Science Elective Credit Hours: 3

**Total: 13 Credit Hours****Total for a B.S. in Electrical Engineering: 184 Credit Hours**

<sup>a</sup> CHE 201/CHE 204 and CHE 202/CHE 205 can be substituted with CHE 221 and CHE 222, respectively. CHE 202/CHE 205 can be substituted with an approved 4 credit Math/Science Elective

<sup>b</sup> EE 225 can be substituted with EE 320. EE 432 can be substituted with an approved technical elective

<sup>c</sup> Upper division EE or REE courses (except EE 311, EE 320, and EE 347), or courses included in the list for a specific degree option (students must satisfy course pre- and co-requisites). Other courses may be used as engineering electives with advisor and department chair approval. Students must complete a minimum of 14 credits of engineering elective coursework

<sup>d</sup> Choose from WRI 327, WRI 350, or WRI 410

**Technical Emphases**

Students in the BSEE program may choose to specialize in a particular area by selecting at least three of their engineering technical elective courses from the appropriate list below. These lists of courses are provided only for guidance. Students are not required to select a technical emphasis, and technical emphases will not appear on the students' transcripts. Some technical elective courses in the emphases may not be available in both campuses. Check course offerings with your advisor.

**Automation, Robotics, and Control**

Choose at least three engineering elective courses from the following list:

- ENGR 420 - Engineering Modeling and Simulation of Dynamic Systems Credit Hours: 4
- ENGR 421 - Automation for Robotics Credit Hours: 4
- ENGR 422 - Process Control Credit Hours: 4
- ENGR 423 - Motion Control in Mechanisms and Robotics Credit Hours: 4
- REE 463 - Energy Systems Instrumentation Credit Hours: 3
- or other approved Technical Electives

**Electrical Power**

Choose at least three engineering elective courses from the following list:

- EE 419 - Power Electronics Credit Hours: 4
- REE 243 - Electrical Power Credit Hours: 4
- REE 253 - Electromechanical Energy Conversion Credit Hours: 3
- REE 345 - Wind Power Credit Hours: 3
- REE 453 - Power System Analysis Credit Hours: 3
- REE 454 - Power System Protection and Control Credit Hours: 3
- or other approved Technical Electives

**Microelectronics**

Choose at least three engineering elective courses from the following list:

- EE 325 - Electronics III Credit Hours: 5
- EE 421 - Analog Integrated - Circuit Design Credit Hours: 5
- EE 423 - CMOS Digital Integrated- Circuit Design Credit Hours: 5
- EE 432 - Advanced Digital System Design Credit Hours: 4
- or other approved Technical Electives

**Optical Engineering**

Choose at least three engineering elective courses from the following list:

- EE 448 - Geometric Optics Credit Hours: 4
- EE 449 - Radiometry & Optical Detection Credit Hours: 4
- EE 450 - Physical Optics Credit Hours: 4
- EE 451 - Lasers Credit Hours: 4
- EE 452 - Waveguides and Fiber Optics Credit Hours: 4
- EE 453 - Optical Metrology Credit Hours: 4
- or other approved Technical Electives

**Note:** Optical Engineering emphasis only available at the Portland-Metro campus.

**Renewable Energy**

Choose at least three engineering elective courses from the following list:

- EE 419 - Power Electronics Credit Hours: 4
- REE 243 - Electrical Power Credit Hours: 4
- REE 253 - Electromechanical Energy Conversion Credit Hours: 3
- REE 345 - Wind Power Credit Hours: 3
- REE 346 - Biofuels and Biomass Credit Hours: 3
- REE 412 - Photovoltaic Systems Credit Hours: 3
- REE 413 - Electric Power Conversion Systems Credit Hours: 3
- REE 425 - Electricity Markets and Modeling Credit Hours: 3
- REE 427 - Greenhouse Gas Accounting/Footprints Credit Hours: 3
- or other approved Technical Electives

## Electrical Engineering (Post-Baccalaureate), BS

The following is a list of additional courses that Oregon Tech BSEET graduates are required to complete in order to meet the BSEE degree requirements.

### Curriculum

#### Mathematics and Science

- CHE 201 - General Chemistry I Credit Hours: 3<sup>a</sup>
- CHE 204 - General Chemistry I Laboratory Credit Hours: 1<sup>a</sup>
- CHE 202 - General Chemistry II Credit Hours: 3<sup>a</sup>
- CHE 205 - General Chemistry II Laboratory Credit Hours: 1<sup>a</sup>
- MATH 253 - Sequences and Series Credit Hours: 4
- MATH 341 - Linear Algebra I Credit Hours: 4
- MATH 465 - Mathematical Statistics Credit Hours: 4

#### Electrical Engineering

- EE 341 - Electricity and Magnetism with Transmission Lines Credit Hours: 4
- EE 343 - Solid-State Electronic Devices Credit Hours: 3

#### Engineering Technical Electives

- Engineering Elective (EE, REE) Credit Hours: 3<sup>b</sup>
- Engineering Elective (EE, REE) Credit Hours: 3<sup>b</sup>

#### Total needed if a BSEET degree awarded by Oregon Tech: 36 Credit Hours

Additional credits needed for students who completed a BSEET degree from another institution: 45 Credit Hours

- Engineering Elective (EE, REE) Credit Hours: 3<sup>b</sup>
- Engineering Elective (EE, REE) Credit Hours: 3<sup>b</sup>
- Engineering Elective (EE, REE) Credit Hours: 3<sup>b</sup>

<sup>a</sup>CHE 201/CHE 204 and CHE 202/CHE 205 can be substituted with CHE 221 and CHE 222 respectively. CHE 202/CHE 205 can be substituted with an approved 4 credit Math/Science Elective

<sup>b</sup>Requires approval

## Electronics Engineering Technology, BS

### Degree Requirements

The Bachelor of Science in Electronics Engineering Technology follows a rigorous curriculum, requiring a minimum of 188 credit hours, which takes approximately four years to complete. To be eligible for graduation, students must maintain a 2.0 GPA. In addition, a final grade of "C" or better must be earned in all EE and EET courses that are prerequisites for another EE or EET course.

All courses listed in the curriculum map for the catalog year of graduation must be completed to be eligible for graduation. Any deviations from the courses listed in the curriculum map require approval from the academic advisor, the department chair, and the Registrar's office. Approvals are not official until entered in the official student records. When changes are made to the curriculum, students who entered the program under a previous catalog will work with their academic advisors to transition to meet the requirements of the current catalog.

### Curriculum

The curriculum map below shows the required courses, recommended sequence, and recommended terms during which they should be taken for students transferring into the program with an accredited AAS degree or equivalent lower division coursework (freshman and sophomore years).

Transfer students and part-time students should contact the BSEET program director to develop a customized curriculum tailored to their individual needs.

### Freshman and Sophomore Years

The degree requirements for the first two years can be fulfilled by completing an accredited Associate of Applied Science degree in Electronics Engineering Technology, Microelectronics Engineering Technology, Microelectronics Technology, Electrical Engineering Transfer, Renewable Energy Technology, or equivalent coursework. Oregon Tech has articulation agreements with various community colleges throughout Oregon. Students transferring to Oregon Tech with an AAS degree from these programs will not be required to take any lower-division electronics courses at Oregon Tech. In addition to the electronics courses, students should complete the programming, math and science, communication, and general education courses specified below during the Freshman and Sophomore years while completing their AAS degree in order to be able to complete the upper-division (Junior and Senior) BSEET courses at Oregon Tech in two years. Below is a list of courses to satisfy the requirements for the first two years of the degree. Completion of all these courses is not required to be able to transfer, but it is recommended for 2+2 transferability.

#### Communication

- SPE 111 - Public Speaking Credit Hours: 3
- WRI 121 - English Composition Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3
- WRI 227 - Technical Report Writing Credit Hours: 3

**Total: 12 Credit Hours**

#### General Education

- Humanities Elective Credit Hours: 9
- Social Science Elective Credit Hours:

**12 Total: 21 Credit Hours**

#### Mathematics and Science

- MATH 111 - College Algebra Credit Hours: 4
- MATH 112 - Trigonometry Credit Hours: 4
- MATH 251 - Differential Calculus Credit Hours: 4
- MATH 252 - Integral Calculus Credit Hours: 4
- PHY 221 - General Physics with Calculus Credit Hours: 4
- PHY 222 - General Physics with Calculus Credit Hours: 4
- PHY 223 - General Physics with Calculus Credit Hours: 4
- Statistics Elective Credit Hours: 4<sup>a</sup>

**Total: 32 Credit Hours**

#### Electronics

- EE 121 - Fundamentals of Electric Circuits I Credit Hours: 4
- EE 123 - Fundamentals of Electric Circuits II Credit Hours: 4
- EE 131 - Digital Electronics I Credit Hours: 4
- EE 133 - Digital Electronics II Credit Hours: 4
- EE 219 - Introduction to Semiconductor Devices and Amplifiers Credit Hours: 4
- 200-level Technical Electives Credit Hours: 16<sup>b</sup>

**Total: 36 Credit Hours**

#### Programming

- CST 116 - C++ Programming I Credit Hours: 4

**Total: 4 Credit Hours**

#### Upper Division

##### Courses Junior Year

##### Fall

- EE 320 - Advanced Circuits and Systems Analysis Credit Hours: 5<sup>c</sup>
- EE 321 - Electronics I Credit Hours: 5
- MGT 345 - Engineering Economy Credit Hours: 3
- MATH 321 - Applied Differential Equations I Credit Hours: 4

**Total: 17 Credit Hours**

**Winter**

- EE 323 - Electronics II Credit Hours: 5
- EE 331 - Digital System Design with HDL Credit Hours: 4
- ENGR 267 - Engineering Programming Credit Hours: 3
- SPE 321 - Small Group and Team Communication Credit Hours: 3

**Total: 15 Credit Hours****Spring**

- EE 325 - Electronics III Credit Hours: 5
- EE 432 - Advanced Digital System Design Credit Hours: 4<sup>e</sup>
- MATH 254 - Vector Calculus I Credit Hours: 4

**Total: 13 Credit Hours****Senior Year****Fall**

- EE 333 - Introduction to Microcontrollers Credit Hours: 4
- ENGR 465 - Capstone Project Credit Hours: 2
- Engineering Elective Credit Hours: 3<sup>d</sup>
- Upper Division Writing Elective Credit Hours: 3<sup>e</sup>

**Total: 12 Credit Hours****Winter**

- EE 335 - Advanced Microcontrollers Credit Hours: 4
- EE 430 - Linear Systems and Digital Signal Processing Credit Hours: 5
- ENGR 465 - Capstone Project Credit Hours: 2
- Engineering Elective Credit Hours: 3<sup>d</sup>

**Total: 14 Credit Hours****Spring**

- EE 401 - Communication Systems Credit Hours: 5
- ENGR 465 - Capstone Project Credit Hours: 2
- Engineering Elective Credit Hours: 3<sup>d</sup>
- Elective Credit Hours: 2

**Total: 12 Credit Hours****Total for a B.S. in Electronics Engineering Technology: 188 Credit Hours**

<sup>a</sup> Choose from MATH 243, MATH 361, and MATH 465.

<sup>b</sup> Lower Division Technical electives include CST 126, CST 136, and other approved 200-level engineering or engineering technology courses.

<sup>c</sup> Choose from WRI 327, WRI 350, and WRI 410.

<sup>d</sup> Upper division EE or REE courses (except EE 311, EE 320, and EE 347), or courses included in the list for a specific degree option (students must satisfy course pre- and co-requisites). Other courses may be used as engineering electives with advisor and department chair approval. Students must complete a minimum of 9 credits of engineering elective coursework.

<sup>e</sup> EE 320 can be substituted with EE 225. EE 432 can be substituted with an approved technical elective.

### Technical Emphases

Students in the BSEET program may choose to specialize in a particular area by selecting their engineering elective courses from the appropriate list below. These lists of courses are provided only for guidance. Students are not required to select a technical emphasis, and technical emphases will not appear on the students' transcripts. Some technical elective courses in the emphases may not be available in both campuses. Check course offerings with your advisor.

#### Automation, Robotics, and Control

Choose technical Elective courses from the following list:

- ENGR 420 - Engineering Modeling and Simulation of Dynamic Systems Credit Hours: 4
- ENGR 421 - Automation for Robotics Credit Hours: 4
- ENGR 422 - Process Control Credit Hours: 4
- ENGR 423 - Motion Control in Mechanisms and Robotics Credit Hours: 4
- REE 463 - Energy Systems Instrumentation Credit Hours: 3
- or other approved technical electives

**Note:** Automation, Robotics, and Control emphasis only available at Portland-Metro campus.

#### Electrical Power

Choose technical elective courses from the following list:

- EE 419 - Power Electronics Credit Hours: 4
- REE 243 - Electrical Power Credit Hours: 4
- REE 253 - Electromechanical Energy Conversion Credit Hours: 3
- REE 345 - Wind Power Credit Hours: 3
- REE 453 - Power System Analysis Credit Hours: 3
- REE 454 - Power System Protection and Control Credit Hours: 3
- or approved technical electives

#### Microelectronics

Choose technical elective courses from the following list:

- EE 341 - Electricity and Magnetism with Transmission Lines Credit Hours: 4
- EE 343 - Solid-State Electronic Devices Credit Hours: 3
- EE 421 - Analog Integrated - Circuit Design Credit Hours: 5
- EE 423 - CMOS Digital Integrated- Circuit Design Credit Hours: 5
- or approved technical electives

#### Optical Engineering

Choose technical elective courses from the following list:

- EE 448 - Geometric Optics Credit Hours: 4
- EE 449 - Radiometry & Optical Detection Credit Hours: 4
- EE 450 - Physical Optics Credit Hours: 4
- EE 451 - Lasers Credit Hours: 4
- EE 452 - Waveguides and Fiber Optics Credit Hours: 4
- EE 453 - Optical Metrology Credit Hours: 4
- or approved technical electives

**Note:** Optical Engineering emphasis only available at Portland-Metro campus.

#### Renewable Energy

Choose technical elective courses from the following list:

- EE 419 - Power Electronics Credit Hours: 4
- REE 243 - Electrical Power Credit Hours: 4
- REE 253 - Electromechanical Energy Conversion Credit Hours: 3
- REE 345 - Wind Power Credit Hours: 3
- REE 346 - Biofuels and Biomass Credit Hours: 3
- REE 412 - Photovoltaic Systems Credit Hours: 3
- REE 413 - Electric Power Conversion Systems Credit Hours: 3
- REE 425 - Electricity Markets and Modeling Credit Hours: 3
- REE 427 - Greenhouse Gas Accounting/Footprints Credit Hours: 3
- or advisor approved technical electives

## Engineering (Multiple Disciplines), MS

Depending on their interest and career goals students can choose a multidisciplinary MSE, a specialized MSE, or a more classical MSE program such as the MSE in Electrical Engineering.

The multidisciplinary MSE program is designed as a highly customizable and modular MS engineering degree, which enables students to choose coursework from multiple disciplines to design specialties typically not available in the classical engineering MS degrees. The flexibility in the MS in Engineering degree ensures a relevant, up-to-date educational experience, and the ability to meet urgent industry needs in multidisciplinary technical fields. The program is designed to provide maximum flexibility while maintaining academic rigor.

### Program Design

The MSE is designed as a "Flexible/Multidisciplinary Engineering Degree." As such, the students have the flexibility to customize the MSE to be highly relevant to their professional interests. The flexibility to design specialized or multidisciplinary degree programs is the defining element of the program and is what makes it such a close match to the interdisciplinary environment in today's fast changing industries. Through a faculty advisory committee, coursework is personally customized for the student or industry partner company to best match the desired outcomes based on a thorough needs assessment.

### Program Mission and Objectives

The MSE at Oregon Tech is designed to prepare engineering professionals with advanced knowledge and skills in high-demand multidisciplinary engineering fields who are ready to assume a broad range of technical and leadership roles.

### Student Preparation

Students should be prepared to start graduate engineering academic work. Typically, this means the successful new student has the following:

1. A baccalaureate degree in engineering, the physical sciences, or a related technical discipline.
2. Evidence of potential for graduate academic work, success or potential for success in industry, and demonstrated interest in their chosen specialty.

### BS/MSE Concurrent Fast Track Degree (5 year Program)

Students enrolled in the EERE BS programs are eligible to apply for the concurrent Fast Track BS/MSE program. This enables students to potentially obtain both the BS and MSE degrees in 5 years.

### MSE Coursework & Specialties

Students can complete a multidisciplinary program by taking courses in Systems Engineering, Research Methods & Innovation (covering peer-reviewed research, IP fundamentals, and technology commercialization), and one or more engineering disciplines including Electrical & Computer Engineering.

#### *Multidisciplinary MSE Program*

MSE (Multidisciplinary)

MSE in Systems Engineering

#### *Engineering Discipline MSE Program*

MSE in Electrical Engineering

#### *Specialized MSE Programs*

MSE in Embedded Systems

MSE in Automation, Robotics & Control

MSE in Optical Engineering

MSE in Power Engineering

## Optical Engineering, BS Dual Major

### Degree Requirements

A dual major in Optical Engineering requires 40 specialized credits in optics and electrical engineering. Some of these courses may be used to meet requirements in the primary major also. The capstone project required in the student's primary major is expected to incorporate elements from both the primary and optical engineering majors. Since the required courses for Optical Engineering must be taken along with those for the primary major, a full curriculum map is not provided. Students should carefully plan each term in consultation with their primary major advisor and with their Optical Engineering advisor. To obtain a dual major in optical engineering, students must complete the courses required for the Bachelor of Science degree in their primary engineering major as well as the following list of specialized Optical Engineering courses:

- EE 221 - Circuits I Credit Hours: 4
- EE 223 - Circuits II Credit Hours: 4
- EE 225 - Circuits III Credit Hours: 4
- EE 343 - Solid-State Electronic Devices Credit Hours: 3
  
- EE 448 - Geometric Optics Credit Hours: 4  
or
- PHY 448 - Geometric Optics Credit Hours: 4
  
- EE 449 - Radiometry & Optical Detection Credit Hours: 4  
or
- PHY 449 - Radiometry & Optical Detection Credit Hours: 4
  
- EE 450 - Physical Optics Credit Hours: 4  
or
- PHY 450 - Physical Optics Credit Hours: 4
  
- EE 451 - Lasers Credit Hours: 4  
or
- PHY 451 - Lasers Credit Hours: 4
  
- EE 452 - Waveguides and Fiber Optics Credit Hours: 4  
or
- PHY 452 - Waveguides and Fiber Optics Credit Hours: 4
  
- EE 453 - Optical Metrology Credit Hours: 4  
or
- PHY 453 - Optical Metrology Credit Hours: 4

## Renewable Energy Engineering (Klamath Falls Campus), BS

### Degree Requirements

The Bachelor of Science in Renewable Energy Engineering follows a rigorous curriculum, requiring a minimum of 184/185 credit hours, which takes approximately four years to complete. To be eligible for graduation, students must maintain a 2.0 GPA. In addition, a final grade of "C" or better must be earned in all courses with MATH, CHE, PHY, EE, ENGR, MECH, and REE prefixes. Students must also earn a grade of "C" or better in all courses listed as prerequisites for these courses.

All courses listed in the curriculum map for the catalog year of graduation must be completed to be eligible for graduation. Any deviations from the courses listed in the curriculum map require approval from the academic advisor, the department chair, and the Registrar's office. Approvals are not official until entered in the official student records. When changes are made to the curriculum, students who entered the program under a previous catalog will work with their academic advisors to transition to meet the requirements of the current catalog.

### Curriculum – Klamath Falls Campus

Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- CHE 201 - General Chemistry I Credit Hours: 3<sup>a</sup>
- CHE 204 - General Chemistry I Laboratory Credit Hours: 1<sup>a</sup>
- ENGR 101 - Introduction to Engineering I Credit Hours: 2<sup>d</sup>
- MATH 251 - Differential Calculus Credit Hours: 4
- WRI 121 - English Composition Credit Hours: 3

**Total: 13 Credit Hours**

##### Winter

- CHE 202 - General Chemistry II Credit Hours: 3<sup>a</sup>
- CHE 205 - General Chemistry II Laboratory Credit Hours: 1<sup>a</sup>
- ENGR 102 - Introduction to Engineering II Credit Hours: 2<sup>d</sup>
- MATH 252 - Integral Calculus Credit Hours: 4
- WRI 122 - Argumentative Writing Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Spring

- CHE 260 - Electrochemistry for Renewable Energy Applications Credit Hours: 4
- ENGR 267 - Engineering Programming Credit Hours: 3
- MATH 254 - Vector Calculus I Credit Hours: 4
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 227 - Technical Report Writing Credit Hours: 3

**Total: 17 Credit Hours**

#### Sophomore Year

##### Fall

- ECO 201 - Principles of Microeconomics Credit Hours: 3  
or
- ECO 202 - Principles of Macroeconomics Credit Hours: 3
- EE 221 - Circuits I Credit Hours: 4
- MATH 321 - Applied Differential Equations I Credit Hours: 4
- PHY 221 - General Physics with Calculus Credit Hours: 4

**Total: 15 Credit Hours**

##### Winter

- EE 223 - Circuits II Credit Hours: 4
- ENGR 211 - Engineering Mechanics: Statics Credit Hours: 4
- HIST 356 - A History of Energy Credit Hours: 3  
or
- HIST 357 - History of the Electric Grid Credit Hours: 3
- PHY 222 - General Physics with Calculus Credit Hours: 4

**Total: 15 Credit Hours**

##### Spring

- EE 225 - Circuits III Credit Hours: 4
- MATH 361 - Statistical Methods I Credit Hours: 4  
or
- MATH 465 - Mathematical Statistics Credit Hours: 4
- PHY 223 - General Physics with Calculus Credit Hours: 4
- REE 243 - Electrical Power Credit Hours: 4

**Total: 16 Credit Hours**

#### Junior Year

##### Fall

- EE 321 - Electronics I Credit Hours: 5
- MATH 341 - Linear Algebra I Credit Hours: 4
- MECH 318 - Fluid Mechanics I Credit Hours: 4  
or
- ENGR 318 - Engineering Mechanics: Fluids Credit Hours: 4

- REE 253 - Electromechanical Energy Conversion Credit Hours: 3

**Total: 16 Credit Hours**

**Winter**

- REE 337 - Materials for RE Applications Credit Hours: 3  
or
- EE 343 - Solid-State Electronic Devices Credit Hours: 3
- EE 461 - Control System Engineering Credit Hours: 4
- Upper Division Writing Elective Credit Hours: 3<sup>c</sup>
- Renewable Energy Engineering Elective Credit Hours: 3

**Total: 16 Credit Hours****Spring**

- EE 419 - Power Electronics Credit Hours: 4
- MECH 323 - Heat Transfer I Credit Hours: 3
- REE 331 - Fuel Cells Credit Hours: 3
- SPE 321 - Small Group and Team Communication Credit Hours: 3
- Renewable Energy Engineering Elective Credit Hours: 3

**Total: 16 Credit Hours****Senior Year****Fall**

- ENGR 465 - Capstone Project Credit Hours: 2
- REE 4XX - Senior Sequence I Credit Hours: 3
- REE 412 - Photovoltaic Systems Credit Hours: 3
- Renewable Energy Engineering Elective Credit Hours: 3
- Humanities Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 17 Credit Hours****Winter**

- ENGR 465 - Capstone Project Credit Hours: 2
- REE 4XX - Senior Sequence II Credit Hours: 3
- REE 413 - Electric Power Conversion Systems Credit Hours: 3
- Renewable Energy Engineering Elective Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 14 Credit Hours****Spring**

- ENGR 465 - Capstone Project Credit Hours: 2
- REE 4XX - Senior Sequence III Credit Hours: 3
- REE 463 - Energy Systems Instrumentation Credit Hours: 3
- Renewable Energy Engineering Elective Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 14 Credit Hours****Total for a B.S. in Renewable Energy Engineering: 185 Credit Hours**

<sup>a</sup> CHE 201/CHE 204 and CHE 202/CHE 205 can be substituted with CHE 221 and CHE 222 respectively

<sup>b</sup> Course may be repeated multiple times for credit with approval

<sup>c</sup> Choose from WRI 327, WRI 350, and WRI 410

<sup>d</sup> With advisor approval students may take REE 201 in place of ENGR 101 and ENGR 102

**Renewable Energy Engineering Electives**

Students in the BSREE program are required to complete 15 credits of technical electives classes. At least 3 of these classes must be REE 300-level or above and up to two courses from the following list: 300- or 400-level EE courses (except for EE 320), ENGR42X, or SEM42X. No more than three 1-credit courses are allowed. Enrollment in graduate-level courses at the undergraduate level requires special approval. Examples of acceptable elective courses are:

- EE 341 - Electricity and Magnetism with Transmission Lines Credit Hours:4
- EE 347 - Digital Logic Credit Hours: 4
- EE 343 - Solid-State Electronic Devices Credit Hours: 3
- MECH 433 - HVAC Credit Hours: 3
- REE 331 - Fuel Cells Credit Hours: 3
- REE 333 - Batteries Credit Hours: 3
- REE 335 - Hydrogen Credit Hours: 3
- REE 337 - Materials for RE Applications Credit Hours:3
- REE 344 - Nuclear Energy Credit Hours: 3
- REE 345 - Wind Power Credit Hours: 3
- REE 346 - Biofuels and Biomass Credit Hours: 3
- REE 347 - Hydroelectric Power Credit Hours: 3
- REE 348 - Solar Thermal Energy Systems Credit Hours: 3
  
- REE 307 - Seminar Credit Hours: (Hours to be arranged each term.)<sup>b</sup>  
or
- REE 407 - Seminar Credit Hours: (Hours to be arranged each term.)<sup>b</sup>
  
- REE 425 - Electricity Markets and Modeling Credit Hours: 3
- REE 427 - Greenhouse Gas Accounting/Footprints Credit Hours:3
- REE 439 - Building Energy Auditing and Management Credit Hours: 3
- REE 451 - Geothermal Energy and Direct Use Applications Credit Hours:3
- REE 453 - Power System Analysis Credit Hours: 3
- REE 454 - Power System Protection and Control Credit Hours:3
- REE 455 - Energy-Efficient Building Design Credit Hours: 3
- REE 465 - Renewable Energy Transportation Systems Credit Hours: 3
- REE 469 - Grid Integration of Renewables Credit Hours:3

### Senior Sequences:

With approval, students can complete a graduate-level REE sequence to meet the senior sequence requirement. Enrollment in graduate-level courses at the undergraduate level requires special approval.

Students are required to complete a minimum of one sequence (all three courses) from the list below:

### Green Building:

- MECH 433 - HVAC Credit Hours: 3
- REE 439 - Building Energy Auditing and Management Credit Hours: 3
- REE 455 - Energy-Efficient Building Design Credit Hours: 3

### Power Systems:

- REE 453 - Power System Analysis Credit Hours: 3
- REE 454 - Power System Protection and Control Credit Hours: 3
- REE 469 - Grid Integration of Renewables Credit Hours: 3

### Geothermal:

- REE 431 - Geothermal Heat Pump Design Credit Hours: 3
- REE 451 - Geothermal Energy and Direct Use Applications Credit Hours: 3
- REE 471 - Geothermal Power Plant Design Credit Hours: 3

## Renewable Energy Engineering (Portland-Metro Campus), BS

### Degree Requirements

The Bachelor of Science in Renewable Energy Engineering follows a rigorous curriculum, requiring a minimum of 184/185 credit hours, which takes approximately four years to complete. To be eligible for graduation, students must maintain a 2.0 GPA. In addition, a final grade of "C" or better must be earned in all courses with MATH, CHE, PHY, EE, ENGR, MECH, and REE prefixes. Students must also earn a grade of "C" or better in all courses listed as prerequisites for these courses.

All courses listed in the curriculum map for the catalog year of graduation must be completed to be eligible for graduation. Any deviations from the courses listed in the curriculum map require approval from the academic advisor, the department chair, and the Registrar's office. Approvals are not official until entered in the official student records. When changes are made to the curriculum, students who entered the program under a previous catalog will work with their academic advisors to transition to meet the requirements of the current catalog.

**Note:** The Portland-Metro campus is a laptop-required campus with resources like laptop specifications, financial aid, and helpful instructions found at <http://www.oit.edu/portland-metro/college-costs/bring-your-own-device>.

### Curriculum – Portland-Metro Campus

Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- CHE 201 - General Chemistry I Credit Hours: 3<sup>a</sup>
- CHE 204 - General Chemistry I Laboratory Credit Hours: 1<sup>a</sup>
- REE 201 - Introduction to Renewable Energy Credit Hours: 3
- MATH 251 - Differential Calculus Credit Hours: 4
- WRI 121 - English Composition Credit Hours: 3

**Total: 14 Credit Hours**

##### Winter

- CHE 202 - General Chemistry II Credit Hours: 3<sup>a</sup>
- CHE 205 - General Chemistry II Laboratory Credit Hours: 1<sup>\*</sup>
- ECO 201 - Principles of Microeconomics Credit Hours: 3  
or
- ECO 202 - Principles of Macroeconomics Credit Hours: 3
- MATH 252 - Integral Calculus Credit Hours: 4
- WRI 122 - Argumentative Writing Credit Hours: 3

**Total: 14 Credit Hours**

##### Spring

- MATH 254 - Vector Calculus I Credit Hours: 4
- CHE 260 - Electrochemistry for Renewable Energy Applications Credit Hours: 4
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 227 - Technical Report Writing Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 17 Credit Hours**

#### Sophomore Year

##### Fall

- EE 221 - Circuits I Credit Hours: 4
- MATH 361 - Statistical Methods I Credit Hours: 4  
or
- MATH 465 - Mathematical Statistics Credit Hours: 4
- PHY 221 - General Physics with Calculus Credit Hours: 4
- Upper Division Writing Elective Credit Hours: 3<sup>c</sup>

**Total: 15 Credit Hours**

##### Winter

- EE 223 - Circuits II Credit Hours: 4
- ENGR 267 - Engineering Programming Credit Hours: 3
- MATH 341 - Linear Algebra I Credit Hours: 4
- PHY 222 - General Physics with Calculus Credit Hours: 4

**Total: 15 Credit Hours**

##### Spring

- EE 225 - Circuits III Credit Hours: 4
- MATH 321 - Applied Differential Equations I Credit Hours: 4
- PHY 223 - General Physics with Calculus Credit Hours: 4
- REE 243 - Electrical Power Credit Hours: 4

**Total: 16 Credit Hours**

#### Junior Year

##### Fall

- EE 321 - Electronics I Credit Hours: 5
- ENGR 211 - Engineering Mechanics: Statics Credit Hours: 4
- ENGR 355 - Thermodynamics Credit Hours: 3

- REE 337 - Materials for RE Applications Credit Hours: 3  
or
- EE 343 - Solid-State Electronic Devices Credit Hours: 3

- SPE 321 - Small Group and Team Communication Credit Hours: 3

**Total: 18 Credit Hours**

**Winter**

- HIST 356 - A History of Energy Credit Hours: 3  
or
- HIST 357 - History of the Electric Grid Credit Hours: 3
- MECH 318 - Fluid Mechanics I Credit Hours: 4  
or
- ENGR 318 - Engineering Mechanics: Fluids Credit Hours: 4
- REE 412 - Photovoltaic Systems Credit Hours: 3
- REE 463 - Energy Systems Instrumentation Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 16 Credit Hours****Spring**

- EE 461 - Control System Engineering Credit Hours: 4
- MECH 323 - Heat Transfer I Credit Hours: 3
- REE 253 - Electromechanical Energy Conversion Credit Hours: 3
- REE 42X - Global Energy Issues Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 16 Credit Hours****Senior Year****Fall**

- ENGR 465 - Capstone Project Credit Hours: 2
- REE 331 - Fuel Cells Credit Hours: 3
- REE 4XX - Senior Sequence I Credit Hours: 3
- REE XXX - Thermal Energy Elective Credit Hours: 3
- Renewable Energy Engineering Elective Credit Hours: 3

**Total: 14 Credit Hours****Winter**

- EE 419 - Power Electronics Credit Hours: 4
- ENGR 465 - Capstone Project Credit Hours: 2
- REE 4XX - Senior Sequence II Credit Hours: 3
- Renewable Energy Engineering Elective Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 15 Credit Hours****Spring**

- ENGR 465 - Capstone Project Credit Hours: 2
- REE 3XX - Hydro Energy Elective Credit Hours: 3
- REE 4XX - Senior Sequence III Credit Hours: 3
- REE 413 - Electric Power Conversion Systems Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 14 Credit Hours****Total for a B.S. in Renewable Energy Engineering: 184 Credit Hours**

<sup>a</sup> CHE 201/CHE 204 and CHE 202/CHE 205 can be substituted with CHE 221 and CHE 222 respectively

<sup>b</sup> Course may be repeated multiple times for credit with approval

<sup>c</sup> Choose from WRI 327, WRI 350, and WRI 410

**Renewable Energy Engineering Electives**

Students in the BSREE program are required to complete 15 credits of technical electives classes. At least 3 of these classes must be REE 300-level or above and up to two courses from the following list: 300- or 400-level EE courses (except for EE 320), ENGR42X, or SEM42X. No more than three 1-credit courses are allowed. Enrollment in graduate-level courses at the undergraduate level requires special approval. Examples of acceptable elective courses are:

- EE 341 - Electricity and Magnetism with Transmission Lines Credit Hours:4
- EE 347 - Digital Logic Credit Hours: 4
- EE 343 - Solid-State Electronic Devices Credit Hours: 3
- MECH 433 - HVAC Credit Hours: 3
- REE 331 - Fuel Cells Credit Hours: 3
- REE 333 - Batteries Credit Hours: 3
- REE 335 - Hydrogen Credit Hours: 3
- REE 337 - Materials for RE Applications Credit Hours:3
- REE 344 - Nuclear Energy Credit Hours: 3
- REE 345 - Wind Power Credit Hours: 3
- REE 346 - Biofuels and Biomass Credit Hours: 3
- REE 347 - Hydroelectric Power Credit Hours: 3
- REE 348 - Solar Thermal Energy Systems Credit Hours: 3
  
- REE 307 - Seminar Credit Hours: (Hours to be arranged each term.)<sup>b</sup>  
or
- REE 407 - Seminar Credit Hours: (Hours to be arranged each term.)<sup>b</sup>
  
- REE 425 - Electricity Markets and Modeling Credit Hours: 3
- REE 427 - Greenhouse Gas Accounting/Footprints Credit Hours:3
- REE 439 - Building Energy Auditing and Management Credit Hours: 3
- REE 451 - Geothermal Energy and Direct Use Applications Credit Hours:3
- REE 453 - Power System Analysis Credit Hours: 3
- REE 454 - Power System Protection and Control Credit Hours:3
- REE 455 - Energy-Efficient Building Design Credit Hours: 3
- REE 465 - Renewable Energy Transportation Systems Credit Hours: 3
- REE 469 - Grid Integration of Renewables Credit Hours:3

### Senior Sequences:

With approval, students can complete a graduate-level REE sequence to meet the senior sequence requirement. Enrollment in graduate-level courses at the undergraduate level requires special approval.

Students are required to complete a minimum of one sequence (all three courses) from the list below:

### Green Building:

- MECH 433 - HVAC Credit Hours: 3
- REE 439 - Building Energy Auditing and Management Credit Hours: 3
- REE 455 - Energy-Efficient Building Design Credit Hours: 3

### Power Systems:

- REE 453 - Power System Analysis Credit Hours: 3
- REE 454 - Power System Protection and Control Credit Hours: 3
- REE 469 - Grid Integration of Renewables Credit Hours: 3

### Geothermal:

- REE 431 - Geothermal Heat Pump Design Credit Hours: 3
- REE 451 - Geothermal Energy and Direct Use Applications Credit Hours: 3
- REE 471 - Geothermal Power Plant Design Credit Hours: 3

## Renewable Energy Engineering, MS

### Degree Requirements

The Master of Science in Renewable Energy Engineering is a rigorous curriculum that requires 54 credit hours and approximately two years to complete.

**Note:** The Portland-Metro campus is a laptop-required campus with resources like laptop specifications, financial aid, and helpful instructions found at <http://www.oit.edu/portland-metro/college-costs/bring-your-own-device>.

### Curriculum

Required courses and recommended terms during which they should be taken:

#### First Year

##### Fall

- REE 511 - Research Methods & Innovation I Credit Hours: 3
- REE 515 - Energy Engineering I Credit Hours: 3
- REE 5xx REE Specialization Sequence X: Course 1 of 3 Credit Hours: 3

**Total: 9 Credit Hours**

##### Winter

- REE 512 - Research Methods & Innovation II Credit Hours: 3
- REE 516 - Energy Engineering II Credit Hours: 3
- REE 5xx REE Specialization Sequence X: Course 2 of 3 Credit Hours: 3

**Total: 9 Credit Hours**

##### Spring

- REE 513 - Research Methods & Innovation III Credit Hours: 3
- REE 517 - Energy Engineering III Credit Hours: 3
- REE 5xx REE Specialization Sequence X: Course 3 of 3 Credit Hours: 3

**Total: 9 Credit Hours**

#### Second Year

##### Fall

- REE 599 Graduate Research or Project 3
- REE 5yy REE Specialization Sequence Y: Course 1 of 3 Credit Hours: 3
- REE 5zz REE Specialization Sequence Z: Course 1 of 3 Credit Hours: 3
- or
- Elective Credit Hours: 3

**Total: 9 Credit Hours**

##### Winter

- REE 599 Graduate Research or Project 3
- REE 5yy REE Specialization Sequence Y: Course 2 of 3 Credit Hours: 3
- REE 5zz REE Specialization Sequence Z: Course 2 of 3 Credit Hours: 3
- or
- Elective Credit Hours: 3

**Total: 9 Credit Hours**

#### Spring

- REE 599 Graduate Research or Project 3
- REE 5yy REE Specialization Sequence Y: Course 3 of 3 Credit Hours: 3
- REE 5zz REE Specialization Sequence Z: Course 3 of 3 Credit Hours: 3
- or
- Elective Credit Hours: 3

**Total: 9 Credit Hours**

**Total for a M.S. in Renewable Energy Engineering: 54 Credit Hours**

**Renewable Energy Specialization Sequences**

Students must complete three REE specialization sequences from the list below. Other sequences may be used to satisfy this requirement with advisor and department chair approval. One of the sequences may be replaced with three approved elective courses. Not all sequences are offered every year.

**Advanced Energy Storage**

- REE 591 - Hydrogen Production and Storage Credit Hours: 3
- REE 592 - Advanced Batteries Credit Hours: 3
- REE 593 - Advanced Fuel Cells Credit Hours: 3

**Biofuels and Biomass**

- REE 521 - Production of Biomass & Biofuels Credit Hours: 3
- REE 541 - Utilization Strategies of Bioenergy Credit Hours: 3
- REE 561 - Process Design and Economic Evaluation for Biomass Energy Systems Credit Hours: 3

**Electrical Power Systems**

- REE 529 - Power System Analysis Credit Hours: 3
- REE 549 - Power System Protection & Control Credit Hours: 3
- REE 569 - Grid Integration of Renewables Credit Hours: 3

**Electrochemical Systems**

- REE 523 - Hydrogen Production and Storage Credit Hours: 3
- REE 543 - Materials for Electrochemical Processes Credit Hours: 3
- REE 563 - Batteries Credit Hours: 3

**Energy Efficient Building Systems**

- REE 533 - Heating, Ventilation and Air Conditioning Credit Hours: 3
- REE 553 - Energy Systems Management and Auditing Credit Hours: 3
- REE 573 - Energy-Efficient Building Design Credit Hours: 3

**Energy Storage**

- REE 581 - Energy Storage Fundamentals Credit Hours: 3
- REE 582 - Introduction to Batteries Credit Hours: 3
- REE 583 - Introduction to Fuel Cells Credit Hours: 3

**Fuel Cell Systems**

- REE 535 - Fuel Cell Fundamentals Credit Hours: 3
- REE 555 - Stationary Fuel Cells Credit Hours: 3
- REE 575 - Transportation Fuel Cells Credit Hours: 3

**Geothermal Energy**

- REE 531 - Ground-Source Heat Pumps Credit Hours: 3
- REE 551 - Advanced Geothermal Energy Credit Hours: 3
- REE 571 - Geothermal Power Generation Credit Hours: 3

**Global Energy Issues**

- REE 537 - Sustainability of Energy Systems Credit Hours: 3
- REE 557 - Costing Renewable Energy Credit Hours: 3
- REE 577 - Renewable Energy Integration Credit Hours: 3

**Hydro Power Systems and Integration**

- REE 539 - Hydraulics & Fluid Mech. of Hydropower Credit Hours: 3
- REE 559 - Development of Hydropower Projects Credit Hours: 3
- REE 579 - Economic, Regulatory, and Environmental Aspects of Hydropower Credit Hours: 3

**Photovoltaic Systems and Processes**

- REE 525 - Solid-State Physics of Photovoltaic Materials Credit Hours: 3
- REE 545 - Applied Photovoltaics Credit Hours: 3
- REE 565 - Semiconductor Process Engineering Credit Hours: 3

### **Wind Power Systems and Integration**

- REE 527 - Wind Power Generators Credit Hours: 3
- REE 547 - Electric Power Conversion Credit Hours: 3
- REE 567 - Wind Energy Systems Integration Credit Hours: 3

## Systems Engineering and Technical Management, BS Dual Major

### Degree Requirements

To obtain a dual major in Systems Engineering & Technical Management, students must complete the courses required for the Bachelor of Science degree in their primary engineering major, as well as the dual major requirements listed below. Some of these courses may be used to meet requirements in the primary major also.

### SE Major Core Requirements

- SEM 421 - Systems Engineering Credit Hours: 4
- SEM 422 - Advanced Systems Engineering Credit Hours: 4
- SEM 425 - Advanced Engineering Management Credit Hours: 4

**Total: 12 Credit Hours**

### Mathematics Requirements

- MATH 321 - Applied Differential Equations I Credit Hours: 4
- MATH 341 - Linear Algebra I Credit Hours: 4
  
- MATH 465 - Mathematical Statistics Credit Hours: 4  
or
- MATH 362 - Statistical Methods II Credit Hours: 4

**Total: 12 Credit Hours**

### Systems Electives

[Select 9 credit hours from the following electives or advisor approved Elective courses]

- EE 430 - Linear Systems and Digital Signal Processing Credit Hours: 5
- EE 432 - Advanced Digital System Design Credit Hours: 4
- EE 401 - Communication Systems Credit Hours: 5
- CST 236 - Engineering for Quality Software Credit Hours: 4
- CST 316 - Junior Team-Based Project Development I Credit Hours: 4
- CST 324 - Database Systems and Design Credit Hours: 4
- MFG 447 - Lean Manufacturing Credit Hours: 3
- MIS 311 - Introduction to Systems Analysis Credit Hours: 3
- MIS 341 - Relational Database Design I Credit Hours: 4
- MIS 375 - Decision Support Systems Credit Hours: 3

**Total: 9 Credit Hours**

### Management Electives

[Select 9 credit hours from the following electives or advisor approved elective courses]

- ACC 203 - Principles of Managerial Accounting Credit Hours: 4
- BUS 223 - Marketing I Credit Hours: 3
- BUS 226 - Business Law Credit Hours: 3
- BUS 304 - Engineering Management Credit Hours: 3
- BUS 308 - Principles of International Business Credit Hours: 3
- MGT 321 - Operations Management I Credit Hours: 3
- MGT 345 - Engineering Economy Credit Hours: 3
- MGT 461 - Lean/Six Sigma Management I Credit Hours: 3
- MGT 462 - Lean/Six Sigma Management II Credit Hours: 3
- MGT 463 - Lean/Six Sigma Management III Credit Hours: 3

**Total: 9 Credit Hours**

**Total for a B.S. (Dual) in Systems Engineering and Technical Management: 42 Credit Hours**

**Note:** Many courses may be part of the primary major.

## Geomatics Department

Jack Walker, *Department Chair*

*Professors:* M. Walker, J. Ritter, J. Walker

*Associate Professor:* M. Marker

### Degree Offered

- Bachelor of Science in Geomatics with options in:
  - Surveying
  - Geographic Information Systems

### Minors Offered

- Geographic Information Systems
- Surveying

Geomatics is the modern surveying, engineering, geoscience, and IT-related discipline which employs an integrated approach to the measurement, mathematical modeling, and management of spatial data. Spatial data is obtained from a variety of sources including ground-based instruments, mobile mapping technologies, aerial imaging, hydrographic, and earth-orbiting satellite systems. Spatial data is used to create a detailed but understandable picture of the Earth's physical features. This data enables the design and development of land administration systems for sustainable planning and management of the built environment.

Geomatics provides the opportunity to work primarily outdoors, exclusively in an office, or in some combination of the two. Geomatics attracts individuals who enjoy working outdoors, as well as those who enjoy working indoors with computers, advanced technology, and high-tech instruments. Career employment is available in rural and urban areas.

The United Nations has adopted its first resolution, *A Global Geodetic Reference Frame for Sustainable Development*, recognizing the importance of a globally coordinated approach to geodesy – the geomatics discipline focused on accurately measuring the shape, rotation, and gravitational field of the earth.

Students within the Geomatics Program must choose between either an option in Surveying or Geographic Information Systems (GIS). Students may, with consent of their advisor, complete both options.

### Program Objectives

Graduates of the Oregon Tech Geomatics options will:

1. Acquire the ability to obtain professional licensure and/or certifications in the geospatial industry.
2. Advance in the geospatial industry during their career by becoming involved in local, state, national, or international professional organizations.
3. Obtain industry positions requiring increased responsibility.
4. Assume responsibility for lifelong learning in professional and personal development.
5. Demonstrate readiness for graduate education and/or advanced technical education.

### Student Preparation

It is recommended that students prepare for entrance into the program by emphasizing mathematics and science in high school. Two years of algebra and one year each of geometry, trigonometry and physics are desirable prerequisites.

### Bachelor of Science in Geomatics, Surveying Option

The department offers a nationally-recognized professional degree program that prepares students for employment within the geomatics profession and licensure as a Professional Land Surveyor (PLS). Students enjoy small classes taught by licensed professionals that emphasize fundamental theory and problem solving in a computer-intensive curriculum. Field laboratory experiences integrated throughout the curriculum provide practical skills, and offer extensive opportunities to prepare students to work in teams using state-of-the art technology. Upon completing the freshman year, students often have sufficient experience to obtain summer employment as a survey crew member.

Completion of the program qualifies graduates to take the Fundamentals of Surveying (FS) exam during the spring term of the senior year. The broad-based nature of the curriculum ensures that graduates will be prepared to fulfill both the traditional and contemporary roles of the profession.

### Cooperative Education

Geomatics students may, upon completion of the freshman year, apply for student career experience programs (Pathways) with the U.S. Bureau of Land Management, Bonneville Power Administration, U.S. Forest Service, or other appropriate federal employers.

Work experiences are paid and may be for three or six month periods. Students may earn two or four credits for work experience periods. A maximum of four credits may be applied toward the bachelor's degree.

Geomatics students are also eligible for the Civil Engineering Cooperative Program (CECOP), offering high-quality, paid industrial experience and related academic activities while students pursue their degree. The Oregon State Board of Examiners for Engineering and Land Surveying (OSBEELS) counts this internship time toward PLS licensure requirements.

### Scholarships

Approximately 40 scholarships are available to geomatics students each year through an endowed Geomatics Department Scholarship, CLSA, PLSO, LSAW, WESTFED, NSPS, and other organizations.

## Career Opportunities

The employment forecast for graduates in this field is exceptional. As an increasing number of licensed surveyors across the nation retire, a personnel shortage has been created within the geomatics profession. Graduates are prepared for a wide variety of career opportunities in the fields of surveying, engineering, construction, remote sensing, GIS, and land information management.

## Accreditation

The Geomatics Program (surveying option) is accredited by the Applied and Natural Science Accreditation Commission (ANSAC) of ABET, Inc., <http://www.abet.org>. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.

## Bachelor of Science in Geomatics, Geographic Information Systems (GIS) Option

Geographic Information Systems (GIS) is a systematic approach to the management, analysis, and display of geographic information. Management of such information requires application of advanced RDBMS techniques, the ability to see a project through to completion requires fundamental project management skills as well. The analysis of geodata sets is predicated on a firm understanding of spatial reference/coordinate systems, topological relationships, and statistical methods. Techniques for displaying geographic information take various forms such as maps, geographic datasets, and data models. Students graduating from this course of study will understand how to manipulate geographically based data in order to solve geospatial problems and how to use and create online resources to effectively communicate their results.

Students learn in a project-based environment to manage the flow of data through the project in terms of data acquisition, processing, analysis, and presentation. Within the GIS option, students are able to select individual areas of focus based on independent study and/or online courses.

## Career Opportunities

The list of opportunities for students in the field of GIS has been, and is continuing to show substantial growth. As our society becomes more data centered, the importance of understanding the spatial location of this data and its spatial relationship to other data is becoming increasingly apparent. Understanding such geospatial relationships is fundamental to areas such as health care, land records management, transportation modeling, environmental engineering/science, and urban planning, to name only a few. Local, state, and federal agencies are embracing GIS more each year as these agencies realize that GIS is the appropriate tool to solve long-standing geospatial problems. Private industry is also embracing GIS since it can be used to streamline delivery and/or response routes. Both private and public entities have also realized that GIS provides an excellent decision support framework structure.

## Geographic Information Systems Minor

The Geographic Information Systems (GIS) minor is open to all majors and is especially recommended for students majoring in Geomatics (Surveying Option), Environmental Sciences, Business/Management/ Information Systems, Computer Software Engineering, Renewable Energy Engineering and Health Care. The minor provides the essential kernel of knowledge and skill necessary to approach geospatial issues pertaining to these disciplines. An advisor in the Geomatics Department must approve any substitution of courses from those listed. Preparation for this course of study entails a functional level of computer literacy that can be evaluated in consultation with an advisor. Students must also have successfully completed MATH 111 prior to enrolling in upper-division classes.

The Minor in Geographic Information Systems (GIS) acknowledges the achievement of 22 credits taken from the following GIS course listing.

## Requirements of Minor

- GIS 103 - The Digital Earth Credit Hours: 3
- GIS 134 - Geographic Information Systems Credit Hours: 3

**Elective Courses: 16 Credits Required**

- GIS 306 - Geospatial Raster Analysis Credit Hours: 4
- GIS 316 - Geospatial Vector Analysis I Credit Hours: 4
- GIS 332 - Customizing the GIS Environment I Credit Hours: 4
- GIS 407 - Seminar Credit Hours: (Hours to be arranged each term.)
- GIS 426 - Geospatial Vector Analysis II Credit Hours: 4
- GIS 432 - Customizing the GIS Environment II Credit Hours: 4
- GIS 446 - GIS Database Development Credit Hours: 4

## Geomatics, Geographic Information Systems (GIS) Option, BS

### Degree Requirements

A minimum of 180 term hours must be completed for the Surveying option, of which 80 term hours must be in the GIS and geomatics area. A minimum of 181 term hours must be completed for the GIS option, of which 74 term hours must be in the GIS and geomatics area.

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- GIS 103 - The Digital Earth Credit Hours: 3
- GME 161 - Plane Surveying I Credit Hours: 4
- MATH 111 - College Algebra Credit Hours: 4
- WRI 121 - English Composition Credit Hours: 3

**Total: 14 Credit Hours**

##### Winter

- CE 203 - Engineering Graphics Credit Hours: 3
- GIS 134 - Geographic Information Systems Credit Hours: 3
- GME 175 - Computations and Platting Credit Hours: 3
- MATH 112 - Trigonometry Credit Hours: 4
- Social Science Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Spring

- GIS 205 - GIS Data Integration Credit Hours: 2
- GME 162 - Plane Surveying II Credit Hours: 4
- MATH 251 - Differential Calculus Credit Hours: 4
- MIS 275 - Introduction to Relational Databases Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3

**Total: 16 Credit Hours**

#### Sophomore Year

##### Fall

- GIS 306 - Geospatial Raster Analysis Credit Hours: 4
- GME 241 - Legal Aspects of Land Surveying I Credit Hours: 3
- MATH 252 - Integral Calculus Credit Hours: 4
- MIS 118 - Introduction to Programming in C# Credit Hours: 4

**Total: 15 Credit Hours**

##### Winter

- GIS 316 - Geospatial Vector Analysis I Credit Hours: 4
- GME 242 - Land Descriptions and Cadastre Credit Hours: 2
- MATH 254 - Vector Calculus I Credit Hours: 4
- MIS 218 - Database Programming Credit Hours: 4

**Total: 14 Credit Hours**

##### Spring

- BUS 226 - Business Law Credit Hours: 3
- MATH 361 - Statistical Methods I Credit Hours: 4
- MGT 345 - Engineering Economy Credit Hours: 3
- SPE 111 - Public Speaking Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 16 Credit Hours**

#### Junior Year

##### Fall

- GIS 332 - Customizing the GIS Environment I Credit Hours: 4
- SPE 321 - Small Group and Team Communication Credit Hours: 3
- PHY 221 - General Physics with Calculus Credit Hours: 4
- WRI 227 - Technical Report Writing Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 17 Credit Hours**

##### Winter

- GIS 432 - Customizing the GIS Environment II Credit Hours: 4
- Math Elective Credit Hours: 3<sup>a</sup>
- MIS 341 - Relational Database Design I Credit Hours: 4
- PHY 222 - General Physics with Calculus Credit Hours: 4

**Total: 15 Credit Hours**

##### Spring

- GIS 426 - Geospatial Vector Analysis II Credit Hours: 4
- MIS 442 - Advanced Web Application Programming Credit Hours: 4
- Humanities Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 14 Credit Hours**

#### Senior Year

##### Fall

- BUS 304 - Engineering Management Credit Hours: 3
- GIS 446 - GIS Database Development Credit Hours: 4
- GME 425 - Remote Sensing Credit Hours: 4
- GME 451 - Geodesy Credit Hours: 4

**Total: 15 Credit Hours**

##### Winter

- GME 452 - Map Projections Credit Hours: 3
- GME 455 - GNSS Surveying for GIS Credit Hours: 4
- Humanities Elective Credit Hours: 3
- Science Elective Credit Hours: 4

**Total: 14 Credit Hours**

##### Spring

- GME 468 - Geomatics Practicum Credit Hours: 2
- WRI 327 - Advanced Technical Writing Credit Hours: 3
- Business Elective Credit Hours: 3 (upper-division)<sup>b</sup>
- Humanities Elective Credit Hours: 3
- Science Elective Credit Hours: 4

**Total: 15 Credit Hours**

**Note:** Humanities and Social Science Electives must be approved by the department.

**Total for a B.S. in Geomatics, Geographic Information Systems Option: 181 Credit Hours**

<sup>a</sup> Students must demonstrate advancement in educational content, courses must not be lower level than courses in the required curriculum. MATH 341 or MATH 362 recommended

<sup>b</sup> BUS 356 recommended

## Geomatics, Surveying Option, BS

### Degree Requirements

A minimum of 180 term hours must be completed for the Surveying option, of which 80 term hours must be in the GIS and geomatics area. A minimum of 180 term hours must be completed for the GIS option, of which 74 term hours must be in the GIS and geomatics area.

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- GIS 103 - The Digital Earth Credit Hours: 3
- GME 161 - Plane Surveying I Credit Hours: 4
- MATH 112 - Trigonometry Credit Hours: 4
- WRI 121 - English Composition Credit Hours: 3

**Total: 14 Credit Hours**

##### Winter

- CE 203 - Engineering Graphics Credit Hours: 3
- GIS 134 - Geographic Information Systems Credit Hours: 3
- GME 175 - Computations and Platting Credit Hours: 3
- MATH 251 - Differential Calculus Credit Hours: 4
- WRI 122 - Argumentative Writing Credit Hours: 3

**Total: 16 Credit Hours**

##### Spring

- GIS 205 - GIS Data Integration Credit Hours: 2
- GME 162 - Plane Surveying II Credit Hours: 4
- MATH 252 - Integral Calculus Credit Hours: 4
- SPE 111 - Public Speaking Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 16 Credit Hours**

#### Sophomore Year

##### Fall

- GME 163 - Route Surveying Credit Hours: 4
- GME 241 - Legal Aspects of Land Surveying I Credit Hours: 3
- MATH 254 - Vector Calculus I Credit Hours: 4
- PHY 221 - General Physics with Calculus Credit Hours: 4

**Total: 15 Credit Hours**

##### Winter

- GME 242 - Land Descriptions and Cadastre Credit Hours: 2
- GME 264 - Digital Design for Surveying Credit Hours: 2
- PHY 222 - General Physics with Calculus Credit Hours: 4
- WRI 227 - Technical Report Writing Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 14 Credit Hours**

#### Spring

- GME 351 - Construction and Engineering Surveying Credit Hours: 3
- GME 372 - Subdivision Planning and Platting Credit Hours: 3
- PHY 223 - General Physics with Calculus Credit Hours: 4
- Humanities Elective Credit Hours: 3

**Total: 13 Credit Hours**

#### Junior Year

##### Fall

- GIS 306 - Geospatial Raster Analysis Credit Hours: 4
- GME 343 - Boundary Surveys Credit Hours: 4
- MATH 361 - Statistical Methods I Credit Hours: 4
- MIS 113 - Introduction to Database Systems Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 18 Credit Hours**

##### Winter

- GIS 316 - Geospatial Vector Analysis I Credit Hours: 4
- GME 444 - Adjustment by Least Squares Credit Hours: 4
- GME 466 - Legal Aspects of Surveying II Credit Hours: 3
- ENV/GIS/GME Elective Credit Hours: 4
- Math Elective Credit Hours: 3<sup>a</sup>

**Total: 18 Credit Hours**

#### Spring

- BUS 226 - Business Law Credit Hours: 3
- MGT 345 - Engineering Economy Credit Hours: 3
- SPE 321 - Small Group and Team Communication Credit Hours: 3
- WRI 327 - Advanced Technical Writing Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 15 Credit Hours**

#### Senior Year

##### Fall

- BUS 304 - Engineering Management Credit Hours: 3
- GME 425 - Remote Sensing Credit Hours: 4
- GME 451 - Geodesy Credit Hours: 4
- MIS 118 - Introduction to Programming in C# Credit Hours: 4

**Total: 15 Credit Hours**

**Winter**

- GME 452 - Map Projections Credit Hours: 3
- GME 454 - GNSS Surveying Credit Hours: 4
- Science Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 14 Credit Hours****Spring**

- GME 468 - Geomatics Practicum Credit Hours: 2
- Business Elective Credit Hours: 3
- Humanities Elective Credit Hours: 3
- Science Elective Credit Hours: 4<sup>b</sup>

**Total: 12 Credit Hours**

**Note:** Humanities and Social Science Electives must be approved by the department.

**Total for a B.S. in Geomatics, Surveying Option: 180 Credit Hours**

<sup>a</sup> Students must demonstrate advancement in educational content, courses must not be lower level than courses in the required curriculum. MATH 341 or MATH 362 recommended

<sup>b</sup> GEOL 201 recommended

**Surveying Minor**

The Surveying minor is open to all engineering majors, and is especially recommended for students majoring in Civil Engineering and Geomatics (GIS option). The minor provides the essential knowledge and skills which meet OSBEELS requirements (OAR 820-010-0226) allowing engineering students to sit for the Fundamentals of Surveying (FS) examination, and pursue licensure as a Professional Surveyor (PS). An advisor in the Geomatics Department must approve substitution of courses from those listed.

The Minor in Surveying acknowledges the achievement of 27 credits taken from the following geomatics course listing.

**Requirements of Minor**

- GIS 134 - Geographic Information Systems Credit Hours: 3<sup>d</sup>
- GME 162 - Plane Surveying II Credit Hours: 4<sup>c,d</sup>
- GME 241 - Legal Aspects of Land Surveying I Credit Hours: 3<sup>c</sup>
- GME 242 - Land Descriptions and Cadastre Credit Hours: 2<sup>c</sup>
- GME 264 - Digital Design for Surveying Credit Hours: 2<sup>a</sup>
- GME 343 - Boundary Surveys Credit Hours: 4

**Elective Courses: 8 Credits Required**

- GME 163 - Route Surveying Credit Hours: 4
- GME 351 - Construction and Engineering Surveying Credit Hours: 3<sup>b</sup>
- GME 372 - Subdivision Planning and Platting Credit Hours: 3
- GME 425 - Remote Sensing Credit Hours: 4<sup>c</sup>
- GME 444 - Adjustment by Least Squares Credit Hours: 4
- GME 451 - Geodesy Credit Hours: 4<sup>c</sup>
- GME 452 - Map Projections Credit Hours: 3<sup>c</sup>
- GME 455 - GNSS Surveying for GIS Credit Hours: 4<sup>c</sup>
- GME 466 - Legal Aspects of Surveying II Credit Hours: 3

<sup>a</sup> CIV 415 will substitute for GME 264

<sup>b</sup> CE 351 will substitute for the GME 163 prerequisite

<sup>c</sup> Required course for GIS majors

<sup>d</sup> MATH 221 will substitute for the GME 175 prerequisite

## Management Department

Hallie Neupert, *Department Chair, Program Director, Health Care Management,*

Richard Bailey, *Curriculum Coordinator, Accounting*

Sharon Beaudry, *Program Director and Curriculum Coordinator, Management*

Jeff Dickson, *Program Director and Curriculum Coordinator, Health Informatics and Information Technology*

Carmen Morgan, *Program Director, Accounting,*

Pat Schaeffer, *Program Director and Curriculum Coordinator, Operations Management*

Kris Rosenberg, *Program Director and Curriculum Coordinator, Cybersecurity*

Maureen Sevigny, *Program Director, Management Distance Education, Program Director and Curriculum Coordinator, BAS Technology and Management*

Kristy Weidman, *Program Director and Curriculum Coordinator, Marketing*

*Professors:* R. Bailey, S. Bailey, H. Neupert, M. Sevigny

*Associate Professors:* J. Dickson, G. Kirby, C. Morgan, M. Pierce, K. Rosenberg, P. Schaeffer

*Assistant Professors:* S. Beaudry, D. Carrere, D. DaSaro, L. Stewart, K. Weidman

### Degrees Offered

- Bachelor of Science in Business, with options in:
  - Accounting
  - Management
  - Marketing
- Bachelor of Science in Health Care Management, with options in:
  - Administration
  - Clinical
  - Radiologic Science Management
- Bachelor of Science in Health Informatics
- Bachelor of Science in Information Technology
- Bachelor of Science in Operations Management
- Bachelor of Applied Science in Technology and Management

### Minors Offered

- Business
- Health Informatics
- International Business
- Information Technology

### Specializations Offered

- Accounting
- Management
- Marketing
- Travel and Tourism

### Certificate Offered

- Accounting (post baccalaureate)

### Emphases Offered

- Six Sigma Green Belt Certification
- Renewable Energy Management

The Management Department's tech-infused degrees empower graduates through innovative, hands-on, and multi-disciplinary learning experiences, and prepares students to take their place as leaders and managers in contemporary public and private organizations. Faculty members have been selected for their managerial experience and expertise in a diverse array of production and service industries.

Coursework in the Management programs builds upon a fundamental core of courses including management, marketing, accounting, finance, information technology, economics, ethics, globalization, business law, and business presentations. These courses, along with program-specific courses, prepare students for their senior year which includes a senior experience and a capstone course. The senior experience provides management students with an opportunity to integrate and synthesize their educational experience within the context of a "real-world" business problem or project.

As a result of this unique combination of resources and coursework, the Management Degree Programs remain vital and up-to-date, providing students with both the technical tools of management and the interpersonal skills that employers most desire. Equally important, each graduate will be poised to positively contribute to society as well as to today's culturally diverse, global work place.

## Department Outcomes

Upon graduating, Management Department graduates should be able to:

1. Communicate the major concepts in the functional areas of accounting, marketing, finance, information technology, and management.
2. Describe the legal, social, ethical, and, economic environments of business in a global context.
3. Solve organization problems, individually and/or in teams, using quantitative, qualitative and technology-enhanced approaches.
4. Demonstrate professional communication and behavior.
5. Apply knowledge of business concepts and functions in an integrated manner.

## Degree Completion and Co-enrollment at Community Colleges

The Management Department, in partnership with many Oregon community colleges, offers joint enrollment, transfer credit (articulation) agreements and course sequences so that students may complete a degree with coursework taken from multiple institutions. See the Oregon Tech Registrar Office's website, or a management advisor for additional information.

## Oregon Tech Online

Many of the management degrees and core management courses are available online to facilitate the needs of degree completion students. Online courses are particularly appropriate for students capable of self-directed educational activities. Online degrees and courses are offered utilizing Internet delivery and collaborative learning. Degrees available online are: BS in Health Care Management, Clinical Option, Radiologic Sciences Management Option; BS in Operations Management; BS in Health Informatics; BS in Information Technology; BAS in Technology and Management.

## Required Student Equipment

Successful completion of these degrees requires intensive, hands-on use of computers.

Therefore, all students are required to own their own computer. Financial aid may be available to help defray the cost of this equipment. Please consult the Financial Aid Office at Oregon Tech.

**Note:** The Portland-Metro campus is a laptop-required campus with resources like laptop specifications, financial aid, and helpful instructions found at <http://www.oit.edu/portland-metro/college-costs/bring-your-own-device>.

## Accreditation

Oregon Tech has received specialized accreditation for its business programs through the International Accreditation Council for Business Education (IACBE).

## Six Sigma Green Belt Emphasis

The Management Department offers students the opportunity to earn a Six Sigma Green Belt Certificate. The Green Belt Certificate is an emphasis under the BS in Business, Management and Marketing options, the BS in Health Care Management, Administration option, and the BS in Operations Management. In addition to the fundamental management curriculum, the emphasis requires the completion of a Lean/Six Sigma project. Those attaining the emphasis will be well-positioned to work in companies that deploy Lean Six Sigma.

Additionally, employees of companies that deploy Lean Six Sigma may complete the course work and project to obtain their certificate.

Students completing the Six Sigma Green Belt Emphasis must complete the following courses and their prerequisites. Prerequisites may be waived for industry students depending on their individual backgrounds and abilities.

## Courses

- BUS 457 - Business Research Methods II Credit Hours: 3
- BUS 496 - Senior Project Credit Hours: 3
- BUS 497 - Senior Project Credit Hours: 3
- MGT 335 - Project Management Credit Hours: 3
- MGT 461 - Lean/Six Sigma Management I Credit Hours: 3
- MGT 462 - Lean/Six Sigma Management II Credit Hours: 3
- MGT 463 - Lean/Six Sigma Management III Credit Hours: 3

**Note:** It should be noted that for OM majors, all of these courses are currently in the curriculum map. No additional coursework is required. With approval, the student's senior project may also be considered for the Six Sigma Green Belt Certificate.

## Renewable Energy Management Emphasis

The Management Department offers students the opportunity to complete a Renewable Energy Management emphasis under the BS in Business, Management option or the BS in Operations Management. In addition to the fundamental management curriculum, the emphasis requires additional coursework in chemistry, management information systems, humanities, history, and economics. Those attaining the emphasis will be prepared to successfully integrate skills in the social, environmental, economic, business and management aspects of energy management.

### Requirement of Emphasis

- CHE 201 - General Chemistry I Credit Hours: 3
- CHE 204 - General Chemistry I Laboratory Credit Hours: 1  
or
- PHY 201 - General Physics Credit Hours: 4
  
- ECO 357 - Energy Economics and Policy Credit Hours: 3
- HIST 356 - A History of Energy Credit Hours: 3
- HUM 125 - Introduction to Technology, Society and Values Credit Hours: 3
- MATH 112 - Trigonometry Credit Hours: 4
- MIS 115 - Visual BASIC Programming Credit Hours: 4
- MGT 212 - Fundamentals of Renewable Energy Management Credit Hours: 3
- REE 201 - Introduction to Renewable Energy Credit Hours: 3

## Business

### Degree Offered

- Bachelor of Science in Business, with options in:
  - Accounting
  - Management
  - Marketing

The BS in Business prepares leaders to manage organizations in the high technology environments of the 21st century. Students develop their abilities to contribute to an organization's performance through hands-on experience built on a solid theoretical base. The Business curriculum skillfully integrates technology-enhanced coursework with a solid core of business courses. Students will also be prepared for graduate level education, such as the Master's in Business Administration (MBA) degree.

The BS in Business develops graduates with relevant skills preparing students for entry into careers in business, government, public, or social service organizations.

Job titles include staff accountant, cost analyst, business unit manager, supervisor, marketing specialist, and sales manager.  
Student Preparation and Admissions

Students must meet Oregon Tech general admissions requirements. Transfer students must arrange for official transcripts from each college and university attended to be sent to Oregon Tech.

## Health Care Management

### Degree Offered

- Bachelor of Science in Health Care Management with options in:
  - Administration
  - Clinical
  - Radiologic Sciences Management

The BS in Health Care Management prepares graduates for a variety of career options in the rapidly growing health care industry, where health service managers are in high demand. Students will learn the knowledge and skills necessary to become effective managers of health systems and operation and will be prepared to assume managerial positions in hospitals, medical clinics, and medical practices. Health care managers plan, direct, and coordinate medical and health services; and might manage an entire facility, a specific clinical area or department, or a medical practice for a group of providers. Oregon Tech's Health Care Management degree includes three options to meet the student's specific needs and interests.

## Health Informatics

### Degree Offered

- Bachelor of Science in Health Informatics

### Objectives

Health Informatics is a rapidly developing scientific field that utilizes computer technology to improve the quality and safety of patient care. This program incorporates the sub disciplines of clinical and computational informatics; emphasizing the integration of computer science and the impact of clinical outcomes. Internship opportunities are available during the senior year. Students will complete a capstone course and a senior project.

The BS in Health Informatics is offered in Klamath Falls, Portland-Metro and through Oregon Tech Online.

### Career Opportunities

Health Informatics professionals work as quality managers, business intelligence and epic analysts, and in health care information technology positions. These professionals are called upon to design and use emerging information technologies with the goal of helping providers and patients access and utilize information to provide improved health care.

Health Informatics professionals provide support in clinical decision making, data architecture, application interfacing, clinical analytics, data analysis, systems analysis and project management.

### Student Preparation and Admissions

Students must meet Oregon Tech general admissions requirements. Transfer students must arrange for official transcripts from each college and university attended to be sent to Oregon Tech.

**Note:** The Portland-Metro campus is a laptop-required campus with resources like laptop specifications, financial aid, and helpful instructions found at <http://www.oit.edu/portland-metro/college-costs/bring-your-own-device>.

## Information Technology

### Degree Offered

- Bachelor of Science in Information Technology

### Objectives

Information Technology powers modern business. This field is interdisciplinary, with applications to all aspects of the economy. Students solve real-world business problems and gain critical skills and hands-on experience in networking, server administration, programming, databases, information security, and systems analysis. Graduating students are prepared to bridge the technology and management disciplines in their organizations. Internship opportunities are available during the senior year. Students will complete a capstone course and a senior project.

The BS in Information Technology is offered in Klamath Falls, Portland-Metro, and through Oregon Tech Online.

### Career Opportunities

The BS in Information Technology prepares students for a wide range of professions including accounting information systems, database administration, systems analyst, business systems consultant, network analyst, software applications specialist, PC support technician, technical writer, Web administrator and vendor representative for either hardware- or software-based firms. With both technical skills and business understanding, Information Technology graduates are uniquely prepared for faster advancement than many of their contemporaries.

### Student Preparation and Admissions

Students must meet Oregon Tech general admissions requirements. Transfer students must arrange for official transcripts from each college and university attended to be sent to Oregon Tech.

**Note:** The Portland-Metro campus is a laptop-required campus with resources like laptop specifications, financial aid, and helpful instructions found at <http://www.oit.edu/portland-metro/college-costs/bring-your-own-device>.

# Operations Management

## Degree Offered

- Bachelor of Science in Operations Management

## Objectives

Operations Managers coordinate equipment, materials, human capital and information across businesses to profitably meet or exceed customer expectations. Students in Operations Management successfully blend the art of management with applied science through creativity, people skills, rational analysis and application of technology.

Operations Management students develop mastery of concepts, tools, and skills in management sciences and specialties tailored to the industries of interest to the student. Particular emphasis is directed toward development of skills in problem solving, project management, communication, and managing effectively in team-based work environments. Students are also prepared for graduate level education, such as the MBA (Master's in Business Administration) degree. Internship opportunities are available during the senior year. Students will complete a capstone course and a senior project.

The BS in Operations Management is offered in Klamath Falls, Portland-Metro and through Oregon Tech online.

## Career Opportunities

The BS in Operations Management prepares students for leadership positions within a wide variety of product and service industries. Initial job titles include: production planner, inventory control analyst, industrial engineer, production supervisor, and quality control manager. Typical departments in which graduates find themselves working are manufacturing, manufacturing engineering, industrial engineering, production control, finance, and quality assurance.

Upon graduation, students should be prepared to address critical issues related to productivity management in a global competitive economy and play leadership roles in the design and implementation of quality control and management programs. They will have mastered a wide array of microcomputer technology and software applications, giving them a competitive edge in the job market.

## Student Preparation and Admissions

Students must meet Oregon Tech general admissions requirements. Transfer students must arrange for official transcripts from each college and university attended to be sent to Oregon Tech.

**Note:** The Portland-Metro campus is a laptop-required campus with resources like laptop specifications, financial aid, and helpful instructions found at <http://www.oit.edu/portland-metro/college-costs/bring-your-own-device>.

# Technology and Management

## Degree Offered

- Bachelor of Applied Science in Technology and Management

## Objectives

The Bachelor of Applied Science (BAS) in Technology and Management provides a path to a bachelor's degree for those students who have completed a technical Associate of Applied Science (AAS) or Associate of Science (AS) degree from an accredited institution recognized by the Council for Higher Education (CHEA) and are seeking career advancement into management or in their technical career fields. The BAS builds on a core of 60 credits of career and technical education (CTE) courses taken as part of the AAS or AS degree, adding 65 credits of business, management, and information technology courses and 55 credits of broad-based general education courses to enable the BAS graduate to advance in the workplace or continue on to graduate school. The management core includes a three-term capstone senior project to enable the student to demonstrate successful integration of technical and managerial coursework.

The BAS in Technology and Management is offered in Klamath Falls, Portland-Metro, and through Oregon Tech online.

## Graduation Requirements

The BAS in Technology and Management requires 180 credits including 60 upper-division credits and up to 60 lower-division career and technical education (CTE) credits transferred from an AAS or AS degree. In addition, the BAS includes 55 general education credits including 18 credits in communication, 12 credits of social science, 9 credits in humanities, and 16 credits of math and science including 4 credits of mathematics with a prerequisite of intermediate algebra or higher and 4 credits of laboratory science.

## Business, Accounting Option, BS

The accounting option is designed to prepare students for careers in public or private accounting. Students become familiar with computerized accounting applications and skilled in the principles of tax, financial, and cost accounting. Upon graduation students selecting this option should have sufficient knowledge to sit for the Certified Public Accountant (CPA) and the Certified Management Accountant (CMA) exams.

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- MATH 111 - College Algebra Credit Hours: 4
- PSY 201 - Psychology Credit Hours: 3
- WRI 121 - English Composition Credit Hours: 3
- Humanities Elective Credit Hours: 3
- Laboratory Science Elective Credit Hours: 4

**Total: 17 Credit Hours**

##### Winter

- BUS 215 - Principles of Management Credit Hours: 3
- ECO 201 - Principles of Microeconomics Credit Hours: 3
- MIS 102 - Spreadsheet Lab Credit Hours: 1
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3
- Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Spring

- ECO 202 - Principles of Macroeconomics Credit Hours: 3
- MIS 275 - Introduction to Relational Databases Credit Hours: 3
- SPE 321 - Small Group and Team Communication Credit Hours: 3
- Elective Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 15 Credit Hours**

#### Sophomore Year

##### Fall

- ACC 201 - Principles of Accounting I Credit Hours: 4
- MATH 361 - Statistical Methods I Credit Hours: 4
- WRI 227 - Technical Report Writing Credit Hours: 3
- Elective Credit Hours: 3

**Total: 14 Credit Hours**

##### Winter

- ACC 202 - Principles of Accounting II Credit Hours: 4
- BUS 223 - Marketing I Credit Hours: 3
- MATH 371 - Finite Mathematics and Calculus I Credit Hours: 4

- PHIL 331 - Ethics in the Professions Credit Hours: 3
- or

- PHIL 342 - Business Ethics Credit Hours: 3

**Total: 14 Credit Hours**

##### Spring

- ACC 203 - Principles of Managerial Accounting Credit Hours: 4
- ACC 205 - Computerized Accounting Credit Hours: 3
- BUS 226 - Business Law Credit Hours: 3
- MGT 335 - Project Management Credit Hours: 3
- MIS 375 - Decision Support Systems Credit Hours: 3

**Total: 16 Credit Hours**

#### Junior Year

##### Fall

- ACC 331 - Intermediate Accounting I Credit Hours: 4
- BUS 308 - Principles of International Business Credit Hours: 3
- BUS 356 - Business Presentations Credit Hours: 4
- MIS 311 - Introduction to Systems Analysis Credit Hours: 3

**Total: 14 Credit Hours**

##### Winter

- ACC 320 - Cost Accounting I Credit Hours: 4
- ACC 325 - Finance Credit Hours: 4
- ACC 332 - Intermediate Accounting II Credit Hours: 4
- MIS 312 - Systems Analysis I Credit Hours: 4

**Total: 16 Credit Hours**

##### Spring

- ACC 321 - Cost Accounting II Credit Hours: 4
- ACC 333 - Intermediate Accounting III Credit Hours: 4
- ACC 405 - Accounting Information Systems Credit Hours: 4
- WRI 327 - Advanced Technical Writing Credit Hours: 3

**Total: 15 Credit Hours**

#### Senior Year

##### Fall

- ACC 411 - Income Tax Procedures Credit Hours: 4
- ACC 435 - Auditing Credit Hours: 4
- ACC 496 - Senior Project Credit Hours: 3
- MGT 321 - Operations Management I Credit Hours: 3

**Total: 14 Credit Hours**

##### Winter

- ACC 412 - Corporate Taxation Credit Hours: 4
- ACC 431 - Advanced Accounting I Credit Hours: 4
- ACC 497 - Senior Project Credit Hours: 3
- BUS 349 - Human Resource Management I Credit Hours: 3
- Elective Credit Hours: 3

**Total: 17 Credit Hours**

**Spring**

- ACC 432 - Advanced Accounting II Credit Hours: 4
- ACC 465 - Case Studies in Accounting Credit Hours: 4  
or
- BUS 478 - Strategic Management Credit Hours: 3
- PSY 347 - Organizational Behavior Credit Hours: 3
- Elective Credit Hours: 3

**Total: 13/14 Credit Hours**

**Total for a B.S. in Business, Accounting Option: 181/182 Credit Hours**

## Business, Management Option, BS

Students selecting the management option will equip themselves to be managers with complete understanding of all aspects of a business. This option provides students with an array of paths to build just the right business tool box to meet their professional goals including business analytics, innovation and entrepreneurship or a customized path.

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- BUS 215 - Principles of Management Credit Hours: 3
- MATH 111 - College Algebra Credit Hours: 4
- PSY 201 - Psychology Credit Hours: 3
- WRI 121 - English Composition Credit Hours: 3
- Laboratory Science Elective Credit Hours: 4

**Total: 17 Credit Hours**

##### Winter

- BUS 223 - Marketing I Credit Hours: 3
- ECO 201 - Principles of Microeconomics Credit Hours: 3
- MIS 102 - Spreadsheet Lab Credit Hours: 1
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3
- Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Spring

- ECO 202 - Principles of Macroeconomics Credit Hours: 3
- MIS 206 - Introduction to Management Information Systems Credit Hours: 3
- SPE 321 - Small Group and Team Communication Credit Hours: 3
- WRI 227 - Technical Report Writing Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 15 Credit Hours**

#### Sophomore Year

##### Fall

- ACC 201 - Principles of Accounting I Credit Hours: 4
- MATH 361 - Statistical Methods I Credit Hours: 4

- MIS 113 - Introduction to Database Systems Credit Hours: 3  
or
- MIS 275 - Introduction to Relational Databases Credit Hours: 3

- Humanities Elective Credit Hours: 3

**Total: 14 Credit Hours**

##### Winter

- BUS 226 - Business Law Credit Hours: 3
- BUS 349 - Human Resource Management I Credit Hours: 3
- MATH 371 - Finite Mathematics and Calculus I Credit Hours: 4

- PHIL 331 - Ethics in the Professions Credit Hours: 3  
or
- PHIL 342 - Business Ethics Credit Hours: 3

- Program Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Spring

- ACC 203 - Principles of Managerial Accounting Credit Hours: 4
- BUS 456 - Business Research Methods Credit Hours: 3
- MIS 375 - Decision Support Systems Credit Hours: 3
- Elective Credit Hours: 3
- Program Elective Credit Hours: 3

**Total: 16 Credit Hours**

#### Junior Year

##### Fall

- BUS 467 - Service Management Credit Hours: 3
- GIS 207 - Seminar Credit Hours: (Hours to be arranged each term.)
- MGT 321 - Operations Management I Credit Hours: 3
- MGT 421 - Quality Management Credit Hours: 3
- Program Elective Credit Hours: 3

**Total: 13 Credit Hours**

##### Winter

- ACC 325 - Finance Credit Hours: 4
- BUS 307 - Seminar Credit Hours: (Hours to be arranged each term.)
- BUS 356 - Business Presentations Credit Hours: 4
- MIS 334 - Business Analytics Credit Hours: 4
- Communication Elective Credit Hours: 3

**Total: 18 Credit Hours**

##### Spring

- BUS 390 - Applied Management Internship Credit Hours: 3  
or
- BUS Elective Credit Hours: 3

- MGT 335 - Project Management Credit Hours: 3
- Elective Credit Hours: 3
- Elective Credit Hours: 3
- Program Elective Credit Hours: 3

**Total: 15 Credit Hours**

**Senior Year****Fall**

- BUS 308 - Principles of International Business Credit Hours: 3
- BUS 441 - Leadership I Credit Hours: 3
- BUS 457 - Business Research Methods II Credit Hours: 3
- BUS 495 - Senior Project Proposal Credit Hours: 3
- MGT 461 - Lean/Six Sigma Management I Credit Hours: 3

**Total: 15 Credit Hours****Winter**

- ANTH 452 - Globalization Credit Hours: 3
- BUS 496 - Senior Project Credit Hours: 3
- PSY 347 - Organizational Behavior Credit Hours: 3
- Elective Credit Hours: 3
- Program Elective Credit Hours: 3

**Total: 15 Credit Hours****Spring**

- BUS 478 - Strategic Management Credit Hours: 3
- BUS 497 - Senior Project Credit Hours: 3
- Elective Credit Hours: 3
- Program Elective Credit Hours: 3

**Total: 12 Credit Hours****Program Electives**

- ACC 205 - Computerized Accounting Credit Hours: 3
- ART 315 - Design Thinking Credit Hours: 3
- BUS 107 - Seminar Credit Hours: (Hours to be arranged each term.)
- BUS 256 - Graphic Design for Business Credit Hours: 3
- BUS 314 - Entrepreneurship I Credit Hours: 3
- BUS 318 - Marketing II Credit Hours: 3
- BUS 319 - Integrated Marketing Communication Credit Hours: 3
- BUS 326 - Sales and Sales Management Credit Hours: 3
- BUS 335 - Entrepreneurship II Credit Hours: 3
- BUS 347 - Geography of Travel and Tourism Credit Hours: 3
- BUS 390 - Applied Management Internship Credit Hours: 3
- BUS 399 - Marketing Special Topics Credit Hours: 3
- BUS 434 - Global Marketing Credit Hours: 3
- BUS 447 - Controversial Issues in Management Credit Hours: 3
- COM 237 - Introduction to Visual Communication Credit Hours: 3
- COM 248 - Digital Media Production Credit Hours: 3
- COM 256 - Public Relations Credit Hours: 3
- COM 347 - Negotiation and Conflict Resolution Credit Hours: 3
- GIS 134 - Geographic Information Systems Credit Hours: 3
- MGT 462 - Lean/Six Sigma Management II Credit Hours: 3
- MGT 463 - Lean/Six Sigma Management III Credit Hours: 3
- MIS 118 - Introduction to Programming in C# Credit Hours: 4
- MIS 225 - Digital Marketing Credit Hours: 4
- MIS 341 - Relational Database Design I Credit Hours: 4
- MIS 344 - Business Intelligence Credit Hours: 3
- MIS 446 - Data Mining Credit Hours: 3
- WRI 350 - Documentation Development Credit Hours: 3

**Total for a B.S. in Business, Management Option: 182 Credit Hours**

## Business, Marketing Option, BS

The marketing option provides students with a broad business education and includes a strong emphasis in modern marketing concepts and practices. This degree option focuses on data-driven analytical skills sought by employers including social media and digital marketing. Students learn to analyze an organization's activities to develop and implement a marketing strategy. Marketing graduates enjoy careers in advertising, marketing research, social media marketing, distribution, and sales.

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- BUS 215 - Principles of Management Credit Hours: 3
- MATH 111 - College Algebra Credit Hours: 4
- PSY 201 - Psychology Credit Hours: 3
- WRI 121 - English Composition Credit Hours: 3
- Laboratory Science Elective Credit Hours: 4

**Total: 17 Credit Hours**

##### Winter

- BUS 223 - Marketing I Credit Hours: 3
- ECO 201 - Principles of Microeconomics Credit Hours: 3
- MIS 102 - Spreadsheet Lab Credit Hours: 1
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3
- Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Spring

- ECO 202 - Principles of Macroeconomics Credit Hours: 3
- MIS 206 - Introduction to Management Information Systems Credit Hours: 3
- SPE 321 - Small Group and Team Communication Credit Hours: 3
- WRI 227 - Technical Report Writing Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 15 Credit Hours**

#### Sophomore Year

##### Fall

- ACC 201 - Principles of Accounting I Credit Hours: 4
- MATH 361 - Statistical Methods I Credit Hours: 4

- MIS 113 - Introduction to Database Systems Credit Hours: 3  
or
- MIS 275 - Introduction to Relational Databases Credit Hours: 3

- Humanities Elective Credit Hours: 3

**Total: 14 Credit Hours**

##### Winter

- BUS 256 - Graphic Design for Business Credit Hours: 3
- BUS 318 - Marketing II Credit Hours: 3
- BUS 349 - Human Resource Management I Credit Hours: 3
- MATH 371 - Finite Mathematics and Calculus I Credit Hours: 4

- PHIL 331 - Ethics in the Professions Credit Hours: 3  
or
- PHIL 342 - Business Ethics Credit Hours: 3

**Total: 16 Credit Hours**

##### Spring

- ACC 203 - Principles of Managerial Accounting Credit Hours: 4
- BUS 456 - Business Research Methods Credit Hours: 3
- MIS 225 - Digital Marketing Credit Hours: 4
- MIS 375 - Decision Support Systems Credit Hours: 3

**Total: 14 Credit Hours**

#### Junior Year

##### Fall

- BUS 319 - Integrated Marketing Communication Credit Hours: 3
- BUS 467 - Service Management Credit Hours: 3
- GIS 207 - Seminar Credit Hours: (Hours to be arranged each term.)
- MGT 321 - Operations Management I Credit Hours: 3
- Elective Credit Hours: 3
- Program Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Winter

- ACC 325 - Finance Credit Hours: 4
- BUS 226 - Business Law Credit Hours: 3
- BUS 307 - Seminar Credit Hours: (Hours to be arranged each term.)
- Communication Elective Credit Hours: 3
- Program Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Spring

- BUS 390 - Applied Management Internship Credit Hours: 3  
or
- BUS Elective Credit Hours: 3

- BUS 435 - Marketing III Credit Hours: 3
- BUS 473 - Marketing Plan Development Credit Hours: 3
- MGT 335 - Project Management Credit Hours: 3
- Elective Credit Hours: 3

**Total: 15 Credit Hours**

**Senior Year****Fall**

- BUS 308 - Principles of International Business Credit Hours: 3
- BUS 414 - Marketing Research Credit Hours: 3
- or
- BUS 457 - Business Research Methods II Credit Hours: 3
- BUS 441 - Leadership I Credit Hours: 3
- BUS 495 - Senior Project Proposal Credit Hours: 3
- PSY 347 - Organizational Behavior Credit Hours: 3

**Total: 15 Credit Hours****Winter**

- ANTH 452 - Globalization Credit Hours: 3
- BUS 356 - Business Presentations Credit Hours: 4
- BUS 496 - Senior Project Credit Hours: 3
- Elective Credit Hours: 3
- Program Elective Credit Hours: 3

**Total: 16 Credit Hours****Spring**

- BUS 478 - Strategic Management Credit Hours: 3
- BUS 497 - Senior Project Credit Hours: 3
- Program Elective Credit Hours: 3
- Program Elective Credit Hours: 3

**Total: 12 Credit Hours****Program Electives**

- ACC 205 - Computerized Accounting Credit Hours: 3
- ART 215 - Design Arts and Aesthetics Credit Hours: 3
- ART 226 - Digital Photography Credit Hours: 3
- ART 315 - Design Thinking Credit Hours: 3
- BUS 107 - Seminar Credit Hours: (Hours to be arranged each term.)
- BUS 314 - Entrepreneurship I Credit Hours: 3
- BUS 326 - Sales and Sales Management Credit Hours: 3
- BUS 335 - Entrepreneurship II Credit Hours: 3
- BUS 347 - Geography of Travel and Tourism Credit Hours: 3
- BUS 390 - Applied Management Internship Credit Hours: 3
- BUS 399 - Marketing Special Topics Credit Hours: 3
- BUS 434 - Global Marketing Credit Hours: 3
- BUS 447 - Controversial Issues in Management Credit Hours: 3
- COM 237 - Introduction to Visual Communication Credit Hours: 3
- COM 248 - Digital Media Production Credit Hours: 3
- COM 256 - Public Relations Credit Hours: 3
- COM 347 - Negotiation and Conflict Resolution Credit Hours: 3
- GIS 134 - Geographic Information Systems Credit Hours: 3
- MGT 461 - Lean/Six Sigma Management I Credit Hours: 3
- MGT 462 - Lean/Six Sigma Management II Credit Hours: 3
- MGT 463 - Lean/Six Sigma Management III Credit Hours: 3
- MIS 118 - Introduction to Programming in C# Credit Hours: 4
- MIS 334 - Business Analytics Credit Hours: 4
- MIS 341 - Relational Database Design I Credit Hours: 4
- MIS 344 - Business Intelligence Credit Hours: 3
- MIS 446 - Data Mining Credit Hours: 3
- WRI 350 - Documentation Development Credit Hours: 3

**Total for a B.S. in Business, Marketing Option: 182 Credit Hours**

## Business Minor

The Minor in Business recognizes the achievement of 23 credits in business courses, some of which can be related to the student's chosen profession. Some of the courses may be included in the student's requirements for a bachelor's degree from Oregon Tech. The Minor in Business may prove valuable to a technical student who ventures into management or consulting in his or her career field; enhancing employability and improving graduate school possibilities. This minor is open to all majors except those in the Management Department.

### Requirements of Minor

- ACC 201 - Principles of Accounting I Credit Hours: 4
- ACC 203 – Principles of Managerial Accounting Credit Hours: 4
  
- BUS 215 – Principles of Management Credit Hours: 3  
or
- BUS 304 – Engineering Management Credit Hours: 3  
or
- BUS 317 – Health Care Management Credit Hours: 3
  
- BUS 223 – Marketing I Credit Hours: 3
- PSY 347 – Organizational Behavior Credit Hours: 3
- And two courses chosen from upper-division BUS or MGT courses not on the required list, or MIS 311 or PSY 410.

**Note:** A passing grade and a cumulative GPA of 2.0 or better in the business minor courses is required. Students are encouraged to consult with a Management Department advisor to select business courses that would be most applicable to their major and/or career goals.

## Health Care Management, Administration Option, BS

### Administration Option

This program offers a BS in Health Care Management to students whose interests lie in business and health care administration. The curriculum is designed to prepare the graduate for entry- and mid-level management positions and/or for graduate programs in Health Care Administration, Hospital Administration or Public Health. Based on a core of common management courses, the program builds a broader base of understanding of health care in the U.S. and its systems, policies and challenges. Students selecting the Administration option will complete a Health Informatics Minor as part of their studies. Students will also choose a second minor/series of focused program electives in: Applied Health Data Analytics, Applied Medical Sociology, or Psychology. During their senior year, students will complete a capstone project or internship.

The BS degree in Health Care Management, Administration Option is offered in Klamath Falls.

### Student Preparation and Admissions

Students must meet the standard Oregon Tech admissions requirements. Transfer students must arrange for official transcripts from each college and university attended to be sent to Oregon Tech.

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- BIO 200 - Medical Terminology Credit Hours: 2
- MATH 111 - College Algebra Credit Hours: 4
- MIS 255 - Health Informatics Concepts and Practices Credit Hours: 3
- PSY 201 - Psychology Credit Hours: 3
- WRI 121 - English Composition Credit Hours: 3

**Total: 15 Credit Hours**

##### Winter

- BUS 223 - Marketing I Credit Hours: 3  
or
- BUS 337 - Principles of Health Care Marketing Credit Hours: 3
- ECO 201 - Principles of Microeconomics Credit Hours: 3
- MIS 102 - Spreadsheet Lab Credit Hours: 1
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3

**Total: 13 Credit Hours**

##### Spring

- ECO 202 - Principles of Macroeconomics Credit Hours: 3
- SOC 204 - Introduction to Sociology Credit Hours: 3
- SPE 321 - Small Group and Team Communication Credit Hours: 3
- WRI 227 - Technical Report Writing Credit Hours: 3
- Elective Credit Hours: 3

**Total: 15 Credit Hours**

#### Sophomore Year

##### Fall

- ACC 201 - Principles of Accounting I Credit Hours: 4
- BIO 103 - Introduction to Human Anatomy and Physiology Credit Hours: 4  
or
- BIO 231 - Human Anatomy and Physiology I Credit Hours: 4

- BUS 313 - Health Care Systems and Policy Credit Hours: 3

- MIS 113 - Introduction to Database Systems Credit Hours: 3  
or
- MIS 275 - Introduction to Relational Databases Credit Hours: 3

**Total: 14 Credit Hours**

##### Winter

- BUS 316 - Total Quality in Health Care Credit Hours: 3
- COM 205 - Intercultural Communication Credit Hours: 3
- MATH 361 - Statistical Methods I Credit Hours: 4
- Humanities Elective Credit Hours: 3
- Program Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Spring

- ACC 203 - Principles of Managerial Accounting Credit Hours: 4
- BUS 317 - Health Care Management Credit Hours: 3
- SOC 225 - Medical Sociology Credit Hours: 3
- Elective Credit Hours: 3
- Elective Credit Hours: 3

**Total: 16 Credit Hours**

**Junior Year****Fall**

- ACC 325 - Finance Credit Hours: 4
- BUS 308 - Principles of International Business Credit Hours: 3
- MGT 321 - Operations Management I Credit Hours: 3
- MIS 445 - Legal, Ethical and Social Issues in Health Care Technology Credit Hours: 3
- Emphasis Elective Credit Hours: 3

**Total: 16 Credit Hours****Winter**

- BUS 349 - Human Resource Management I Credit Hours: 3
- PHIL 342 - Business Ethics Credit Hours: 3
- STAT 414 - Statistical Methods in Epidemiology Credit Hours: 4
- Program Elective Credit Hours: 3
- Program Elective Credit Hours: 3

**Total: 16 Credit Hours****Spring**

- BUS 356 - Business Presentations Credit Hours: 4
- MGT 335 - Project Management Credit Hours: 3
- Humanities Elective Credit Hours: 3
- Program Elective Credit Hours: 3
- Program Elective Credit Hours: 3

**Total: 16 Credit Hours****Senior Year****Fall**

- BUS 441 - Leadership I Credit Hours: 3
- BUS 457 - Business Research Methods II Credit Hours: 3
- BUS 467 - Service Management Credit Hours: 3
- BUS 495 - Senior Project Proposal Credit Hours: 3
- MIS 345 - Health Care Information Systems Management Credit Hours: 3

**Total: 15 Credit Hours****Winter**

- BUS 496 - Senior Project Credit Hours: 3
- MIS 357 - Information and Communication Systems in Health Care Credit Hours: 3
- Elective Credit Hours: 3
- Elective Credit Hours: 3
- Program Elective Credit Hours: 3

**Total: 15 Credit Hours****Spring**

- BUS 478 - Strategic Management Credit Hours: 3
- BUS 497 - Senior Project Credit Hours: 3
- PSY 347 - Organizational Behavior Credit Hours: 3
- Elective Credit Hours: 3
- Program Elective Credit Hours: 3

**Total: 15 Credit Hours**

**Program Electives**

Students may choose to mix and match these.

**Health Data Analytics Track:**

- MIS 118 - Introduction to Programming in C# Credit Hours:4
- MIS 334 - Business Analytics Credit Hours: 4
- MIS 341 - Relational Database Design I Credit Hours: 4
- MIS 344 - Business Intelligence Credit Hours: 3
- MIS 446 - Data Mining Credit Hours: 3
- BUS Elective Credit Hours: 3
- COM Elective Credit Hours: 3

**Medical Sociology Track:**

- BUS 256 - Graphic Design for Business Credit Hours: 3
- BUS 397 - Human Resource Management II Credit Hours: 3
- BUS 442 - Leadership II Credit Hours: 3
- COM 346 - Health Communication Credit Hours: 3
- PSY 336 - Health Psychology I Credit Hours: 3
- SOC 325 - Global Population Health Credit Hours: 3
- SOC 335 - Health Inequality and Cultural Competency Credit Hours: 3
- WRI 410 - Proposal and Grant Writing Credit Hours: 3

**Psychology Track:**

- PSY 202 - Psychology Credit Hours: 3
- PSY 203 - Psychology Credit Hours: 3
- BUS Elective Credit Hours: 3
- COM Elective Credit Hours: 3
- Lower/Upper PSY Elective Credit Hours: 3
- Upper Division Elective Credit Hours: 3
- Upper Division PSY Elective Credit Hours: 3
- Upper Division PSY Elective Credit Hours: 3

**Total for a B.S.in Health Care Management: Administration Option: 182 Credit Hours**

## Health Care Management, Clinical Option, BS

### Clinical Option

This program bridges two disciplines; Allied Health and Management. The clinical option requires a current state and/or national registry, license or certificate in an approved allied health field. The degree prepares Allied Health professionals for advancement to management or supervisory roles. During their senior year, students will complete a capstone project or internship. The BS degree in Health Care Management, Clinical Option is offered in Klamath Falls and online.

### Student Preparation and Admissions

To be eligible for admission to the Health Care Management, Clinical Option, students must meet the following criteria: Meet the Oregon Tech general admissions requirements.

Provide documentation of a current state and/or national registry, license, or certificate in an approved allied health field. Each prospective student's academic credits and registry, license, or certificate will be individually evaluated to determine transferability and acceptability of the coursework.

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Prior Learning

- Registry Transfer Credits Credit Hours: 44

#### Sophomore Year

##### Fall

- ACC 201 - Principles of Accounting I Credit Hours: 4
- BIO 103 - Introduction to Human Anatomy and Physiology Credit Hours: 4  
or
- BIO 231 - Human Anatomy and Physiology I Credit Hours: 4
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 121 - English Composition Credit Hours: 3

**Total: 14 Credit Hours**

##### Winter

- MATH 111 - College Algebra Credit Hours: 4
- MIS 102 - Spreadsheet Lab Credit Hours: 1
- WRI 122 - Argumentative Writing Credit Hours: 3
- Elective Credit Hours: 3
- Math/Science Elective Credit Hours: 4

**Total: 15 Credit Hours**

##### Spring

- ACC 203 - Principles of Managerial Accounting Credit Hours: 4
- BUS 226 - Business Law Credit Hours: 3
- BUS 317 - Health Care Management Credit Hours: 3
- WRI 227 - Technical Report Writing Credit Hours: 3
- Elective Credit Hours: 3

**Total: 16 Credit Hours**

#### Junior Year

##### Fall

- ACC 325 - Finance Credit Hours: 4
- BUS 308 - Principles of International Business Credit Hours: 3
- BUS 313 - Health Care Systems and Policy Credit Hours: 3
- MIS 113 - Introduction to Database Systems Credit Hours: 3
- PSY 201 - Psychology Credit Hours: 3

**Total: 16 Credit Hours**

##### Winter

- BIO 200 - Medical Terminology Credit Hours: 2
- BUS 349 - Human Resource Management I Credit Hours: 3
- ECO 201 - Principles of Microeconomics Credit Hours: 3
- MATH 243 - Introductory Statistics Credit Hours: 4  
or
- MATH 361 - Statistical Methods I Credit Hours: 4
- PHIL 331 - Ethics in the Professions Credit Hours: 3  
or
- PHIL 342 - Business Ethics Credit Hours: 3

**Total: 15 Credit Hours**

##### Spring

- BUS 356 - Business Presentations Credit Hours: 4
- BUS 223 - Marketing I Credit Hours: 3  
or
- BUS 337 - Principles of Health Care Marketing Credit Hours: 3
- ECO 202 - Principles of Macroeconomics Credit Hours: 3
- MGT 335 - Project Management Credit Hours: 3
- SPE 321 - Small Group and Team Communication Credit Hours: 3

**Total: 16 Credit Hours**

**Senior Year****Fall**

- BUS 441 - Leadership I Credit Hours: 3
- BUS 457 - Business Research Methods II Credit Hours: 3
- BUS 467 - Service Management Credit Hours: 3
- BUS 495 - Senior Project Proposal Credit Hours: 3
- MIS 345 - Health Care Information Systems Management Credit Hours: 3

**Total: 15 Credit Hours****Winter**

- BUS 316 - Total Quality in Health Care Credit Hours: 3
- BUS 496 - Senior Project Credit Hours: 3
- COM 205 - Intercultural Communication Credit Hours: 3
- Upper Division Elective Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 15 Credit Hours****Spring**

- BUS 478 - Strategic Management Credit Hours: 3
- BUS 497 - Senior Project Credit Hours: 3
- PSY 347 - Organizational Behavior Credit Hours: 3
- WRI 410 - Proposal and Grant Writing Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 15 Credit Hours****Total for a B.S. in Health Care Management: Clinical Option: 181 Credit Hours**

## Health Care Management, Radiological Science Management Option, BS

This program offers a BS in Health Care Management to students who hold a current registry through the American Registry of Radiologic Technologists (ARRT) and who wish to enhance their career by obtaining a management degree with emphasis on management of a medical imaging facility or department. It is designed for the radiologic technologist seeking skills and credentials that enable advancement to positions of middle management. During their senior year, students will complete a capstone project or internship.

The BS degree in Health Care Management, Radiologic Science Management Option is fully online with no requirement to come to campus and does not require clinical practice involving patient contact.

### Student Preparation and Admissions

Students must be registered through the ARRT and be in good standing. Students must meet the standard Oregon Tech admissions requirements. Transfer students must arrange for official transcripts from each college and university attended to be sent to Oregon Tech.

### Curriculum

This curriculum map is arranged in the typical term by term format; however, online degree completion students should consult with their academic advisor regarding course scheduling.

#### Prior Learning

- Registry Transfer Credits Credit Hours: 89

#### Sophomore Year

##### Fall

- ACC 201 - Principles of Accounting I Credit Hours: 4
- MIS 113 - Introduction to Database Systems Credit Hours: 3
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 121 - English Composition Credit Hours: 3

**Total: 13 Credit Hours**

##### Winter

- BIO 200 - Medical Terminology Credit Hours: 2
- MATH 111 - College Algebra Credit Hours: 4
- MIS 102 - Spreadsheet Lab Credit Hours: 1
- SPE 321 - Small Group and Team Communication Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3

**Total: 13 Credit Hours**

##### Spring

- ACC 203 - Principles of Managerial Accounting Credit Hours: 4
- BUS 223 - Marketing I Credit Hours: 3  
or
- BUS 337 - Principles of Health Care Marketing Credit Hours: 3
- ECO 201 - Principles of Microeconomics Credit Hours: 3
- WRI 227 - Technical Report Writing Credit Hours: 3

**Total: 13 Credit Hours**

#### Junior Year

##### Fall

- ACC 325 - Finance Credit Hours: 4
- BIO 103 - Introduction to Human Anatomy and Physiology Credit Hours: 4  
or
- BIO 231 - Human Anatomy and Physiology I Credit Hours: 4
- BUS 313 - Health Care Systems and Policy Credit Hours: 3
- MATH 243 - Introductory Statistics Credit Hours: 4  
or
- MATH 361 - Statistical Methods I Credit Hours: 4

**Total: 15 Credit Hours**

##### Winter

- ECO 202 - Principles of Macroeconomics Credit Hours: 3
- PSY 201 - Psychology Credit Hours: 3  
or
- PSY 202 - Psychology Credit Hours: 3  
or
- PSY 203 - Psychology Credit Hours: 3
- Math/Science Elective Credit Hours: 4
- Humanities Elective Credit Hours: 3

**Total: 13 Credit Hours**

##### Spring

- BUS 226 - Business Law Credit Hours: 3
- BUS 317 - Health Care Management Credit Hours: 3
- BUS 356 - Business Presentations Credit Hours: 4
- MGT 335 - Project Management Credit Hours: 3

**Total: 13 Credit Hours**

**Senior Year****Fall**

- BUS 308 - Principles of International Business Credit Hours: 3
- BUS 457 - Business Research Methods II Credit Hours: 3
- BUS 495 - Senior Project Proposal Credit Hours: 3
- MIS 345 - Health Care Information Systems Management Credit Hours: 3

**Total: 12 Credit Hours****Winter**

- BUS 316 - Total Quality in Health Care Credit Hours: 3
- BUS 496 - Senior Project Credit Hours: 3
  
- PHIL 331 - Ethics in the Professions Credit Hours: 3  
or
- PHIL 342 - Business Ethics Credit Hours: 3
  
- PSY 347 - Organizational Behavior Credit Hours: 3

**Total: 12 Credit Hours****Spring**

- BUS 478 - Strategic Management Credit Hours: 3
- BUS 497 - Senior Project Credit Hours: 3
- WRI 410 - Proposal and Grant Writing Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 15 Credit Hours****Total for a B.S. in Health Care Management: Radiologic Science Option: 208 Credit Hours**

## Health Informatics Minor

The Minor in Health Informatics may prove valuable to allied health students who will likely be expected to interact with technology in their profession. The minor exposes students to the database systems, health information systems, management processes and data used to improve efficiencies and patient care.

### Requirements of Minor

- BUS 313 - Health Care Systems and Policy Credit Hours: 3
- BUS 317 - Health Care Management Credit Hours: 3
- MIS 255 - Health Informatics Concepts and Practices Credit Hours: 3
- MIS 275 - Introduction to Relational Databases Credit Hours: 3
- MIS 345 - Health Care Information Systems Management Credit Hours: 3
- MIS 357 - Information and Communication Systems in Health Care Credit Hours: 3

**Note:** Not all courses are offered every year or on every campus. Additional prerequisites may be required; see catalog descriptions and recent course schedules for details.

## Health Informatics, BS

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- MATH 111 - College Algebra Credit Hours: 4
- MIS 255 - Health Informatics Concepts and Practices Credit Hours: 3
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 121 - English Composition Credit Hours: 3
- Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Winter

- BIO 200 - Medical Terminology Credit Hours: 2
- ECO 201 - Principles of Microeconomics Credit Hours: 3
- MIS 102 - Spreadsheet Lab Credit Hours: 1
- MIS 145 - Introduction to PC Hardware/Software Credit Hours: 4
- WRI 122 - Argumentative Writing Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Spring

- BUS 317 - Health Care Management Credit Hours: 3
- ECO 202 - Principles of Macroeconomics Credit Hours: 3
- MIS 251 - Networking Fundamentals Credit Hours: 4
- MIS 275 - Introduction to Relational Databases Credit Hours: 3

**Total: 13 Credit Hours**

#### Sophomore Year

##### Fall

- ACC 201 - Principles of Accounting I Credit Hours: 4
- MATH 361 - Statistical Methods I Credit Hours: 4
- MIS 118 - Introduction to Programming in C# Credit Hours: 4
- WRI 227 - Technical Report Writing Credit Hours: 3

**Total: 15 Credit Hours**

##### Winter

- BUS 223 - Marketing I Credit Hours: 3  
or
- BUS 337 - Principles of Health Care Marketing Credit Hours: 3
- MATH 362 - Statistical Methods II Credit Hours: 4
- MIS 218 - Database Programming Credit Hours: 4
- MIS 357 - Information and Communication Systems in Health Care Credit Hours: 3

**Total: 14 Credit Hours**

##### Spring

- ACC 203 - Principles of Managerial Accounting Credit Hours: 4
- BIO 103 - Introduction to Human Anatomy and Physiology Credit Hours: 4
- MGT 335 - Project Management Credit Hours: 3
- SOC 225 - Medical Sociology Credit Hours: 3
- SPE 321 - Small Group and Team Communication Credit Hours: 3

**Total: 17 Credit Hours**

#### Junior Year

##### Fall

- ACC 325 - Finance Credit Hours: 4
- BUS 313 - Health Care Systems and Policy Credit Hours: 3
- BUS 356 - Business Presentations Credit Hours: 4
- MIS 311 - Introduction to Systems Analysis Credit Hours: 3
- General Elective Credit Hours: 3

**Total: 17 Credit Hours**

##### Winter

- MIS 312 - Systems Analysis I Credit Hours: 4
- MIS 334 - Business Analytics Credit Hours: 4
- MIS 341 - Relational Database Design I Credit Hours: 4
- General Elective Credit Hours: 3

**Total: 15 Credit Hours**

**Spring**

- BUS 316 - Total Quality in Health Care Credit Hours: 3
- MIS 322 - Systems Analysis II Credit Hours: 4
- MIS 344 - Business Intelligence Credit Hours: 3
- MIS 442 - Advanced Web Application Programming Credit Hours: 4
- MIS 495 - Senior Project Selection Credit Hours: 1

**Total: 15 Credit Hours****Senior Year****Fall**

- BUS 457 - Business Research Methods II Credit Hours: 3
- MIS 345 - Health Care Information Systems Management Credit Hours: 3
- MIS 445 - Legal, Ethical and Social Issues in Health Care Technology Credit Hours: 3
- MIS 496 - Senior Project Management Credit Hours: 3

**Total: 12 Credit Hours****Winter**

- ANTH 452 - Globalization Credit Hours: 3
- MIS 497 - Senior Project II Credit Hours: 3
  
- PHIL 305 - Medical Ethics Credit Hours: 3  
or
- PHIL 331 - Ethics in the Professions Credit Hours: 3  
or
- PHIL 342 - Business Ethics Credit Hours: 3
  
- STAT 414 - Statistical Methods in Epidemiology Credit Hours: 4
- Humanities Elective Credit Hours: 3

**Total: 16 Credit Hours****Spring**

- BUS 478 - Strategic Management Credit Hours: 3
- MIS 446 - Data Mining Credit Hours: 3
- MIS 498 - Senior Project III Credit Hours: 3
- PSY 347 - Organizational Behavior Credit Hours: 3
- WRI 410 - Proposal and Grant Writing Credit Hours: 3

**Total: 15 Credit Hours****Total for a B.S. in Health Informatics: 181 Credit Hours**

## Information Technology, BS

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- MATH 111 - College Algebra Credit Hours: 4
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 121 - English Composition Credit Hours: 3
- Science Elective Credit Hours: 4

**Total: 14 Credit Hours**

##### Winter

- ECO 201 - Principles of Microeconomics Credit Hours: 3
- MIS 102 - Spreadsheet Lab Credit Hours: 1
- MIS 145 - Introduction to PC Hardware/Software Credit Hours: 4
- WRI 122 - Argumentative Writing Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 14 Credit Hours**

##### Spring

- BUS 215 - Principles of Management Credit Hours: 3
- ECO 202 - Principles of Macroeconomics Credit Hours: 3
- MIS 251 - Networking Fundamentals Credit Hours: 4
- MIS 275 - Introduction to Relational Databases Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 16 Credit Hours**

#### Sophomore Year

##### Fall

- ACC 201 - Principles of Accounting I Credit Hours: 4
- MIS 118 - Introduction to Programming in C# Credit Hours: 4
- MIS 273 - Windows Server Fundamentals Credit Hours: 4
- WRI 227 - Technical Report Writing Credit Hours: 3

**Total: 15 Credit Hours**

##### Winter

- BUS 223 - Marketing I Credit Hours: 3
- MATH 361 - Statistical Methods I Credit Hours: 4
- MIS 218 - Database Programming Credit Hours: 4
- SPE 321 - Small Group and Team Communication Credit Hours: 3
- Elective Credit Hours: 3

**Total: 17 Credit Hours**

##### Spring

- ACC 203 - Principles of Managerial Accounting Credit Hours: 4
- MATH 362 - Statistical Methods II Credit Hours: 4
- MGT 335 - Project Management Credit Hours: 3
- PSY 201 - Psychology Credit Hours: 3

**Total: 14 Credit Hours**

**Total for a B.S. in Information Technology: 181 Credit Hours**

#### Junior Year

##### Fall

- ACC 325 - Finance Credit Hours: 4
- BUS 356 - Business Presentations Credit Hours: 4
- MIS 311 - Introduction to Systems Analysis Credit Hours: 3
- Focused Sequence Elective Credit Hours: 4<sup>a</sup>

**Total: 15 Credit Hours**

##### Winter

- MIS 312 - Systems Analysis I Credit Hours: 4
- MIS 341 - Relational Database Design I Credit Hours: 4
- WRI 350 - Documentation Development Credit Hours: 3
- Focused Sequence Elective Credit Hours: 4<sup>a</sup>

**Total: 15 Credit Hours**

##### Spring

- BUS 226 - Business Law Credit Hours: 3
- MIS 322 - Systems Analysis II Credit Hours: 4
- MIS 495 - Senior Project Selection Credit Hours: 1
- Focused Sequence Elective Credit Hours: 4<sup>a</sup>
- Focused Sequence Elective Credit Hours: 4<sup>a</sup>

**Total: 16 Credit Hours**

#### Senior Year

##### Fall

- BUS 457 - Business Research Methods II Credit Hours: 3
- MGT 461 - Lean/Six Sigma Management I Credit Hours: 3
- MIS 496 - Senior Project Management Credit Hours: 3
- PSY 347 - Organizational Behavior Credit Hours: 3
- Focused Sequence Elective Credit Hours: 3<sup>a</sup>

**Total: 15 Credit Hours**

##### Winter

- ANTH 452 - Globalization Credit Hours: 3
- MIS 497 - Senior Project II Credit Hours: 3
- PHIL 331 - Ethics in the Professions Credit Hours: 3  
or
- PHIL 342 - Business Ethics Credit Hours: 3
- Elective Credit Hours: 3
- Focused Sequence Elective Credit Hours: 4<sup>a</sup>

**Total: 16 Credit Hours**

##### Spring

- BUS 478 - Strategic Management Credit Hours: 3
- MIS 498 - Senior Project III Credit Hours: 3
- Focused Sequence Elective Credit Hours: 4<sup>a</sup>
- Focused Sequence Elective Credit Hours: 4<sup>a</sup>

**Total: 14 Credit Hours**

<sup>a</sup> Students must choose, in consultation with their advisor, a minimum of 31 credits of focused upper division Electives

## Operations Management, BS

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- BUS 215 - Principles of Management Credit Hours: 3
- PSY 201 - Psychology Credit Hours: 3
- WRI 121 - English Composition Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 12 Credit Hours**

##### Winter

- MATH 111 - College Algebra Credit Hours: 4
- MIS 102 - Spreadsheet Lab Credit Hours: 1
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3
- Elective Credit Hours: 3

**Total: 14 Credit Hours**

##### Spring

- BUS 223 - Marketing I Credit Hours: 3
- ECO 201 - Principles of Microeconomics Credit Hours: 3
- MIS 206 - Introduction to Management Information Systems Credit Hours: 3
- WRI 227 - Technical Report Writing Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 15 Credit Hours**

#### Sophomore Year

##### Fall

- ACC 201 - Principles of Accounting I Credit Hours: 4
- MATH 361 - Statistical Methods I Credit Hours: 4
- MIS 113 - Introduction to Database Systems Credit Hours: 3
- Elective Credit Hours: 3
- Elective Credit Hours: 3

**Total: 17 Credit Hours**

##### Winter

- BUS 226 - Business Law Credit Hours: 3
- ECO 202 - Principles of Macroeconomics Credit Hours: 3
- MATH 371 - Finite Mathematics and Calculus I Credit Hours: 4
- Elective Credit Hours: 3
- Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Spring

- ACC 203 - Principles of Managerial Accounting Credit Hours: 4
- BUS 356 - Business Presentations Credit Hours: 4
- BUS 456 - Business Research Methods Credit Hours: 3
- SPE 321 - Small Group and Team Communication Credit Hours: 3

**Total: 14 Credit Hours**

#### Junior Year

##### Fall

- ACC 325 - Finance Credit Hours: 4
- BUS 457 - Business Research Methods II Credit Hours: 3
- MGT 321 - Operations Management I Credit Hours: 3
- MGT 461 - Lean/Six Sigma Management I Credit Hours: 3
- Elective Credit Hours: 3

**Total: 16 Credit Hours**

##### Winter

- MGT 322 - Operations Management II Credit Hours: 3
- MGT 462 - Lean/Six Sigma Management II Credit Hours: 3
- WRI 327 - Advanced Technical Writing Credit Hours: 3
- BUS 349 - Human Resource Management I Credit Hours: 3
- Elective Credit Hours: 3

**Total: 15 Credit Hours**

##### Spring

- MGT 323 - Operations Management III Credit Hours: 3
- MGT 335 - Project Management Credit Hours: 3
- MGT 463 - Lean/Six Sigma Management III Credit Hours: 3
- MIS 375 - Decision Support Systems Credit Hours: 3
- Elective Credit Hours: 3

**Total: 15 Credit Hours**

#### Senior Year

##### Fall

- BUS 441 - Leadership I Credit Hours: 3
- BUS 467 - Service Management Credit Hours: 3
- BUS 495 - Senior Project Proposal Credit Hours: 3
- MGT 421 - Quality Management Credit Hours: 3
- Laboratory Science Elective Credit Hours: 4

**Total: 16 Credit Hours**

##### Winter

- ANTH 452 - Globalization Credit Hours: 3  
or
- PSCI 326 - World Politics in Transition Credit Hours: 3
- BUS 496 - Senior Project Credit Hours: 3
- MGT 422 - Materials Management Credit Hours: 3
- PHIL 331 - Ethics in the Professions Credit Hours: 3
- PSY 347 - Organizational Behavior Credit Hours: 3

**Total: 15 Credit Hours**

##### Spring

- BUS 478 - Strategic Management Credit Hours: 3
- BUS 497 - Senior Project Credit Hours: 3
- MGT 423 - Logistics Management Credit Hours: 3
- Elective Credit Hours: 3
- Elective Credit Hours: 3

**Total: 15 Credit Hours**

**Total for a B.S. in Operations Management: 180 Credit Hours**

## Technology and Management, BAS

**Note:** The Portland-Metro campus is a laptop-required campus with resources like laptop specifications, financial aid, and helpful instructions found at <http://www.oit.edu/portland-metro/college-costs/bring-your-own-device>.

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Freshman Year

- Up to 60 Career Technical Elective credits

#### Sophomore Year

##### Winter

- ACC 201 - Principles of Accounting I Credit Hours: 4
- BUS 215 - Principles of Management Credit Hours: 3  
or
- BUS 304 - Engineering Management Credit Hours: 3  
or
- BUS 317 - Health Care Management Credit Hours: 3
- BUS 226 - Business Law Credit Hours: 3
- MATH 111 - College Algebra Credit Hours: 4
- WRI 121 - English Composition Credit Hours: 3

**Total: 17 Credit Hours**

##### Spring

- ACC 203 - Principles of Managerial Accounting Credit Hours: 4
- ECO 201 - Principles of Microeconomics Credit Hours: 3
- MATH 361 - Statistical Methods I Credit Hours: 4
- SPE 111 - Public Speaking Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3

**Total: 17 Credit Hours**

#### Junior Year

##### Fall

- BUS 457 - Business Research Methods II Credit Hours: 3
- MGT 321 - Operations Management I Credit Hours: 3
- MGT 461 - Lean/Six Sigma Management I Credit Hours: 3
- WRI 227 - Technical Report Writing Credit Hours: 3

**Total: 12 Credit Hours**

##### Winter

- ACC 325 - Finance Credit Hours: 4
- BUS 349 - Human Resource Management I Credit Hours: 3
- ECO 202 - Principles of Macroeconomics Credit Hours: 3
- MIS 102 - Spreadsheet Lab Credit Hours: 1
- PHIL 331 - Ethics in the Professions Credit Hours: 3  
or
- PHIL 342 - Business Ethics Credit Hours: 3 (upper-division)  
a

**Total: 14 Credit Hours**

**Note:** The BAS degree specifies 60 upper-division credits. Students transferring in lower-division course equivalents do not receive upper-division credit and may be required to take upper-division electives to meet the minimum 60 credits of upper division credits required for the BAS degree.

**Total for a B.A.S. in Technology and Management: 180 Credit Hours**

#### Spring

- BUS 356 - Business Presentations Credit Hours: 4
- MGT 335 - Project Management Credit Hours: 3
- MIS 206 - Introduction to Management Information Systems Credit Hours: 3
- Laboratory Science Elective Credit Hours: 4

**Total: 14 Credit Hours**

#### Senior Year

##### Fall

- BUS 223 - Marketing I Credit Hours: 3
- BUS 441 - Leadership I Credit Hours: 3
- BUS 467 - Service Management Credit Hours: 3
- BUS 495 - Senior Project Proposal Credit Hours: 3
- SPE 321 - Small Group and Team Communication Credit Hours: 3

**Total: 15 Credit Hours**

##### Winter

- ANTH 452 - Globalization Credit Hours: 3  
or
- HIST 452 - Globalization and the Pacific Northwest Credit Hours: 3
- BUS 496 - Senior Project Credit Hours: 3
- PSY 347 - Organizational Behavior Credit Hours: 3
- Humanities Elective Credit Hours: 3
- Math/Science Elective Credit Hours: 4

**Total: 16 Credit Hours**

##### Spring

- BUS 478 - Strategic Management Credit Hours: 3
- BUS 497 - Senior Project Credit Hours: 3
- MIS 113 - Introduction to Database Systems Credit Hours: 3  
or
- MIS 275 - Introduction to Relational Databases Credit Hours: 3
- WRI 327 - Advanced Technical Writing Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 15 Credit Hours**

## Manufacturing and Mechanical Engineering and Technology Department

Jeffrey Hayen, *Department Chair*

Steve Edgeman, *Program Director, Undergraduate Manufacturing Engineering Technology*

Joe Stuart, *Program Director, Graduate Manufacturing Engineering Technology*

Josh Millard, *Program Director, Mechanical Engineering*

David Culler, *Program Director, Mechanical Engineering Technology*

Wangping Sun, *Program Director, Portland-Metro Programs*

Nathan Mead and Wahab Abrous, *Joint Interim Program Directors, Seattle-Boeing Programs*

*Professors:* D. Culler, N. Mead, B. Moravec, R. Shih, W. Sun, L. Wolf

*Associate Professors:* W. Abrous, I. Demeshko-Prosnik, Y. Gao, J. Hayen, J. Stuart, Assistant

*Professors:* S. Edgeman, D. Lee, J. Millard, S. Sloan,

### Degrees Offered

- Master of Science in Manufacturing Engineering Technology
- Bachelor of Science in Manufacturing Engineering Technology
- Bachelor of Science in Mechanical Engineering
- Bachelor of Science in Mechanical Engineering Technology

## Manufacturing Engineering Technology

### Degrees Offered

- Master of Science in Manufacturing Engineering Technology
- Bachelor of Science in Manufacturing Engineering Technology

### Program Mission Statement

The Manufacturing Engineering Technology Program at Oregon Institute of Technology is an applied engineering technology program. Its mission is to provide graduates with the skills and knowledge for successful careers in Manufacturing Engineering Technology.

### Program Educational Objectives

Program educational objectives are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve. The Program Educational Objectives of Oregon Tech's Manufacturing Engineering Technology Program are to produce graduates who:

- are able to analyze and design practical mechanical and manufacturing systems
- communicate effectively and work well on team-based engineering projects
- succeed in entry-level manufacturing engineering positions
- pursue continued professional development

### Career Opportunities

Manufacturing Engineering graduates will find a wide range of opportunities for employment in manufacturing design, research and development, testing, educational institutions, consulting and business. Manufacturing Engineering Technology also prepares students for further study in graduate school. In today's engineering environment, manufacturing engineers are often called upon to perform a wide range of tasks, from designing and purchasing manufacturing equipment to improving and troubleshooting the manufacturing process. Manufacturing engineers are involved in the design and continuous improvement of products, manufacturing equipment and production tooling. The Manufacturing Engineering curriculum provides education in a variety of areas including manufacturing process, robotics and automation, industrial controls, manufacturing tool design, computer aided design and manufacturing, engineering materials, manufacturing planning and quality control. Technical Electives allow the student flexibility in developing technical breadth or focus in their areas of interest.

### Bachelor Program Objectives

The objective of the Manufacturing Engineering Technology undergraduate program is to offer the student a quality education that provides the greatest possible opportunity for rewarding and successful careers. This includes practical training and technical education in engineering, manufacturing processes, and manufacturing equipment as well as supplemental coursework in communications, mathematics, science, social science, and business.

## Master Program Objectives

The objective of the graduate program in Manufacturing Engineering Technology is to offer students an advanced level of education that will help them to be successful in their professional career. This includes the theoretical and practical training in manufacturing systems, design for manufacturability, development of lean enterprise, quality engineering, computer-aided manufacturing, project management and information systems. The master's degree is also available online to students meeting the admission requirements for the program. There are no residency requirements for this degree. The same degree requirements apply to the online program.

## Student Preparation

Students planning to enter the Manufacturing Engineering Technology Program are strongly encouraged to take mathematics and science training in high school. In addition, courses such as drafting, CAD, computer skills, and industrial arts will prove beneficial.

**Note:** The Portland-Metro campus is a laptop-required campus with resources like laptop specifications, financial aid, and helpful instructions found at <http://www.oit.edu/portland-metro/college-costs/bring-your-own-device>.

## Cooperative Education Program

Students in the Bachelor of Science degree program have an opportunity to work in industry for a specified time and receive college credit. They are encouraged to meet with the Manufacturing Engineering Technology Undergraduate Program Director. MFG students have the opportunity to participate in the state-wide MECOP internship program. For information, see the following Web site: <https://mecopinc.org>.

## Accreditation

The Bachelor of Science in Manufacturing Engineering Technology is accredited by the Engineering Technology Accreditation Commission (ETAC) of ABET, Inc., <http://www.abet.org>. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.

# Mechanical Engineering

## Degree Offered

- Bachelor of Science in Mechanical Engineering

## Program Mission Statement

The Mechanical Engineering Program at Oregon Institute of Technology is an applied engineering program. Its mission is to provide graduates the skills and knowledge for successful careers in mechanical engineering.

## Program Educational Objectives

Program educational objectives are broad statements that describe the career and professional accomplishments that the program is preparing alumni to achieve.

The program expects graduates to achieve, within several years of graduation, the following objectives. Mechanical Engineering graduates will have:

- demonstrated the ability to analyze, design and improve practical thermal and/or mechanical systems
- shown the ability to communicate effectively and work well on team-based engineering projects
- succeeded in entry-level mechanical engineering positions regionally and nationally
- pursued continued professional development, including professional registration, if desired
- successfully pursued engineering graduate studies and research, if desired

## Career Opportunities

Mechanical Engineering is the broadest branch of engineering providing graduates the ability to pursue many varied career paths. It encompasses a wide variety of specialties including alternative energy, mechanical design, thermal/fluids/heat transfer, and mechatronics to name a few. Graduates will find a wide range of opportunities for employment in design, research and development, testing, manufacturing, government agencies, educational institutions, consulting and business. The Mechanical Engineering degree also prepares the student for further study in graduate school.

## Objectives of the Program

The Mechanical Engineering Program at Oregon Institute of Technology provides an excellent theoretical and applied or hands on engineering education. The program provides graduates with a foundation in fundamentals, applications, design, project management, communications, and professional and ethical responsibility.

The program offers coursework in all of the above areas beginning with mathematics, science, machining, welding, and computer aided design topics in the freshman year. Engineering science and physics courses are typically taken by the student in the sophomore

year. Junior and senior curriculum is devoted to analysis, design, and testing aspects of mechanical engineering. Technical electives are available for students to pursue their particular fields of interest.

Throughout the four-year curriculum, emphasis is placed on oral and written communication skills, teamwork and cooperation, and hands on laboratory and project work. Graduates are well-rounded engineers and readily accepted into industry or graduate programs.

### **Student Preparation**

Students planning to enter the Mechanical Engineering curriculum should undertake Mathematics/science training in high school. Such courses as algebra, trigonometry, calculus, physics, chemistry, drafting, CAD, writing, speech, and shop classes will prove beneficial.

**Note:** The Portland-Metro campus is a laptop-required campus with resources like laptop specifications, financial aid, and helpful instructions found at <http://www.oit.edu/portland-metro/college-costs/bring-your-own-device>.

### **Cooperative Field Experience**

There is an opportunity for students in the Bachelor of Science degree program to work in industry for a specified time and receive college credit. Those interested in such an opportunity are encouraged to work out the details with the Mechanical Engineering Program Director. Mechanical Engineering students have the opportunity to participate in the state-wide MECOP internship program. For information, see the following Web site: <https://mecopinc.org>.

### **Accreditation**

The Mechanical Engineering Program is accredited by the Engineering Accreditation Commission (EAC) of ABET, Inc., <http://www.abet.org>. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.

## **Mechanical Engineering Technology**

### **Degree Offered**

- Bachelor of Science in Mechanical Engineering Technology

### **Program Mission Statement**

The Mechanical Engineering Technology Program at Oregon Institute of Technology is an applied engineering technology program. Its mission is to provide graduates with the skills and knowledge for successful careers in mechanical engineering and manufacturing.

### **Program Educational Objectives**

Program educational objectives are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve. The Program Educational Objectives of Oregon Tech's Mechanical Engineering Technology Program are to produce graduates who:

- are able to analyze and design practical mechanical systems
- communicate effectively and work well on team-based engineering projects
- succeed in entry-level mechanical and manufacturing engineering positions
- pursue continued professional development

### **Career Opportunities**

Mechanical Engineering Technology graduates find a wide range of opportunities for employment in design, research and development, testing, manufacturing, government agencies, educational institutions, consulting and business. The largest number of graduates are employed by manufacturing firms. There, the graduates may develop new products, improve existing products, modify existing products for easier manufacture, or develop equipment for use in the production process. The work done by Mechanical Engineering Technologists varies widely. Interfacing computers and machines is a rapidly growing area of employment. This involvement with robotics and automation is having an impact on most mechanical systems. New materials such as high strength ceramics and polymers, fiber reinforced plastics, and new bonding agents are growing in importance and their applications will offer many interesting and fulfilling careers. Energy systems become increasingly important as energy costs rise. Aerospace firms employ many Oregon Tech graduates in design, testing, and manufacturing. Careers in such traditional areas as power plants, heating and cooling systems, gas and steam turbines, and automotive systems are within the domain for the Mechanical Engineering Technologist.

### **Objectives of the Program**

The objective of the Mechanical Engineering Technology Program is to ensure that graduates of this curriculum acquire competency in those theoretical, applied engineering and practical subjects necessary to become successful in their careers. The program strives to maintain a reputation for academic standards that will assure graduates a welcome by prospective employers.

### **Student Preparation**

Students planning to enter the Mechanical Engineering Technology curriculum should undertake mathematics-science training in high school. Such courses as algebra, geometry, trigonometry, physics, chemistry, drafting, CAD, English, writing, speech, and shop classes will prove beneficial.

**Note:** The Portland-Metro campus is a laptop-required campus with resources like laptop specifications, financial aid, and helpful instructions found at <http://www.oit.edu/portland-metro/college-costs/bring-your-own-device>.

### **Cooperative Field Experience**

There is an opportunity for students in the Bachelor of Science degree program to work in industry for a specified time and receive college credit. Those interested in such an opportunity are encouraged to work out the details with the Mechanical Engineering Technology program director. MET students have the opportunity to participate in the state-wide MECOP internship program. For information, see the following Web site: <https://mecopinc.org>.

### **Accreditation**

The Mechanical Engineering Technology Program is accredited by the Engineering Technology Accreditation Commission (ETAC) of ABET, Inc., <http://www.abet.org>. ABET is a specialized accrediting board recognized by the Council for Higher Education and/ or the Secretary of the U.S. Department of Education.

## Manufacturing Engineering Technology, BS

### Degree Requirements

The Bachelor of Science in Manufacturing Engineering Technology requires completing 192 credit hours, as prescribed in the following curriculum outline. Several of these courses are titled manufacturing elective, and allow the student some flexibility to pursue specific career objectives within the manufacturing engineering field. Upper-division manufacturing engineering technology courses not specifically required for graduation, as well as selected upper-division mechanical engineering technology courses and other approved courses, may be used as manufacturing electives. Students should contact their advisor for specific details as to which courses qualify as manufacturing electives.

### Engineering Science Elective

In order to satisfy the engineering science elective, the student must complete one of the following courses:

- ENGR 212 - Engineering Mechanics: Dynamics Credit Hours: 3
- MET 218 - Fluid Mechanics Credit Hours: 4
- ENGR 355 - Thermodynamics Credit Hours: 3

### Business/Management Restricted Elective

In order to satisfy the business/management restricted elective the student must complete one of the following courses:

- BUS 226 - Business Law Credit Hours: 3
- BUS 304 - Engineering Management Credit Hours: 3
- BUS 335 - Entrepreneurship II Credit Hours: 3
- MGT 321 - Operations Management I Credit Hours: 3
- MGT 461 - Lean/Six Sigma Management I Credit Hours: 3
- MGT 462 - Lean/Six Sigma Management II Credit Hours: 3

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- ENGR 111 - MMET Orientation Credit Hours: 2
- MATH 111 - College Algebra Credit Hours: 4
- WRI 121 - English Composition Credit Hours: 3
- Humanities/Social Science Elective Credit Hours: 3<sup>a</sup>
- Humanities/Social Science Elective Credit Hours: 3<sup>a</sup>

**Total: 15 Credit Hours**

##### Winter

- CHE 201 - General Chemistry I Credit Hours: 3<sup>b</sup>
- CHE 204 - General Chemistry I Laboratory Credit Hours: 1<sub>b</sub>
- MATH 112 - Trigonometry Credit Hours: 4
- MET 241 - CAD for Mechanical Design I Credit Hours: 2
- MFG 120 - Introductory Machining Processes Credit Hours: 4
- WRI 122 - Argumentative Writing Credit Hours: 3

**Total: 17 Credit Hours**

##### Spring

- MATH 251 - Differential Calculus Credit Hours: 4
- MET 242 - CAD for Mechanical Design II Credit Hours: 2
- MFG 103 - Introductory Welding Processes Credit Hours: 3
- SPE 111 - Public Speaking Credit Hours: 3
- Humanities/Social Science Elective Credit Hours: 3<sup>a</sup>

**Total: 15 Credit Hours**

#### Sophomore Year

##### Fall

- MATH 252 - Integral Calculus Credit Hours: 4
- MECH 260 - Engineering Materials I Credit Hours: 3
- MFG 314 - Geometric Dimensioning and Tolerancing Credit Hours: 3
- PHY 221 - General Physics with Calculus Credit Hours: 4
- Humanities/Social Science Elective Credit Hours: 3<sup>a</sup>

**Total: 17 Credit Hours**

##### Winter

- ENGR 211 - Engineering Mechanics: Statics Credit Hours: 4<sub>c</sub>
- MATH 361 - Statistical Methods I Credit Hours: 4
- MFG 112 - Introduction to Manufacturing Processes Credit Hours: 3
- PHY 222 - General Physics with Calculus Credit Hours: 4

**Total: 15 Credit Hours**

##### Spring

- ENGR 213 - Engineering Mechanics: Strength of Materials Credit Hours: 4<sup>c</sup>
- ENGR 236 - Fundamentals of Electric Circuits Credit Hours: 3
- ENGR 266 - Engineering Computation Credit Hours: 3
- MATH 362 - Statistical Methods II Credit Hours: 4
- WRI 227 - Technical Report Writing Credit Hours: 3

**Total: 17 Credit Hours**

**Junior Year****Fall**

- ENGR 326 - Electric Power Systems Credit Hours: 3
- MECH 315 - Machine Design I Credit Hours: 3
- MECH 360 - Engineering Materials II Credit Hours: 3
- MET 375 - Solid Modeling Credit Hours: 3
- MFG 313 - Manufacturing Analysis and Planning Credit Hours: 3
- MFG 341 - Numerical Control Programming Credit Hours: 3

**Total: 18 Credit Hours****Winter**

- MECH 316 - Machine Design II Credit Hours: 3
- MECH 363 - Engineering Instrumentation Credit Hours: 3
- MFG 333 - Statistical Methods for Quality Improvement Credit Hours: 3
- MFG 342 - Computer Aided Machining Credit Hours: 3
- MFG 343 - Manufacturing Tool Design Credit Hours: 3

**Total: 15 Credit Hours****Spring**

- MFG 331 - Industrial Controls Credit Hours: 3
- MFG 344 - Design of Manufacturing Tooling Credit Hours: 3
- SPE 321 - Small Group and Team Communication Credit Hours: 3
- Engineering Science Elective Credit Hours: 3<sup>d</sup>
- Project Management Requirement Credit Hours: 3<sup>e</sup>

**Total: 15 Credit Hours****Senior Year****Fall**

- ANTH 452 - Globalization Credit Hours: 3
- ENGR 491 - MMET Senior Projects I Credit Hours: 3
- MFG 453 - Automation and Robotics in Manufacturing Credit Hours: 3
- MFG 454 - Thermal Systems for Manufacturing Credit Hours: 3
- WRI 327 - Advanced Technical Writing Credit Hours: 3
- MFG Elective Credit Hours: 3<sup>f</sup>

**Total: 18 Credit Hours****Winter**

- ENGR 492 - MMET Senior Projects II Credit Hours: 3
- MGT 345 - Engineering Economy Credit Hours: 3
- Humanities Elective Credit Hours: 3
- MFG Elective Credit Hours: 3<sup>f</sup>
- MFG Elective Credit Hours: 3<sup>f</sup>

**Total: 15 Credit Hours****Spring**

- ENGR 415 - Occupational Safety Credit Hours: 3
- ENGR 493 - MMET Senior Projects III Credit Hours: 3
- MECH 426 - Fluid Power Systems Credit Hours: 3
- MFG 447 - Lean Manufacturing Credit Hours: 3
- Humanities/Social Science Elective Credit Hours: 3<sup>a</sup>

**Total: 15 Credit Hours****Total for a B.S. in Manufacturing Engineering Technology: 192 Credit Hours**

<sup>a</sup> Select 9 credits of Humanities electives and 9 credits of Social Science electives. ANTH 452 fulfills the remaining credits needed to satisfy the 12 credits of Social Science courses for the Baccalaureate general education requirements

<sup>b</sup> CHE 101 and CHE 104 should be taken if needed to adequately prepare for CHE 201 and CHE 204. Any credits earned from these courses (CHE101/104) do not apply to the degree program. Consult with an academic advisor for further guidance

<sup>c</sup> MECH 221, MECH 222, MECH 223 may be alternatively taken (as an entire sequence) to satisfy the ENGR 211 and ENGR 213 requirements

<sup>d</sup> Select **one** course from the following list: ENGR 212, ENGR 355, or MECH 318

<sup>e</sup> Select either ENGR 445 or MGT 335

<sup>f</sup> Consult with an academic advisor or program director regarding available and appropriate MFG elective courses. Certain ENGR, MECH, and MET upper-division courses not already required for the program are also acceptable

## Manufacturing Engineering Technology, MS

### Degree Requirements

The Master of Science in Manufacturing Engineering Technology requires completing 45 credit hours of graduate work, with at least 30 credit hours of graduate coursework from the following four Curriculum Content Areas (CCAs):

- Engineering Science and Design Technology
- Manufacturing Software and Computer Integration
- Advanced Manufacturing Materials and Processes Technology
- Business, Financial and Management Processes

In addition to the 30 CCA credit hours, students must complete 12 credits toward thesis or 9 credits toward an approved project and three credits in graduate seminars. Students must take at least one course in each of the four CCAs and three courses in at least one CCA. All graduate courses are three credits each. See Master's student advisor to complete an academic plan.

## Manufacturing Engineering Technology/Mechanical Engineering Technology, BS

### Concurrent Degree

The Mechanical and Manufacturing Engineering Technology Department provides the opportunity for the interested student to earn concurrent degrees in Manufacturing Engineering Technology (MFG) and Mechanical Engineering Technology (MET) or Mechanical Engineering (MECH). Students who earn both degrees are highly sought after and have been very successful in industry. The concurrent degree program usually requires the student to complete an additional year of study beyond the Bachelor's Degree in Mechanical Engineering or Mechanical Engineering Technology.

### Fall

- MFG 313 - Manufacturing Analysis and Planning Credit Hours: 3
- MFG 341 - Numerical Control Programming Credit Hours: 3
- MFG 453 - Automation and Robotics in Manufacturing Credit Hours: 3
- BUS/MGT Restricted Elective Credit Hours 3<sup>a</sup>
- Manufacturing Elective Credit Hours: 3<sup>b</sup>

**Total: 15 Credit Hours**

### Winter

- MFG 112 - Introduction to Manufacturing Processes Credit Hours: 3<sup>c</sup>
- MFG 333 - Statistical Methods for Quality Improvement Credit Hours: 3
- MFG 342 - Computer Aided Machining Credit Hours: 3
- MFG 343 - Manufacturing Tool Design Credit Hours: 3
- MATH 362 - Statistical Methods II Credit Hours: 4

**Total: 16 Credit Hours**

### Spring

- ENGR 415 - Occupational Safety Credit Hours: 3
- MFG 331 - Industrial Controls Credit Hours: 3
- MFG 344 - Design of Manufacturing Tooling Credit Hours: 3
- MFG 447 - Lean Manufacturing Credit Hours: 3
- Manufacturing Elective Credit Hours: 3<sup>b</sup>

**Total: 15 Credit Hours**

<sup>a</sup> Restricted Elective from the following courses: BUS 226, BUS 304, BUS 335, MGT 321, MGT 461 or MGT 462

<sup>b</sup> These courses must be different than those used to satisfy the BS degree in MET or MECH. In all cases the student must have at least 36 credits of additional coursework beyond the MET or MECH degree to qualify for the concurrent degree in MFG

<sup>c</sup> This course is already required for the BSMET degree

## Manufacturing Engineering Technology/Mechanical Engineering, BS

### Concurrent Degree

The Mechanical and Manufacturing Engineering Technology Department provides the opportunity for the interested student to earn concurrent degrees in Manufacturing Engineering Technology (MFG) and Mechanical Engineering Technology (MET) or Mechanical Engineering (MECH). Students who earn both degrees are highly sought after and have been very successful in industry. The concurrent degree program usually requires the student to complete an additional year of study beyond the Bachelor's Degree in Mechanical Engineering or Mechanical Engineering Technology.

#### Fall

- MFG 313 - Manufacturing Analysis and Planning Credit Hours: 3
- MFG 341 - Numerical Control Programming Credit Hours: 3
- MFG 453 - Automation and Robotics in Manufacturing Credit Hours: 3
- BUS/MGT Restricted Elective Credit Hours 3<sup>a</sup>
- Manufacturing Elective Credit Hours: 3<sup>b</sup>

**Total: 15 Credit Hours**

#### Winter

- MFG 112 - Introduction to Manufacturing Processes Credit Hours: 3<sup>c</sup>
- MFG 333 - Statistical Methods for Quality Improvement Credit Hours: 3
- MFG 342 - Computer Aided Machining Credit Hours: 3
- MFG 343 - Manufacturing Tool Design Credit Hours: 3
- MATH 362 - Statistical Methods II Credit Hours: 4

**Total: 16 Credit Hours**

#### Spring

- ENGR 415 - Occupational Safety Credit Hours: 3
- MFG 344 - Design of Manufacturing Tooling Credit Hours: 3
- MFG 447 - Lean Manufacturing Credit Hours: 3
- MFG 331 - Industrial Controls Credit Hours: 3
- Manufacturing Elective Credit Hours: 3<sup>b</sup>

**Total: 15 Credit Hours**

<sup>a</sup> Restricted Elective from the following courses: BUS 226, BUS 304, BUS 335, MGT 321, MGT 461 or MGT 462

<sup>b</sup> These courses must be different than those used to satisfy the BS degree in MET or MECH. In all cases the student must have at least 36 credits of additional coursework beyond the MET or MECH degree to qualify for the concurrent degree in MFG

<sup>c</sup> This course is already required for the BSMET degree

## Mechanical Engineering Technology, BS

### Degree Requirements

In the curriculum listings appear several courses titled "MET Elective." MET electives allow the student to select and pursue specific career objectives within the mechanical engineering technology field. MET electives are upper-division MET courses, not specifically required for graduation.

Students from other institutions should refer to the sections of this catalog titled "Transfer Students" and "Admission to Baccalaureate Programs." The Bachelor of Science in Mechanical Engineering Technology requires 191 credit hours as prescribed in the following curriculum outline.

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- CHE 201 - General Chemistry I Credit Hours: 3
- CHE 204 - General Chemistry I Laboratory Credit Hours: 1
- ENGR 111 - MMET Orientation Credit Hours: 2
- MATH 111 - College Algebra Credit Hours: 4
- WRI 121 - English Composition Credit Hours: 3
- Psychology Elective Credit Hours: 3<sup>a</sup>

**Total: 16 Credit Hours**

##### Winter

- MATH 112 - Trigonometry Credit Hours: 4
- MFG 120 - Introductory Machining Processes Credit Hours: 4
- WRI 122 - Argumentative Writing Credit Hours: 3
- Humanities Elective Credit Hours: 3
- Social Science Elective Credit Hours: 3

**Total: 17 Credit Hours**

##### Spring

- MATH 251 - Differential Calculus Credit Hours: 4
- MFG 103 - Introductory Welding Processes Credit Hours: 3
- SPE 111 - Public Speaking Credit Hours: 3
- Economics Elective Credit Hours: 3
- Humanities Elective Credit Hours: 3

**Total: 16 Credit Hours**

#### Sophomore Year

##### Fall

- MATH 252 - Integral Calculus Credit Hours: 4
- MECH 260 - Engineering Materials I Credit Hours: 3
- MET 241 - CAD for Mechanical Design I Credit Hours: 2
- PHY 221 - General Physics with Calculus Credit Hours: 4
- WRI 227 - Technical Report Writing Credit Hours: 3

**Total: 16 Credit Hours**

##### Winter

- ENGR 211 - Engineering Mechanics: Statics Credit Hours: 4<sup>b</sup>
- MATH 254 - Vector Calculus I Credit Hours: 4
- MET 242 - CAD for Mechanical Design II Credit Hours: 2
- MFG 112 - Introduction to Manufacturing Processes Credit Hours: 3
- PHY 222 - General Physics with Calculus Credit Hours: 4

**Total: 17 Credit Hours**

##### Spring

- ENGR 213 - Engineering Mechanics: Strength of Materials Credit Hours: 4<sup>b</sup>
- ENGR 266 - Engineering Computation Credit Hours: 3
- MATH 361 - Statistical Methods I Credit Hours: 4
- PHY 223 - General Physics with Calculus Credit Hours: 4

**Total: 15 Credit Hours**

#### Junior Year

##### Fall

- ENGR 236 - Fundamentals of Electric Circuits Credit Hours: 3
- ENGR 355 - Thermodynamics Credit Hours: 3
- MECH 315 - Machine Design I Credit Hours: 3
- MECH 360 - Engineering Materials II Credit Hours: 3
- MET 375 - Solid Modeling Credit Hours: 3

**Total: 15 Credit Hours**

##### Winter

- ENGR 212 - Engineering Mechanics: Dynamics Credit Hours: 3
- MECH 318 - Fluid Mechanics I Credit Hours: 4
- MECH 316 - Machine Design II Credit Hours: 3
- MECH 363 - Engineering Instrumentation Credit Hours: 3
- SPE 321 - Small Group and Team Communication Credit Hours: 3

**Total: 16 Credit Hours**

##### Spring

- MATH 321 - Applied Differential Equations I Credit Hours: 4
- MECH 313 - Thermodynamics II Credit Hours: 3
- MECH 351 - Finite Element Analysis Credit Hours: 3
- MFG 314 - Geometric Dimensioning and Tolerancing Credit Hours: 3
- Project Management Requirement Credit Hours: 3<sup>c</sup>

**Total: 16 Credit Hours**

#### Senior Year

##### Fall

- ENGR 326 - Electric Power Systems Credit Hours: 3
- ENGR 491 - MMET Senior Projects I Credit Hours: 3
- MECH 323 - Heat Transfer I Credit Hours: 3
- MGT 345 - Engineering Economy Credit Hours: 3
- MET Elective Credit Hours: 3<sup>d</sup>

**Total: 15 Credit Hours**

**Winter**

- ENGR 492 - MMET Senior Projects II Credit Hours: 3
- MECH 437 - Heat Transfer II Credit Hours: 2
- WRI 327 - Advanced Technical Writing Credit Hours: 3
- MET Elective Credit Hours: 3<sup>d</sup>
- MET Elective Credit Hours: 3<sup>d</sup>
- Social Science Elective Credit Hours: 3

**Total: 17 Credit Hours****Spring**

- ENGR 493 - MMET Senior Projects III Credit Hours: 3
- MECH 426 - Fluid Power Systems Credit Hours: 3
- MFG 331 - Industrial Controls Credit Hours: 3
- Humanities Elective Credit Hours: 3
- MET Elective Credit Hours: 3<sup>d</sup>

**Total: 15 Credit Hours****Total for a B.S. in Mechanical Engineering Technology: 191 Credit Hours**<sup>a</sup> PSY 201 is highly recommended<sup>b</sup> MECH 221, MECH 222, and MECH 223 may be alternatively taken (as an entire sequence) to satisfy the ENGR 211 and ENGR 213 requirements<sup>c</sup> Select either ENGR 445 or MGT 335<sup>d</sup> Consult with an academic advisor or program director regarding available and appropriate MET elective courses. Certain ENGR, MECH and MET upper-division courses not already required for the program **are also** acceptable

## Mechanical Engineering, BS

### Degree Requirements

In the curriculum listings appear several courses titled "MECH Elective." MECH electives allow the student to select and pursue specific career objectives within the mechanical engineering field. MECH electives are upper-division MECH courses, not specifically required for graduation.

Students from other institutions should refer to the sections of this catalog titled "Transfer Students" and "Admission to Baccalaureate Programs."

The Bachelor of Science in Mechanical Engineering requires 192 credit hours as prescribed in the following curriculum outline.

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Freshman Year

##### Fall

- CHE 201 - General Chemistry I Credit Hours: 3
- CHE 204 - General Chemistry I Laboratory Credit Hours: 1
- ENGR 111 - MMET Orientation Credit Hours: 2
- WRI 121 - English Composition Credit Hours: 3
- Humanities/Social Science Elective Credit Hours: 3<sup>a</sup>
- College Algebra (if suggested by advisor)<sup>b</sup>

**Total: 12 Credit Hours**

##### Winter

- CHE 202 - General Chemistry II Credit Hours: 3
- CHE 205 - General Chemistry II Laboratory Credit Hours: 1
- MFG 103 - Introductory Welding Processes Credit Hours: 3
- WRI 122 - Argumentative Writing Credit Hours: 3
- Humanities/Social Science Elective Credit Hours: 3<sup>a</sup>
- Trigonometry (if suggested by advisor)<sup>b</sup>

**Total: 13 Credit Hours**

##### Spring

- MATH 251 - Differential Calculus Credit Hours: 4
- MFG 120 - Introductory Machining Processes Credit Hours: 4
- MET 241 - CAD for Mechanical Design I Credit Hours: 2
- SPE 111 - Public Speaking Credit Hours: 3
- Economics Elective Credit Hours: 3<sup>a</sup>

**Total: 16 Credit Hours**

#### Sophomore Year

##### Fall

- MATH 252 - Integral Calculus Credit Hours: 4
- MECH 260 - Engineering Materials I Credit Hours: 3
- MET 242 - CAD for Mechanical Design II Credit Hours: 2
- PHY 221 - General Physics with Calculus Credit Hours: 4
- WRI 227 - Technical Report Writing Credit Hours: 3

**Total: 16 Credit Hours**

##### Winter

- ENGR 211 - Engineering Mechanics: Statics Credit Hours: 4<sup>f</sup>
- MATH 254 - Vector Calculus I Credit Hours: 4
- MFG 314 - Geometric Dimensioning and Tolerancing Credit Hours: 3
- PHY 222 - General Physics with Calculus Credit Hours: 4

**Total: 15 Credit Hours**

##### Spring

- ENGR 213 - Engineering Mechanics: Strength of Materials Credit Hours: 4<sup>f</sup>
- ENGR 236 - Fundamentals of Electric Circuits Credit Hours: 3
- ENGR 266 - Engineering Computation Credit Hours: 3
- MATH 321 - Applied Differential Equations I Credit Hours: 4
- PHY 223 - General Physics with Calculus Credit Hours: 4

**Total: 18 Credit Hours**

#### Junior Year

##### Fall

- MATH 341 - Linear Algebra I Credit Hours: 4
- MECH 318 - Fluid Mechanics I Credit Hours: 4
- MECH 363 - Engineering Instrumentation Credit Hours: 3
- MET 375 - Solid Modeling Credit Hours: 3
- Statistics Requirement Credit Hours: 4<sup>c</sup>

**Total: 18 Credit Hours**

##### Winter

- ENGR 212 - Engineering Mechanics: Dynamics Credit Hours: 3
- ENGR 326 - Electric Power Systems Credit Hours: 3
- ENGR 355 - Thermodynamics Credit Hours: 3
- MECH 315 - Machine Design I Credit Hours: 3
- MECH 360 - Engineering Materials II Credit Hours: 3
- SPE 321 - Small Group and Team Communication Credit Hours: 3

**Total: 18 Credit Hours**

##### Spring

- HUM 125 - Introduction to Technology, Society and Values Credit Hours: 3
- MATH 451 - Numerical Methods I Credit Hours: 4
- MECH 313 - Thermodynamics II Credit Hours: 3
- MECH 316 - Machine Design II Credit Hours: 3
- MECH Elective Credit Hours: 3<sup>d</sup>

**Total: 16 Credit Hours**

**Senior Year****Fall**

- ENGR 491 - MMET Senior Projects I Credit Hours: 3
- MECH 323 - Heat Transfer I Credit Hours: 3
- MECH 351 - Finite Element Analysis Credit Hours: 3
- WRI 327 - Advanced Technical Writing Credit Hours: 3
- Fluid Mechanics II Requirement Credit Hours: 3<sup>c</sup>
- MECH Elective Credit Hours: 3<sup>d</sup>

**Total: 18 Credit Hours****Winter**

- ENGR 492 - MMET Senior Projects II Credit Hours: 3
- MECH 437 - Heat Transfer II Credit Hours: 2
- MECH 480 - Mechanical Vibrations Credit Hours: 3
- PHIL 331 - Ethics in the Professions Credit Hours: 3
- Humanities/Social Science Elective Credit Hours: 3<sup>a</sup>
- MECH Elective Credit Hours: 3<sup>d</sup>

**Total: 17 Credit Hours****Spring**

- ENGR 493 - MMET Senior Projects III Credit Hours: 3
- MECH 436 - Classical Control Systems Credit Hours: 3
- MGT 345 - Engineering Economy Credit Hours: 3
- Humanities /Social Science Elective Credit Hours: 3<sup>a</sup>
- MECH Elective Credit Hours: 3<sup>d</sup>

**Total: 15 Credit Hours****Total for a B.S. in Mechanical Engineering: 192 Credit Hours**

<sup>a</sup> Along with HUM 125, PHIL 331, and an Economics course, another 3 credits of Humanities courses and 9 credits of Social Science courses. Furthermore, activity or performance-based Humanities courses are not accepted

<sup>b</sup> MATH 111 and MATH 112 should be taken if needed to adequately prepare for MATH 251. Any credits earned from these courses **do not** apply to the degree program. Consult with an academic advisor for further guidance

<sup>c</sup> Select either MATH 361 or MATH 465

<sup>d</sup> Consult with an academic advisor or program director regarding available and appropriate MECH elective courses. MET and MFG electives **are not** acceptable.

<sup>e</sup> Select either MECH 417 or MECH 418, depending upon which course is currently offered

<sup>f</sup> MECH 221, MECH 222, MECH 223 may be alternatively taken (as an entire sequence) to satisfy the ENGR 211 and ENGR 213 requirements

# Graduate Programs

## Admissions and Academic Policies

Graduate degree programs at Oregon Institute of Technology provide students with opportunities for advanced study in various disciplines. Graduates will develop the competence required for leadership roles in professional fields. Graduate education at Oregon Tech maintains an applied focus. Our mission is to integrate theory and practice.

## Admission

The Office of Admissions, in conjunction with the appropriate academic department, maintains all pertinent information regarding the admission of graduate students.

## Admission Requirements

To be considered for admission to a graduate program, an applicant must have a baccalaureate degree from a regionally accredited college or university, as well as a scholastic record that evidences the ability to perform satisfactory graduate work. Specifically, a student shall:

- have completed a four-year college course of study and hold an acceptable baccalaureate degree from an institution accredited by a regional accrediting association
- be in good academic standing at the last college or university attended
- have attained a grade point average of at least 3.0 on a 4.0 scale for the last 90 term (60 semester) units attempted
- have attained a grade point average of at least 3.0 on a 4.0 scale for the last 45 term hours in the major
- satisfactorily meet the professional, personal, scholastic, and other standards for graduate study
- pass qualifying examinations required by specific programs

Unusual circumstances may warrant exceptions to these criteria.

## Application as a Degree-Seeking U.S. Resident Student

Degree-seeking students must submit the following items to the Office of Admissions before the deadlines specified in the Application Deadlines section:

- an official admissions application, along with a \$50 non-refundable application fee. The application fee is waived for applicants who are currently attending Oregon Tech or who graduated from Oregon Tech within the previous two years
- official transcripts from each post-secondary educational institution attended

Individual programs may have additional requirements. Applicants must submit all required items before admission to the graduate program will be considered. Submitting the items, however, does not ensure admission. Applicants will receive official notification of admission after a review of the application by the Office of Admissions and the graduate program department.

## Application as an International Degree-Seeking Graduate Student

Oregon Tech must assess the academic preparation of international students. For this purpose, international students, including those who hold U.S. visas as student exchange visitors or other non-immigrant classifications, should apply early. Official transcripts must be on file at least eight weeks before registration for the first term and, if not written in English, must be accompanied by a certified English translation.

All international applicants from countries in which English is not the native language must take the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System exam (IELTS). A minimum score of 520 paper based TOEFL, 68 internet-based TOEFL or 6 IELTS is required for consideration. This requirement may be waived for some students whose primary language is English. Since the results of this test constitute part of the material reviewed for admission to graduate studies at Oregon Tech, students should arrange to have their test scores sent directly from the testing agency to the Office of Admissions well before the application deadline.

The following is an application checklist for degree-seeking international students:

1. submit the graduate application for admission with the \$50 (U.S.) application fee
2. submit the international graduate student supplement to the graduate application form (as well as the Statement of Financial Responsibility form), available from the Admissions Office
3. provide evidence of ability to meet educational expenses at Oregon Tech. The Statement of Financial Responsibility form must be completed and submitted with documentation such as official bank statements and tax returns
4. official academic transcripts of all university course work sent to Oregon Tech
5. for university course work done outside the United States, transcripts must be reviewed by an evaluation service. There are several such services that are acceptable. A "course-by-course evaluation" or a "detail report" is necessary
6. proof of proficiency in the English language. Oregon Tech requires that international graduate students submit official test scores on the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System exam

(IELTS). A minimum score of 520 paper-based TOEFL, 68 Internet-based TOEFL, or 6 IELTS is required for consideration. This requirement may be waived for some students whose primary language is English

7. students currently in the United States should submit a photocopy of the I-20 form and passport

Individual programs may have additional requirements.

### **Application Deadlines**

Oregon Tech encourages all prospective students to submit graduate application materials six to nine months in advance of the planned enrollment date. This recommendation is especially important for international students in order to allow sufficient time for visa processing. However, applications will be accepted any time before the deadlines listed below. The recommended entrance time is fall term.

- Fall Term: April 1
- Winter Term: July 1
- Spring Term: October 1

### **Residency Classification**

See the residency section of this catalog.

### **Tuition and Fees**

See the tuition and fees section of this catalog.

### **Graduate Assistantships**

Oregon Institute of Technology offers graduate assistantships, awarded on a competitive basis, to qualified graduate students based on department needs. Compensation varies with the type of service, the amount of time required for performing the service, and the academic qualifications and experience of the appointee. An applicant for a graduate assistantship must be admitted to a graduate program. Graduate departments usually award appointments and assistantships by Summer term, effective at the beginning of the next academic year. A graduate assistant application form is available from the appropriate department.

### **Types of Assistantships**

Graduate assistantships (GAs) at Oregon Tech are either research assistantships (RAs) or teaching assistantships (TAs). Research assistantships are awarded by the faculty member administering the research grant and involve providing assistance in fulfilling the goals and objectives of the grant. Depending upon the grant, research assistantships may include additional support for summer term. If you are interested in a research assistantship, contact the faculty members responsible for the grant.

Teaching assistantships are awarded by the department and involve classroom and laboratory instruction. If you are interested in a TA, contact the individual department to determine availability.

### **Assistantship Offer**

Assistantship notices of appointment are awarded on a term-by-term basis and renewal is dependent upon competent performance of assistantship duties, adequate academic progress, departmental needs, and the availability of funds. Assistantships may include a tuition waiver and/or a monthly stipend based upon a percentage of a full-time equivalent (FTE) salary.

### **Assistantship Course Load**

Graduate assistants are expected to maintain full-time enrollment (nine credits). Graduate assistants not enrolled in nine credits of formal courses must supplement the course load with thesis or project credits to maintain full-time enrollment status.

### **Satisfactory Progress**

Graduate assistants must make satisfactory progress toward a graduate degree to retain a graduate assistantship. Satisfactory progress includes:

- maintaining a 3.0 or higher grade point average
- maintaining full-time student enrollment

Failure to maintain satisfactory academic progress will result in loss of an assistantship.

### **Academic Policies**

The Graduate Council determines graduate academic policies at Oregon Tech. Other academic policies and procedures are described and/or defined in the general policies of Oregon Tech.

## Student Rights and Responsibilities

Oregon Tech encourages students to perform at a high academic level, and students are responsible for knowing degree requirements and enrolling in courses that will enable them to complete the master's program. Oregon Tech expects students to conduct themselves in a manner compatible with the university's function as an institution of higher learning. Students should acquaint themselves with regulations for the standard of work required to continue in the graduate school. For additional information, students should consult their graduate advisor.

## Academic Integrity

Oregon Tech's goal is to foster an atmosphere that produces educated, literate graduates. Academic misconduct, such as cheating and plagiarism, will not be tolerated. Cheating includes, but is not limited to, the following:

- use of any unauthorized assistance in taking quizzes, tests or examinations
- dependence upon the aid of sources specifically prohibited by instructors in writing papers, preparing reports, solving problems or carrying out other assignments
- the acquisition, without permission, of tests or other academic materials belonging to a faculty member of the school

Plagiarism includes, but is not limited to, the use, by paraphrase or direct quotation, of the published or unpublished work of another person without acknowledging the source. Plagiarism occurs when a student either copies the work of another person and attempts to receive credit for that work or acquires and uses prepared material from someone who is selling academic materials. These examples are intended to provide general guidelines and are in no way comprehensive in describing academic dishonesty.

Faculty may assign specific penalties for cases of academic misconduct, including a failing grade for a test or assignment, a reduced grade for a test or assignment, or a failing grade in the course. Responding to academic dishonesty is the responsibility of the course instructor. If a student commits plagiarism or other academic dishonesty during the graduate project, the advisor, in consultation with the dean, determines the appropriate response.

All graduate students should acquaint themselves with the definitions and implications of academic misconduct as explained in Oregon Tech's student conduct code. Repercussions for a student guilty of academic conduct violations range from a warning to expulsion. Students may contest a charge of academic misconduct by following the grievance procedure outlined in the OIT catalog and the student handbook, available on the Oregon Tech Web site.

## Student Records

The Registrar's Office maintains a permanent file for each graduate student. Faculty advisors will maintain a file of advising records, grade information and other correspondence pertaining to each graduate student's academic progress. For more information on student records, contact the Registrar's Office.

## Enrollment Status

Full and part-time credit loads for graduate students are defined as follows:

- Full-time: 9 or more credits
- 3/4 time: 7 - 8 credits
- Half-time: 5 - 6 credits

Oregon Tech undergraduate seniors may enroll in 500-level graduate courses for graduate credit with the approval of the student's undergraduate advisor and the graduate program director.

Students who are not yet admitted to Oregon Tech may take up to one third of the graduate program credits as a non-admit student and apply them toward the graduate degree upon formal admission to the graduate program.

Oregon Tech offers some courses which are dual-listed at the 400- and 500-level. The 400-level courses apply only to an undergraduate degree, while 500-level courses apply to both undergraduate and graduate degrees. Students enrolled in a dual-listed 500-level course will be required to complete additional work to obtain graduate credit.

## Continuous Enrollment for All Graduate Students

All graduate degree-seeking students must be continuously enrolled. Continuous enrollment is defined as completing, with grades assigned, a minimum of 1 hour of graduate credit every quarter.

## Academic Prerequisite Deficiencies

Students who have prerequisite deficiencies for graduate studies may be required to take additional course work prior to completing their graduate studies, as determined by the graduate program director. If there are deficiencies, the director will recommend substitute courses, and these are entered on the Graduate Program Form. When students pass these courses with a B or better, they become fully qualified graduate students. Prior to completion of the listed courses, the graduate student is considered "provisionally admitted."

## Academic Performance Standards

Students must maintain a cumulative GPA of 3.0 or better in all graduate work specific to the program of study to remain in good academic standing. Grades below C do not meet requirements for a graduate degree.

Graduate students earning a cumulative GPA of less than 3.0 will be placed on probation and, if no improvement is made, will be suspended from the graduate program. Conditions established for probation and suspension are listed below:

**Academic Probation:** Students having 9 or more attempted credit hours will be placed on academic probation for each term that their cumulative GPA falls below 3.0.

**Academic Suspension:** Students who have served one term on academic probation and have not raised their graduate cumulative GPA to 3.0 in the next term will be placed on academic suspension. Suspended students lose their institutional financial aid, including graduate research and teaching assistantships. A student may appeal academic suspension by following the process outlined in the Oregon Tech catalog. A successful appeal results in probation status.

## Transfer Credits

Students may petition to transfer up to one third of the program graduate term hours earned at other accredited institutions and apply those credits toward an Oregon Tech graduate degree. However, each course must be consistent with the program of study planned by the student and the graduate advisor. Only grades of A and B are acceptable as transfer credit into the graduate program.

## Grading Policy

Oregon Tech uses a 4.0 grading scale to evaluate student performance. Upon completion of a course or upon termination of attendance in the course, a student's performance will be graded by the instructor and reported to the Registrar's Office.

## Requirements

Graduate degree academic requirements are specified by the program. The student, in conference with the graduate faculty advisor, will prepare a program of study for the graduate degree as a guide for planning an academic schedule.

## Application for Graduation

To apply for graduation, the student must submit a petition for graduation to the Registrar's Office two terms in advance of the anticipated final term of work. The petition is a record of the approved program of study. To receive favorable action, candidates must meet the following requirements:

- show that course requirements for the master's degree will be satisfied before or during the final term
- maintain an overall grade point average of at least 3.0
- provide evidence of passing any qualifying or comprehensive examinations, including defense of the master's project or thesis
- obtain approval of both the student's academic advisor and department chair, or by the program director or other faculty member in the event that the student's academic advisor is the department chair

## Right of Appeal

### Philosophy of Policy Application

The graduate student academic grievance procedure provides a mechanism for exchanging information between student and instructor in cases of grade dispute and a safeguard against unfair grading practices. The intent is to provide an informal forum for discussing and resolving differences of opinion.

### Academic Disputes Appealable by Policy

Student claims that final course grade resulted from:

1. unfair or prejudicial treatment by instructor
2. unusual or irregular procedures that impacted an individual student's grade in a disproportionate manner
3. dismissal from a professional program or externship because of failure to meet prerequisite or sequential course requirements

**Note:** *The student should initiate appeals of final grades or professional academic standing within three weeks after distribution of final course grades or dismissal notice. The appropriate academic dean will not consider appeals after that time limit unless the student was incommunicado with the campus or unable to obtain grades after distribution because of academic assignment, or unusual events associated with grading procedure or completion of assignments made it impossible for the student to receive or appeal the grade in a timely manner.*

### Academic and Related Disputes Not Appealable by Policy

1. Grades assigned to tests, quizzes, homework, papers, projects, or other components of a course
2. Final grades based on failure to meet published (via syllabus) standards for the course that involves no unusual or prejudicial treatment

3. Disciplinary or other student conduct matters not specifically covered above
4. Challenges to the instructor's grading system or components thereof, as long as the system was made available to students at the beginning of the academic term

### **Procedure**

1. Student reads policy to determine if grievance is appealable
2. Student makes appointment to discuss dispute with course instructor. Since reconciliation of the dispute at this level is in the best interests of all parties, instructors and students are urged to engage in an honest and open-minded effort to resolve the problem
3. Failing to resolve the dispute with the instructor, the student makes an appointment with the program director and department chair. The student and the instructor document the dispute in writing and bring this to the meeting. Department chair and program director should confer with instructor before consultation with the student. Department chair decides dispute based on available information.
4. If the student disagrees with the decision, s/he may request an appointment with the appropriate dean. The appropriate dean will not see students unless they have followed the preceding steps. If the course instructor is the department chair, the second level of appeal is the appropriate academic dean. The appropriate dean contacts the department chair and program director, and, when appropriate, the course instructor, to obtain information about the dispute. After consultation with the department and the student, the appropriate academic dean offers the student the choice of a summary decision or the opportunity for a hearing with the Graduate Council.

### **Summary Decision by Academic Dean**

If the appropriate academic dean summarily decides the dispute, the grievance is terminated and the department chair, program director, instructor, and the student are notified in writing. If a grade change results, the Registrar's Office is also notified in writing.

### **Graduate Council Hearing**

If the student elects to have the dispute referred to the Graduate Council,

1. The student must prepare a written request, summarizing the reasons for a hearing and the requested intervention (e.g., change of grade, reinstatement), with supporting documentation attached. The request is presented to the academic dean within three academic days after discussion with the dean.
2. The council schedules a hearing at the earliest time mutually available, normally within five academic days after the academic dean receives the request.
3. The department chair and program director receive a copy of the student request and supporting documentation.
4. The Graduate Council chair convenes the hearing and considers the presentations of student and instructor. Either may call witnesses to offer supporting information. The student has the right to have an advisor or attorney. The advisor may be at the student's side, and the student may consult with the advisor, but the advisor may not address or question the council.
5. The council formulates and sends a recommendation, supported by a rationale, to the academic dean. It may include a majority and minority report, if appropriate.
6. After careful consideration of the council's findings, the academic dean renders a final decision and notifies the council, department chair, program director, instructor and student. If the outcome is a grade change, the academic dean notifies the Registrar's Office.

## Course Descriptions

Course descriptions in this section are reasonable summaries only and are neither completely inclusive nor completely exclusive of total course content for any given course.

Courses listed herein may or may not be offered each term.

Courses are listed alphabetically according to prefix.

### Numbering Code

Courses are grouped into a three-digit number series which indicates the normal teaching levels. Some variations may occur.

**1-99** Preparatory and Developmental Courses. Courses numbered below 100 are not applicable toward a degree even though units are assigned, grades are awarded and tuition is assessed.

Lower-Division Courses (freshman and sophomore)

**100-199** First-Year Courses

**200-299** Second-Year Courses

Upper-Division Courses (junior and senior)

**300-399** Third-Year Courses

**400-499** Fourth-Year Courses

Graduate Courses

**500-599** Graduate Courses

### Other Codes

*Each Term:*

Some courses in this section have a code following the course title. This code designates when the course will be offered. F indicates Fall, W indicates Winter, S indicates Spring.

*Lecture, Lab, Credit Hours:*

The three numbers following the course title. For example:

CST 101 Introduction to Personal Computing

(3-3-4) = weekly lecture hours – lab hours – total credits

For more information, see Baccalaureate General Education Requirements

**Courses with the following notation fulfill the appropriate general education requirements:**

**C - Communication H - Humanities HP - Humanities Performance SS - Social Science**

### Special Terms

**As Required:** This term designates a course or series of courses which will be offered only as enrollment, student interest, or individual department needs demand and as staffing allows. A course so designated may be offered if special student needs, situations of extreme hardship, or other unusual circumstances deem it in the best interest of both the student(s) and the institution to do so.

**Hours to be Arranged Each Term:** Normally students negotiate individually with faculty members and/or departments and arrange to have courses so designated offered for the term most suitable to their unique situation.

**Corequisite:** A course that must be taken simultaneously with another course. Corequisites are noted at the end of each course description.

**Prerequisite:** A course that must be passed satisfactorily before another course may be taken. Prerequisites are noted at the end of each course description. Courses transferred in to Oregon Tech with a C- or better meet the prerequisite requirement of obtaining a C or better.

**Quarter Credit:** A credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally established equivalency that reasonably approximates not less than:

1. One hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work each week for approximately fifteen weeks for one semester or trimester hour of credit, or ten to twelve weeks for one quarter hour of credit, or the equivalent amount of work over a different amount of time; or

2. At least an equivalent amount of work as required in paragraph (1) of this definition for other academic activities as established by the institution, including laboratory work, internships, practicals, studio work, and other academic work leading to the award of credit hours.

A numerical credit value assigned to certain number of lecture or laboratory hours. A lecture class meeting for three 50-minute periods a week would be assigned three units of credit. Students have traditionally been expected to spend an additional six hours of outside class work per week for each three units of lecture class credit. Generally, a lab class requires three hours per week for one unit of credit, or a total of nine in-lab hours with no additional outside class work expected for three units of lab class credit.

**Reading and Conference:** A course taken on an independent study basis with the supervision of an instructor, usually consisting of weekly conferences, assigned readings, research papers, etc.

**Seminar:** A class taught by a group discussion process rather than by means of formal lecture. Student research and reporting are usually expected.

**Sequence:** A series of classes in the same subject area that, taken as a whole, comprise a full year's work. Generally, course sequences are numbered consecutively, and often (though not always) should be taken in the numerical order listed (i.e., CHE 201 should be taken before CHE 202, etc.).

**Applied Behavior Analysis****ABA 501 - ABA Colloquium**

Lecture Hours: 1

Lab Hours: 0

Credit Hours: 1

Weekly seminar focused on current topics, research in ABA. May be repeated for credit.

**ABA 511 - Foundations of ABA I**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Basic principles, characteristics, and concepts of Applied Behavioral Analysis (ABA). Includes history of ABA, terminology, and applications.

**ABA 512 - Foundations of ABA II**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Basic principles, characteristics, and concepts of Applied Behavioral Analysis (ABA). Foundational knowledge for practice of ABA; introduction to measurement and data analysis.

Prerequisite: ABA 511

**ABA 515 - Basic Behavior Analysis**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Experimental analysis of behavior, human and non-human research, basic principles of operant and respondent conditioning.

**ABA 516 - ABA and Human Development**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Typical and atypical development across the lifespan, emphasis on behavioral theories, principles, and applications.

Prerequisite: ABA 512 with grade "B" or better

**ABA 521 - Ethics and Professional Issues I**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to ethical and professional issues in Applied Behavior Analysis (ABA). Professional identity, certification and licensure, code of conduct, confidentiality and privacy.

**ABA 522 - Ethics and Professional Issues II**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Examines ethical and professional issues in Applied Behavior Analysis (ABA) including ethical and professional conduct, ethical decision making, implementation, management and supervision, and professional practices.

Prerequisite: ABA 521

**ABA 525 - Research Methods in ABA**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Methods for conducting valid and reliable behavioral measurement and experimental evaluations of behavioral interventions, including data collection, data display, and data interpretation and designing and evaluating behavioral research designs.

**ABA 526 - Behavioral Assessment**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Behavioral assessment including descriptive assessments and functional analysis; methods of assessment, data collection and interpretation; assessment based selection of intervention; ethical and practical issues.

**ABA 527 - Radical Behaviorism**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Concepts, principles, history, and philosophy of behaviorism; behavioral theory and understanding behavior.

Prerequisites: ABA 511 and ABA 515 with grade "B" or better

**ABA 531 - Behavioral Change I**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Fundamental elements of, and ethical and practical considerations related to behavior change, behavioral interventions, behavior change systems, and specific behavior change procedures.

Prerequisite: ABA 512

**ABA 532 - Behavior Change II**

(Su)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Behavior analytic interventions.

Fundamental elements of, and ethical and practical considerations related to behavior change, behavioral interventions, behavior change systems, and specific behavior change procedures.

Prerequisite: ABA 531

**ABA 535 - Special Topics in ABA**

(Su)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Examination of systems, interventions, current issues, and/or advances in Applied Behavior Analysis; includes focus on strategies for managing program implementation and supervision of behavior change agents. Topics vary.

Prerequisites: ABA 525 and ABA 531

**ABA 536 - Behavior, Physiology, and Pharmacology**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Interrelationship of physiological and behavioral processes, includes psychotropic medications, drug effects and interactions.

Prerequisite: ABA 515 with grade "B" or better

**ABA 565 - Organizational Behavior Management**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Application of the theory, principles, and methods of behavior analysis in businesses, industries, human service organizations, and governments.

Prerequisites: ABA 522, ABA 525, and ABA 532 all with grade "B" or better

**ABA 566 - ABA and Education**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Applications of behavior analysis in education; instructional design and classroom behavior management applications in education, special education, and college instruction.

Prerequisites: ABA 525 and ABA 532, both with grade "B" or better

**ABA 567 - ABA and Health**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Application of the theory, principles, and methods of behavior analysis to areas of behavioral medicine, individual health, and public health.

Prerequisites: ABA 522 and ABA 536, both with grade "B" or better

**ABA 575 - Community Behavior Analysis**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Applications of behavior analysis in the community; historical developments, conceptual issues, and practical issues are examined; applications to socially significant issues.

Prerequisites: ABA 525 and ABA 532, both with grade "B" or better

**ABA 576 - Clinical Behavior Analysis**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Clinical applications of behavior analysis; focus on methods, theory, and evidence-based practices.

Prerequisites: ABA 522, ABA 525, and ABA 532, all with grade "B" or better

**ABA 577 - ABA and Special Populations**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Applications of behavior analysis across diverse populations including intellectual and developmental disabilities, autism, and brain injury; ethical, legal, and practical considerations.

Prerequisites: ABA 521, ABA 525, and ABA 532, all with grade "B" or better

**ABA 598 - Supervised Practicum**

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

Supervised experience in Applied Behavior Analysis. Designed to meet Intensive Practicum experience standards and supervisory requirements of the Behavior Analysts Certification Board (BACB®). Students will have the opportunity to develop proficiency in behavior analytic consultation and service delivery. May be repeated for credit.

**ABA 599 - Thesis**

Lecture Hours: 1

Lab Hours: 0

Credit Hours: 1

Supervised research experience for the thesis leading to the master's degree in Applied Behavior Analysis. May be repeated for credit.

Prerequisites: ABA 521, ABA 525, and ABA 531, all with grade "B" or better

**Academic Success****ACAD 101 - Student Success Seminar (F,W,S)**

Credit Hours: (Variable Credit)

A course to facilitate the success of first year students at Oregon Tech. Emphasis on faculty-student and student-student interactions. Includes academic resources, campus services, the learning process, communication skills, and health and wellness issues. May also include academic skills and career planning.

**ACAD 105 - Achieving Academic Success (F,W,S)**

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

Course identifies attitudes, behaviors and specific strategies that will lead to academic success at the college level.

Topics may include study habits, time management, strategies for memorization and test-taking and goal-setting.

**ACAD 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**ACAD 115 - Career Exploration (F)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Effective academic and career decision-making is facilitated by thorough self-assessment, exploration of the world of work and identification of appropriate academic majors. Course includes activities such as personality type testing, research, visits to academic departments and information interviews with professionals in various occupations.

**ACAD 120 - Stress Management (F,S)**

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

Identifies signs and symptoms of stress as well as the ways in which they impact student academic success. Effective ways of dealing with stress, including relaxation techniques, will be identified, discussed and practiced.

**ACAD 135 - Reading Tutor**

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

For "America Reads" tutors. Provides information about how children learn to read and write, strategies for teaching children and working in an elementary school.

**ACAD 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**ACAD 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**ACAD 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**Accounting****ACC 101 - Introduction to Accounting (F,W,S)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

The principles of elementary accounting systems for small businesses.

**ACC 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**ACC 115 - Basic Income Tax Preparation**

Lecture Hours: 2

Lab Hours: 4

Credit Hours: 3

Federal and state laws, ethics and regulations applicable to individual income tax returns. Prepares tax preparers for the qualifying examination and meets the personal needs of individuals preparing their own returns.

**ACC 124 - Business Math/Machines**  
(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Business math such as decimals, percents, markups, proration and interest. Emphasis on operational techniques of electronic calculators for problem solving.

**ACC 201 - Principles of Accounting I**  
(F,W)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Introduction to terminology, content and form of financial statements for sole proprietorships. Recording of data for use in preparing profit-and loss statements and balance sheets.

Prerequisite: MATH 100 or equivalent

**ACC 202 - Principles of Accounting II**  
(W,S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

A continuation of ACC 201 with emphasis on corporate accounting.

Prerequisite: ACC 201 with grade "C" or better

**ACC 203 - Principles of Managerial Accounting**  
(F,W,S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Theory and procedure in gathering cost data and their use in analyzing and controlling operation costs: job-order and process-cost systems. Technique of standard costs, analysis of variance, managerial reports and specialized cost programs including activity based costing systems.

Prerequisite: ACC 201 with grade "C" or better

**ACC 205 - Computerized Accounting**  
(W,S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Spreadsheet software used to solve accounting problems, model-building techniques. Integrated accounting software introduced.

Prerequisite: ACC 201

**ACC 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**ACC 245 - Payroll Accounting**  
(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Covers federal and state laws pertaining to wages, payroll taxes, payroll tax forms and journal and general ledger transactions. Emphasis is placed on computing wages; calculating social security, income and unemployment taxes; preparing appropriate payroll tax forms; and journalizing/ posting transactions.

Prerequisite: ACC 101 or ACC 201

**ACC 295 - Individual Studies**

Credit Hours: (Hours to be arranged each term.)

**ACC 298 - Reading and Conference**

Credit Hours: (Hours to be arranged each term.)

**ACC 299 - Laboratory Practice**

Credit Hours: (Hours to be arranged each term.)

**ACC 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**ACC 320 - Cost Accounting I**  
(W)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Cost accumulation systems including job order costing, process costing and activity-based costing will be explored. Techniques to control and evaluate operations including variance analysis based on flexible budgets and standard costs.

Prerequisite: ACC 203 with grade "C" or better

**ACC 321 - Cost Accounting II**  
(S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Continuation of Cost Accounting I. Strategic planning and financial budgeting. Cost measurement, planning, control and performance evaluation and behavioral issues. The role of responsibility accounting for revenue, cost, contribution and profit centers will be investigated.

Prerequisite: ACC 320 with grade "C" or better

**ACC 325 - Finance**  
(F,W,S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Emphasis on working capital management, long-term finance and capital structure.

Prerequisites: ACC 203, and MATH 105 or MATH 111

**ACC 331 - Intermediate Accounting I**  
(F)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Financial accounting concepts, theory and practices involving current asset accounts; practical application of theory to accounting problems.

Prerequisite: ACC 202 with grade "C" or better

**ACC 332 - Intermediate Accounting II**  
(W)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Accounting concepts, theory and practices involving ownership equities, interpretation, analysis of financial statements and correction of errors; practical application of theory to accounting problems.

Prerequisite: ACC 331 with grade "C" or better

**ACC 333 - Intermediate Accounting III**  
(S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Accounting concepts, theory and practices involving plant assets, intangible assets and liabilities; practical application of theory to accounting problems.

Prerequisite: ACC 332 with grade "C" or better

**ACC 405 - Accounting Information Systems**  
(S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Analysis of accounting cycles and the associated controls with emphasis on problem solving and critical thinking. Includes computerized accounting system implementation.

Prerequisites: ACC 332, MIS 275, and MIS 312

**ACC 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**ACC 411 - Income Tax Procedures**

(F)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Federal and state income tax laws and regulations applicable to individuals and their businesses including computerized tax return preparation.

Prerequisite: ACC 333 with grade "C" or better

**ACC 412 - Corporate Taxation**

(W)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Federal tax law applicable to corporations, partnerships and estates.

Emphasis on tax research procedures and locating and evaluating various sources of tax law.

Prerequisite: ACC 411 with grade "C" or better

**ACC 421 - Income Tax Procedures****Laboratory**

Lecture Hours: 0

Lab Hours: 6

Credit Hours: 2

Lab accompanying class content in ACC 411

**ACC 431 - Advanced Accounting I**

(W)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Comprehensive study of problems in partnership accounting, fund accounting, branch accounting and governmental accounting.

Prerequisite: ACC 333 with grade "C" or better

**ACC 432 - Advanced Accounting II**

(S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Analysis of problems facing small, medium and large companies, with emphasis upon an integrated and concurrent decision making methodology applying economics, finance, organizational theory, quantitative analysis and accounting and tax theory.

Prerequisite: ACC 431 with grade "C" or better

**ACC 435 - Auditing**

(F)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Introduction to auditing concepts and practices. Topics include professional standards, audit planning and procedures, ethical considerations, internal controls, professional responsibilities, the acquisition and evaluation of audit evidence and report writing.

Prerequisites: ACC 333 and ACC 405, both with grade "C" or better

**ACC 465 - Case Studies in Accounting**

(S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

The use of accounting cases to develop problem solving/critical thinking skills. Application of the case methodology to all areas of accounting.

Prerequisites: ACC 431, ACC 435, and ACC 496, all with grade "C" or better

**ACC 496 - Senior Project**

(F,W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Development and implementation of an accounting related project for the benefit of an external entity and the student. Projects will include a proposal, analysis, design and implementation. An oral presentation and project documentation will be required at the completion of each course.

Prerequisites: ACC 320 and ACC 405, or instructor consent

**ACC 497 - Senior Project**

(F,W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Development and implementation of an accounting related project for the benefit of an external entity and the student. Projects will include a proposal, analysis, design and implementation. An oral presentation and project documentation will be required at the completion of each course.

Prerequisites: ACC 320 and ACC 405, or instructor consent

**Allied Health Education****AHED 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**AHED 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**AHED 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**AHED 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**AHED 450 - Instructional Methods**

(F,W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Students develop instructional content and an instructional plan for teaching topics for adult learners. Teaching methods, learning styles, student and instructor evaluation and use of media will be discussed.

Prerequisite: DH 380, or admission to the RCP or BDH degree completion program

**AHED 451 - Instructional Experience**

(F,S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Students create and structure their own instructional experience, participate in a clinical or laboratory setting as a supervising instructor, present a didactic unit using visual aids.

Prerequisite: AHED 450

**AHED 452 - Instructional Practicum**

(W,S)

Lecture Hours: 0

Lab Hours: 9

Credit Hours: 3

Student and faculty advisor design an individualized teaching experience. A learning contract is written and implemented.

Prerequisite: AHED 451 or AHED 460

**AHED 460 - Fundamentals of Distance Education**

(F,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Students learn the fundamentals of online teaching and learning. Lesson plan developed in AHED 450 will be finalized as an online module. Synchronous vs. asynchronous learning, instructional design and course management as it relates to online instruction will be discussed.

Prerequisite: AHED 450

**Allied Health****ALH 505 - ALH Introduction to Information Technology for Healthcare Professionals**

Lecture Hours: 1

Lab Hours: 0

Credit Hours: 1

Students will get an introduction to information technology (IT) as it applies to healthcare and in learning IT tools for success in online education.

Prerequisite: Admission to the MSAH program

**ALH 506 - Program Administration**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

The roles, responsibilities and function of administrators in healthcare and educational environments.

**ALH 508 - Medical Education Theories and Methods**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Instructional methods for allied health educators. Emphasis on lesson plan design to meet learning style needs of adult learners. Learning objectives, active teaching strategies, traditional and non-traditional assessment, and evaluation are addressed for teaching in an on-campus or online environment.

**ALH 509 - Master's Capstone Project Presentation and Defense**

Lecture Hours: 6

Lab Hours: 0

Credit Hours: 6

The capstone project is designed as a culminating clinical experience and provides an alternative to the thesis option. The student must present a formal capstone project plan prior to beginning the project to his/her graduate committee. Upon completion of the experience, the student will provide a written evaluation of the project. The student will also perform an oral presentation and oral defense to his/her committee.

Prerequisite: Admission to the MSAH program

**ALH 510 - Science Review Health Care Professionals**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

This course is designed to allow practicing health care professionals to develop a better understanding of the molecular pathophysiology that occurs in three of the major diseases afflicting western health: diabetes, obesity and atherosclerosis. This course will provide information from primary and secondary professional sources about these diseases and the mechanisms by which the major drugs and lifestyle changes work.

Prerequisites: ALH 515, CHE 101, and admission to the MSAH program

**ALH 515 - Scientific Writing and Healthcare Leadership Literature Review**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

A large focus of this class is in reading and interpreting scholarly literature related to healthcare leadership. In addition, students will be learning to write using instructor led professional and scientific methods.

Prerequisite: Admission to the MSAH program

**ALH 525 - Effective Healthcare Leadership Teams**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

The students will explore best practices in team leadership including team theories and safety concerns as they apply to healthcare. Real life case examples will be taught and the students will be able to practice their team leadership skills to learn how to effectively lead healthcare teams.

Prerequisite: Admission to the MSAH program

**ALH 535 - Assessment, Planning, Implementation and Evaluation**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Focus is teaching students to assess needs, plan effectively, implement changes and evaluate their own success in a healthcare setting.

Prerequisite: Admission to the MSAH program

**ALH 545 - Pertinent Ethical and Legal considerations for Healthcare Leaders**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Common real-life healthcare ethical cases will be presented and discussed in this class with a focus on the role of a healthcare leader in handling difficult ethical situations. Healthcare legalities will be introduced to help with liability and malpractice, etc.

Prerequisite: Admission to the MSAH program

**ALH 555 - Leadership Theory for Healthcare Leaders**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

A wide range of scholarly leadership theories will be discussed, ranging from the military leadership models to Gardiner's Servant Leadership Model. Students will self-assess to evaluate their own leadership and communication styles along with their own power and influence styles. These research based leadership theories will be applied to health care leadership and best practices.

Prerequisite: Admission to the MSAH program

**ALH 565 - Population Health Issues for the Allied Health Professionals**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Population health issues and needs will be discussed in all aspects particularly as it applies to healthcare leadership.

Prerequisites: ALH 515 and admission to the MSAH program

**ALH 575 - Methods of Research for Allied Health Professionals**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

The various types of health care research will be discussed including qualitative, quantitative, and mixed methods. Students will design their own research project that will include data collection and analysis, with particular attention given to the planning process of the research and choosing appropriate methodology.

Prerequisites: ALH 515 and admission to the MSAH program

**ALH 585 - Financial Considerations and Political Strategies for Healthcare Leaders**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Students will be introduced to best practices in healthcare finances including health care policies and funding sources. The emphasis will be to teach students how to incorporate successful financial models into their own healthcare organizations. Discussions will take place to include the best practices in using political models and strategies related to demand and supply within healthcare settings.

Prerequisite: Admission to the MSAH program

**ALH 595 - Curriculum Design for Allied Healthcare Professionals**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Creating the best health care curriculum that ensures the best practices and student outcomes will be emphasized. How to manage health care curriculum with consideration to needs assessment and program specific accreditation standards will be discussed.

Prerequisite: Admission to the MSAH program

**ALH 599 - Master's Thesis Presentation and Defense**

Lecture Hours: 6

Lab Hours: 0

Credit Hours: 6

The topic of thesis must be approved by the Program Director. The student and Program Director will help form a committee of three faculty members to serve in an advisory role. The thesis topic will be selected by the candidate with the advice and approval of the Program Director. The student must prepare a written document describing the research problem, purpose, data collection, data analysis, research methods, interpretation methods and any other concerns related to the research. After the thesis topic has been researched and written, the student will perform an oral presentation and oral defense to his/her committee.

Prerequisite: Admission to the MSAH program

**Anthropology****ANTH 101 - Introduction to Physical Anthropology**

(W) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

An introduction to physical anthropology, emphasizing man's place in the animal kingdom, evolution of man, fossil hominid forms, Paleolithic cultures and principles of genetics. Satisfies either a science elective or a social science elective.

**ANTH 102 - Introduction to Archeology**

(F,S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Survey of the science of archeology. Covers the biological and social evolution of the human species with emphasis on the growth of human populations and social complexity. Relates site-specific evidence to theories of social change. Discusses field and laboratory methods of archeology.

**ANTH 103 - Introduction to Cultural Anthropology**

(F,W) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Culture, language, subsistence patterns, group formation, kinship, economic systems, political organizations, religion and cultural change.

**ANTH 107 - Seminar**

SS

Credit Hours: (Hours to be arranged each term.)

**ANTH 207 - Seminar**

SS

Credit Hours: (Hours to be arranged each term.)

**ANTH 307 - Seminar**

SS

Credit Hours: (Hours to be arranged each term.)

**ANTH 335 - The Built Environment**

(W) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

An examination of the American built environment from historical to modern times and the role it plays in shaping American Society. The topics include city planning, architecture, transportation technologies, dam and bridge building and urban sprawl.

**ANTH 407 - Seminar**

SS

Credit Hours: (Hours to be arranged each term.)

**ANTH 452 - Globalization**

(F,W,S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Addresses what globalization is and how it developed and spread. Benefits and harms of globalization in the areas of work, culture, warfare, national sovereignty, health and food. Countervailing pressures from social movements will be examined.

Prerequisite: WRI 122

**Art****ART 107 - Seminar**

H or HP

Credit Hours: (Hours to be arranged each term.)

**ART 205 - Introduction to Watercolors**  
(F,W,S) HP

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introductory studio course in beginning watercolor painting. Students will learn a variety of watercolor techniques as well as elements of design and aesthetics.

**ART 207 - Seminar**

H or HP

Credit Hours: (Hours to be arranged each term.)

**ART 210 - Beginning Sculpture**

(F,S) HP

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introductory studio course in beginning sculpture, emphasizing basic materials and techniques.

**ART 215 - Design Arts and Aesthetics**

H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Students learn how to think like designers through critical analysis of design principles, enabling them to differentiate between good and bad design as well as how to influence perception, increase appeal, and problem solve when designing.

**ART 220 - Basic Drawing**

(F,W,S) HP

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Designed for the student who has an interest in exploring the field of pictorial representation but has had, for a variety of reasons, little opportunity to do so.

**ART 226 - Digital Photography**

(F,W,S) HP

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Studio course in digital photography, studying and producing photographs. Focus on digital exposures, color, location, Photoshop techniques and issues in photography. Students must have the use of a digital SLR camera or a digital camera with a manual setting.

**ART 280 - Introductory Painting**

(W) HP

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Offers an opportunity to study rendering in color by exposure to a study of color and color mixing, tones and values with an introduction to acrylics, watercolors and oils.

**ART 282 - Introduction to Acrylic Painting**

(F,W,S) HP

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introductory studio course with emphasis on basic materials and techniques in acrylic painting.

**ART 307 - Seminar**

H or HP

Credit Hours: (Hours to be arranged each term.)

**ART 315 - Design Thinking**

H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Students learn how to collaborate and tackle complex problems through creative design strategies, and develop an ability to define the problem, increase empathy, ideate and pitch their idea.

Prerequisite: Junior standing

**ART 407 - Seminar**

H or HP

Credit Hours: (Hours to be arranged each term.)

**Biology****BIO 101 - Introduction to Cell Biology**  
(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introduction to cell biology, genetics, basic chemistry of living organisms, and the scientific method.

**BIO 102 - Diversity of Life**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Evolution and phylogenetics among all major groups of living organisms, including bacteria, protists, fungi, plants and animals.

**BIO 103 - Introduction to Human Anatomy and Physiology**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Basic human anatomy and physiology, including a survey of all major bodily systems. (Cannot be used for graduation credit by students who have taken BIO 231, BIO 232 and BIO 233)

**BIO 105 - Microbiology**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Classification, morphology, reproduction, transmission and control of microorganisms causing disease in man. Laboratory practice in culturing methods, microscopic observation and physical and chemical control.

**BIO 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**BIO 109 - Introduction to the Medical Sciences**

(W,S)

Lecture Hours: 1

Lab Hours: 2

Credit Hours: 2

Survey of medical and health-related occupations, including biomedical sciences. Discussion of health care structure, private and public entities, the research community and trends in health education and practice

**BIO 135 - Preparation for Human Anatomy and Physiology**

(F)

Lecture Hours: 1

Lab Hours: 0

Credit Hours: 1

Study techniques for a science course are explored using examples from Human Anatomy and Physiology. Corequisite: BIO 231

**BIO 200 - Medical Terminology**  
(F,W,S)

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

Basic structure of medical works including prefixes, suffixes, roots and combining forms. Correct spelling, pronunciation and meaning of terms are stressed.

**BIO 205 - Nutrition**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

A study of the relationships of food and nutrition to health. An overview of the basic nutrition principles including the nutrients and how they function in the body, nutrient requirements, diet planning and energy balance. Current topics and controversies are examined.

**BIO 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**BIO 209 - Current Research Topics in Medical Sciences I**

(F,W)

Lecture Hours: 1

Lab Hours: 0

Credit Hours: 1

Introduces students to topics in medicine focusing on global health issues, infectious and chronic diseases. Projects in medical literature research, understanding scientific paper format, preparing technical presentations and public speaking.  
Prerequisite: Biology or Health Sciences major, or instructor consent

**BIO 211 - Principles of Biology**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Principles of modern biology emphasizing form and function of multicellular plants, major invertebrate phyla and general vertebrate morphology and physiology.

**BIO 212 - Principles of Biology**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Principles of modern biology emphasizing evolution, ecology, population genetics and behavior of organisms.  
Prerequisite: BIO 211 with grade "C" or better, or instructor consent

**BIO 213 - Principles of Biology**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Principles of modern biology emphasizing the biochemical basis for life processes, cell structure and function. Molecular genetics, cell reproduction, metabolism and form and function of microorganisms.  
Prerequisite: BIO 212 with grade "C" or better, or instructor consent

**BIO 216 - Biology of Companion Animals**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Covers many aspects of animal health and their impact on society. Discussions of care, anatomy, preventive medicine, common diseases, and behavioral problems of dogs, cats, and other companion animals. Labs will include some field trips and pets in class.

**BIO 220 - Cardiovascular Physiology**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Application of principles of fluid dynamics to the human vascular system. Detailed considerations of cardiac function and its regulation, analysis of flow in arterial, venous and capillary systems and integration of cardiovascular regulation.  
Prerequisite: BIO 233

**BIO 226 - Introduction to Wildlife Rehabilitation**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Principles of wildlife rehabilitation including state and federal laws, medical terminology, basic anatomy, natural history and diet, form and function and euthanasia. Field captures, basic restraint, first aid, minimum housing requirements and zoonotic diseases are also included.

**BIO 227 - Introduction to Forensic Science**

(W,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

An entry-level course exploring the methodologies and procedures utilized by crime scene investigators and forensic laboratories. Emphasis on crime scene investigation, recognition, documentation and collecting of physical evidence. Laboratory exercises provide hands-on opportunities supplementing lecture topics.

**BIO 231 - Human Anatomy and Physiology I**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introduction to the systematic studies of human anatomy and physiology. Introduction to cytology and histology followed by the integumentary, skeletal, muscular and endocrine systems and the physiology of excitable tissues. The laboratory sessions emphasize human anatomy using models and human cadavers.

**BIO 232 - Human Anatomy and Physiology II**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

A continuation of the systematic study of human anatomy and physiology. The nervous, cardiovascular and immune systems are studied. The laboratory sessions emphasize human anatomy using models and human cadavers. Dissections and physiological experiments are conducted.  
Prerequisite: BIO 231 with grade "C" or better

**BIO 233 - Human Anatomy and Physiology III**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Conclusion of the sequence in human anatomy and physiology. Digestive, respiratory, renal and reproductive systems are examined. Metabolism, human genetics and development are also studied. Laboratory sessions emphasize physiological experiments and human anatomy using models and human cadavers.

Prerequisite: BIO 232 with grade "C" or better

**BIO 235 - Human Genetics**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Genetic concepts using human examples, including the molecular and cellular basis of inheritance, patterns of inheritance, basic pedigree analysis, mutation, single-gene and polygenic diseases and an introduction to genetic biotechnology.

Prerequisite: BIO 233

**BIO 247 - Forensic Anthropology**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

The morphological characteristics unique to the human skeleton that are used in establishing population demographics will be discussed and demonstrated. The laboratories are designed as a hands-on experience applying the methodologies as presented in the lecture section.

**BIO 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**BIO 313 - Botany**

(S)

Lecture Hours: 2

Lab Hours: 6

Credit Hours: 4

Introduction to classification and identification of vascular plants, emphasizing major plant families in California and Oregon; field and herbarium techniques. Weekend field trip required.

Prerequisites: BIO 211 and BIO 212

**BIO 331 - Human Anatomy and Physiology I**

(F)

Lecture Hours: 3

Lab Hours: 6

Credit Hours: 5

An in-depth systematic study of human anatomy and physiology of the integumentary, skeletal and muscular systems. Laboratories include histology, examination of human bones, cadaver dissection, computer-aided physiology studies and other hands-on activities.

Prerequisites: BIO 213 and CHE 223, both with grade "C" or better

Pre- or Corequisite: BIO 200 or instructor consent

**BIO 332 - Human Anatomy and Physiology II**

(W)

Lecture Hours: 3

Lab Hours: 6

Credit Hours: 5

An in-depth systematic study of human anatomy and physiology of nervous, endocrine and cardiovascular systems. Laboratories will include histology, cadaver dissection, computer-aided physiology studies and other hands-on activities.

Prerequisite: BIO 331 with grade "C" or better, or instructor consent

**BIO 333 - Human Anatomy and Physiology III**

(S)

Lecture Hours: 3

Lab Hours: 6

Credit Hours: 5

An in-depth systematic study of human anatomy and physiology of the lymphatic, respiratory, digestive, urinary and reproductive systems and an overview of embryology. Laboratories will include histology, cadaver dissection, computer-aided physiology studies and other hands-on activities.

Prerequisite: BIO 332 with grade "C" or better, or instructor consent

**BIO 335 - Cross-Sectional Anatomy**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Cross-sectional anatomy correlated with computer tomography, ultrasonography and magnetic resonance imaging.

Prerequisite: BIO 233

**BIO 336 - Essentials of Pathophysiology (F,S)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Study of dynamic aspects of disease process with emphasis on abnormal physiology. Detailed discussion of cellular alterations, normal immunology, neoplasia, inflammation and alterations of the respiratory and skeletal systems and Diabetes Mellitus.

Prerequisites: BIO 200 and BIO 233

**BIO 337 - Aquatic Ecology**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Lotic and lentic ecosystems, hydrologic principles, processes and patterns of development, abiotic-biotic interactions, aquatic organisms and trophic structures, nutrient cycles and eutrophication, effects of disturbance, bio-assessment techniques, management and restoration case studies.

Prerequisite: BIO 212

**BIO 341 - Medical Genetics**

(F,W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Principles of heredity, chromosome mechanisms and molecular genetics applied to disease processes in humans. Review of case histories of selected inherited disorders. Discussion of genetic intervention therapies.

Prerequisite: BIO 213 or BIO 233 or instructor consent

**BIO 342 - Cell Biology**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Organelle organization, protein sorting, cell signaling, cytoskeletal functions, cell division mechanics and cell interactions in development and aging.

Prerequisite: BIO 213 or instructor consent

**BIO 345 - Medical Microbiology**

(F)

Lecture Hours: 4

Lab Hours: 3

Credit Hours: 5

Mechanisms of pathogenicity and virulence relating to disease-causing viruses, bacteria, fungi and other microorganisms. Host-parasite relationships and immunology, microbial physiology and genetics. Laboratory procedures and identification of selected bacteria and parasites.

Prerequisite: BIO 213 or BIO 233 or instructor consent

**BIO 346 - Pathophysiology I**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Study of the dynamic aspects of the disease process with emphasis on abnormal physiology. Detailed discussion of cellular alterations, normal and abnormal immunology, neoplasia, inflammation, atherosclerosis, hypertension, cardiac and vascular diseases.

Prerequisites: BIO 200, and BIO 233 or BIO 333 with grade "C" or better, or instructor consent

**BIO 347 - Pathophysiology II**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Study of the dynamic aspects of the disease process with emphasis on abnormal physiology. Detailed discussion of alterations of respiratory function, liver and digestive system, neurologic, urinary, musculoskeletal disorders and Diabetes Mellitus.

Prerequisite: BIO 346 with grade "C" or better, or instructor consent

**BIO 352 - Developmental Biology**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

This course will explore the developmental processes of selected invertebrate and vertebrate groups. The events of gametogenesis, fertilization, gastrulation, neurulation and post-embryonic development will be discussed. The role of differential gene expression in developmental pathways will be covered.

Prerequisite: BIO 213

**BIO 357 - Introduction to Neuroscience**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

This is an introductory course covering the organization and function of the human nervous system to build a foundation of general knowledge in neurobiology of such topics as sensory/motor systems, the brain and behaviors, the biological basis of brain development and learning and memory.

Prerequisite: BIO 232 or BIO 332 or PSY 339 or instructor consent

**BIO 366 - Zoology**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Organismal and integrative approach to the study of animal functional morphology, ecological physiology, behavior and interactions, development and evolution.

Prerequisites: BIO 211 and BIO 212

**BIO 367 - Plant Ecology**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Overview of plant ecology including physiology, populations, communities, and ecosystems. Some topics covered are unique to plants, such as photosynthesis, and other topics, not necessarily unique to plants, emphasize the distinctive ways that plants deal with their environments. Weekend field trip required.

Prerequisites: BIO 211 and BIO 212

**BIO 375 - Cross Sectional Anatomy II**

(F,W,S,Su)

Lecture Hours: 1 or 3

Lab Hours: 0

Credit Hours: 1 or 3

Continuation of cross section anatomy not included in BIO 335. This course covers MR images of the joints of the wrist, elbow, shoulder, ankle, knee, hip, thorax, spine and arterial system from the arch of the aorta to the circle of Willis, as demonstrated by MRA.

Prerequisite: BIO 233

**BIO 377 - Wildlife Ecology**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Fundamental concepts and applied methods in the study and management of wildlife population. Focus on study design, habitat ecology, and animal movements. Develop skills in wildlife data analysis, animal capture, marking and remote tracking.

Prerequisites: BIO 211 and BIO 212

**BIO 386 - Ornithology**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Overview of biology, ecology and evolution, field study and identification of birds. Emphasis on applied field methods and identification of birds of Oregon and the Klamath region.

Prerequisites: BIO 211 and BIO 212

**BIO 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**BIO 409 - Current Research Topics in Medical Sciences II**

(W)

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

A continuation of BIO 209 covering topics in medicine focusing on global health issues, infectious and chronic diseases. Projects in medical literature research, understanding scientific paper format, preparing technical papers and presentations, and public speaking.

Prerequisite: BIO 209 or instructor consent

**BIO 426 - Evolutionary Biology**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Principles of evolutionary science, including speciation, biogeography, biodiversity, population genetics, natural selection and coevolution.

Prerequisite: BIO 213 or instructor consent

**BIO 436 - Immunology**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Cellular and humoral immunology including innate immunity, acquired immunity, antibodies, anatomy of immune response, production of effectors, adversarial strategies during infection, immunodeficiency and transplantation. Prerequisite: BIO 213 or BIO 233 or instructor consent

**BIO 446 - Conservation Biology**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Study global patterns of and threats to biodiversity. In-depth focus on ecosystem services, habitat fragmentation, design of conservation reserves, conservation funding and politics, and understanding and communicating impacts of climate change.

Prerequisites: BIO 211 and BIO 212

**BIO 461 - Human Cadaver Dissection**

(S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Study of human anatomy utilizing cadaver dissection. Attention will be given to three-dimensional relationships of structures, appreciation of textural differences and development of palpation skills. Recognition of pathologic abnormalities and individual variations will be investigated.

Prerequisites: BIO 233 or BIO 333, and instructor consent

**BIO 462 - Human Cadaver Dissection**

(S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Study of human anatomy utilizing cadaver dissection. Attention will be given to three-dimensional relationships of structures, appreciation of textural differences and development of palpation skills. Recognition of pathologic abnormalities and individual variations will be investigated.

Prerequisites: BIO 233 or BIO 333, and instructor consent

**Business****BUS 101 - Introduction to Business**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to the basic aspects of business, marketing, management, production, accounting, and finance; various forms of business ownership; role of business in the economy, and society. Discussion of cultural, ethical, current events, and trends affecting business. Exposure to career opportunities.

**BUS 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**BUS 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**BUS 215 - Principles of Management**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to the history of management. Emphasis on the management functions of planning, organizing, directing, and controlling; existing and emerging managing theories, social responsibilities and business ethics. (Cannot be taken for graduation credit by students who have taken BUS 304 or BUS 317.)

**BUS 223 - Marketing I**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Principles that drive the integration of the marketing mix (product, price, place, promotion) to meet the needs and wants of consumer and business markets. Function of market research and the study of market opportunities to grow and sustain organizations.

**BUS 226 - Business Law**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

The fundamentals of business law: the structure of federal and state courts and agencies, their decision processes; the legal structure of modern business organizations including closely and publicly held corporations, partnerships, limited partnerships, nonprofit corporations, sole proprietorships and limited liability companies; contract law; Uniform Commercial Code; tort law and its implications for business; administrative law; and criminal law as it applies to business and industry.

**BUS 256 - Graphic Design for Business**

(W)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Emphasis on effective content, structure, tone, and visual format for both internal and external communication. Students will compose various commonly occurring business documents achieving effectiveness in design, organization, content, and style, applying current graphic design and visual-design principles.

Prerequisites: BUS 215 or BUS 223, and WRI 122

**BUS 304 - Engineering Management**

(F,W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

The engineering management process. The unique aspects of managing "knowledge workers." The manager's role in planning, organizing, leading and controlling. Managing design and new products development, materials and inventory. Organizational styles, structures and policies. Human resource management for individuals and groups. (Cannot be taken for graduation credit by students who have taken BUS 215 or BUS 317.)

Prerequisite: Junior standing or instructor consent

**BUS 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**BUS 308 - Principles of International Business**

(F,W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to international business fundamentals in the areas of cultural, ethical, legal and economic environments, international finance tools and instruments, international trade theory, manufacturing strategies, international supply chain management, country selection, exchange rate mechanics and international human resource management.

Prerequisite: WRI 121

**BUS 309 - Introduction to Tourism**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to tourism industry. Topics include major components of tourism, service suppliers, travel, transportation, accommodations, food and beverage, attractions, entertainment, destinations and impacts of tourism on society.

**BUS 313 - Health Care Systems and Policy**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

This course will explore the U.S. Health System focusing on its historical development, current configuration and possible future direction. Included will be the study of health system development, key influencers, accessibility, financing, changing components and the effects the system has on patients, providers, financiers, employers, government and insurers. Particular attention will be paid to the future direction of health care and what parts of the system are likely to change.

Prerequisite: WRI 227

**BUS 314 - Entrepreneurship I**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Examination of the entrepreneurial mindset with an introduction to and focus on design thinking exercises and innovation processes. Fundamental business and organizational models will be studied as well as methods to analyze market opportunities in B2C and B2B markets.

**BUS 316 - Total Quality in Health Care**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

The health care quality management process, contemporary issues and trends involved with quality control, organization structures, policies, human factors and teamwork.

Prerequisite: Junior standing

**BUS 317 - Health Care Management**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

The health care manager's role in planning, organizing, leading and controlling. Special emphasis on the unique and complex issues involved in health care management. Organizational structures. Strategic and operational planning. Health care finance and budgeting. The future of management. (Cannot be taken for graduation credit by students who have taken BUS 215 or BUS 304.)

Prerequisite: WRI 121

**BUS 318 - Marketing II**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Advanced study of markets with a focus on the motivational and behavioral characteristics of consumers. Study and apply analytics, technology and data-driven decision making in the formation of a customer centered marketing and marketing communication strategy.

Prerequisites: BUS 223 and PSY 201

**BUS 319 - Integrated Marketing Communication**

(F,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Develop an integrated cross-media strategy and creative message to reach the target audience and deliver the brand promise through an IMC campaign. Special emphasis on paid, owned and earned digital media and social media platforms and analytics.

Prerequisite: BUS 223 or BUS 337

**BUS 325 - Finance Management**

(W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Basic issues and methodology of financial management. Emphasis placed on working capital management, sources of short-term and long-term funds and optimal capitalization of the firm.

Prerequisites: BUS 215 and ACC 203

**BUS 326 - Sales and Sales Management**

(F,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

This course introduces the student to the fundamentals of sales management. Topics include principles of selling, introduction to prospecting skills, application of pricing strategies and theory, pricing after sales service offering, developing a value proposition, sales/service territory identification and alignment to maximize total revenue opportunity and administration of sales personnel in diverse sales territories and developing sales programs.

Prerequisites: ACC 201 and BUS 223

**BUS 328 - Health Care Accounting and Finance**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

General principles and application of managerial accounting in health care organizations. Theory and procedure in gathering cost data and their use in analyzing and controlling operation costs: job-order and process-cost systems. Revenue cycle, sources and systems analysis of variance, cost effectiveness and managerial reporting are examined.

Prerequisite: ACC 201

**BUS 331 - Personal Finance**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to the basic principles of personal financial planning and budgeting. Includes banking services, consumer credit, asset purchases, insurance and the fundamentals of investments and retirement planning.

**BUS 335 - Entrepreneurship II**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Students will learn and apply strategic design-making skills in the innovation and start-up of a new business or organization/venture. Students will function in an interdisciplinary team or environment to complete a project/proposal to move from idea to development plan.

**BUS 337 - Principles of Health Care Marketing**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Fundamentals of health care marketing covering strategy, planning process, assessment, marketing actions, branding and evaluation.

**BUS 345 - Fraud Examination**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Study of fraud and fraud investigative techniques. Topics include nature of fraud, types of fraud, fraud prevention, detection and investigation methods and legal follow-up procedures.

**BUS 347 - Geography of Travel and Tourism**

(F,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Study of those destinations around the world that are most important to travelers including the World Heritage sites. Topics include fundamentals of geography, both physical and cultural, and major tourism destinations.

**BUS 349 - Human Resource Management I**

(W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Principles, theories and applications of HR management in the areas of strategy, workforce planning, employment law, job analysis, recruitment, selection, training, performance management and international HRM.

Prerequisite: BUS 215 or BUS 304 or BUS 317 or instructor consent

**BUS 350 - Hospitality Management (S)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Study of management principles in the tourism and hospitality industry. Topics include managing growth and change in the hospitality industry, major functional areas in hotels and restaurants and the economic aspects of the industry.

**BUS 356 - Business Presentations**

(F,W,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Design, preparation and delivery of effective business presentations. Emphasis on integration of skills in speech and digital communication software to deliver effective, informative and persuasive presentations in any business or organization.

Prerequisites: SPE 111 and WRI 122

**BUS 358 - Marketing for Hospitality and Tourism**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Study of marketing principles as they apply to the tourism and hospitality industry. Topics include marketing in strategic planning, the marketing environment, marketing information systems and marketing research, consumer buying behavior, market segmentation, product pricing, distribution channels and internet marketing. (Cannot be taken for graduation credit by students who have taken BUS 399.)

**BUS 385 - Ecotourism**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Study of sustainability principles as they apply to the tourism and hospitality industry. Topics include the ecotourism environment, the economic, sociological and cultural impacts of ecotourism, ecotourism as a business and a world survey of ecotourism sites.

Prerequisite: WRI 121

**BUS 387 - International Human Resource Management**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

In-depth review of human resource selection, training for international assignments, managing the expatriate manager, compensation packages, repatriation training, women and dual-career couples, conflicting interests of parent company and host country and managing joint ventures.

Prerequisite: BUS 308

**BUS 390 - Applied Management Internship**

(F,W,S)

Lecture Hours: 0

Lab Hours: 9

Credit Hours: 3

This course provides credit for an approved internship related to the student's program. Students work in a supervised setting where they receive training to develop career related skills while applying college learned theory.

Prerequisite: Instructor consent

**BUS 397 - Human Resource Management II**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Principles, theories, and applications of HR management in the areas of compensation, benefits, safety, labor relations, employee rights and engagement.

Prerequisite: BUS 349

**BUS 399 - Marketing Special Topics**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Concentrated areas of marketing will be taught on a rotating basis: business to business, hospitality and travel, entertainment and sports, high tech, direct marketing and public relations.

Prerequisite: BUS 223

**BUS 405 - Reading and Conference**

Credit Hours: (Hours to be arranged each term.)

**BUS 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**BUS 414 - Marketing Research**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to the research function as it applies to marketing. Research methodology, design, surveys, data collection, interpretation and recommendations.

Prerequisites: MATH 361 and WRI 227

**BUS 415 - Environmental Regulation (F,W)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Legislation and enforcement activities involving natural and industrial environments. Conservation laws, land use and planning, responsibilities of regulatory agencies, review of current legislative actions and judicial decisions.

Prerequisite: BIO 112 or BUS 226

**BUS 416 - Environmental Management (W)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Review of contemporary management issues and business practices related to land use management and planning, ecological planning, environmental quality engineering and control and natural resource economics.

Prerequisites: BUS 415, and ECO 201 or BIO 112

**BUS 420 - Applied Management Internship (F,W,S)**

Lecture Hours: 0

Lab Hours: 9

Credit Hours: 3

This course provides credit for an approved internship related to the student's program. Students work in a supervised setting where they receive training to develop career related skills while applying college learned theory.

Prerequisite: Instructor consent

**BUS 434 - Global Marketing (S)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Comprehensive study of global business issues that develop strategic visions for market entry in emerging and developed countries, analyzing financial and pricing considerations, evaluating strategies of export versus local manufacturing, developing a marketing program that demonstrates implementation of global business principles.

Prerequisites: BUS 223 and BUS 308

**BUS 435 - Marketing III (S)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Marketing management strategies within a marketing centric business or organization, including the development of new products and services in response to market demands. Development of collaborative strategies in distribution, pricing and product/service mixes for new projects, services and line extensions.

Prerequisite: BUS 318

**BUS 441 - Leadership I (F,W)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Role of managers and leaders within an organization. Recognizing styles, competencies and traits of a leader and strategic application within a working environment through case analysis and discussion, introduction and development of personal leadership skills.

Prerequisite: BUS 349 or instructor consent

**BUS 442 - Leadership II**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Leadership in developing and communicating vision/mission, values, setting ethical standards. Leading and developing multi-levels of managers. Mentoring high potential managers and transformational leaders. Leadership during conflict, change and diversity. The role of the leader in organizational development.

Prerequisite: BUS 441

**BUS 447 - Controversial Issues in Management (W,S)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Examination of the many controversial issues in management such as social responsibility, whistle blowing, outsourcing, drug testing, Affirmative Action and so on. Students will study opposing views and arguments from a variety of viewpoints. Discussion and debate develops critical thinking skills.

Prerequisites: BUS 215, BUS 304 or BUS 317, PSY 347, WRI 122, and Junior standing

**BUS 456 - Business Research Methods (F,W,S)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Research design, exploration and proposals. Hypotheses formulation and testing. Data sources, collection and analysis. Survey design, sampling and census techniques. Library and online information retrieval sources. Effective search strategies. Research reporting.

Prerequisites: MATH 361 and WRI 227

**BUS 457 - Business Research Methods II (F,S)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Emphasizes quantitative elements of research methods including presenting and describing information, drawing conclusions about populations using sample information; and improving business processes.

Prerequisites: BUS 215 or BUS 304 or BUS 317, and MATH 243 or MATH 361

**BUS 467 - Service Management (F,W,S)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

The nature of service and service encounters, strategy and competitiveness. Design of service systems. Facilities location, design and layout. Service quality and continuous improvement.

Prerequisite: BUS 215 or BUS 317

**BUS 473 - Marketing Plan Development**

(W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Development of an in-depth marketing plan for a local community business. All aspects of the plan will be covered in detail.

Prerequisites: BUS 223 and BUS 319

**BUS 478 - Strategic Management**

(F,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Comprehensive study and analysis of businesses and/or case studies. Evaluation of strategic and operational decision making. Performance analysis in areas of finance, marketing and social performance.

Prerequisites: ACC 203, WRI 227, and Senior standing

**BUS 495 - Senior Project Proposal**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Examination of senior internship and/or project process and requirements.

Definitions of a suitable senior project topic and preparation of a formal proposal. Topics dealing with client contact, task definition, privacy and confidentiality. Initial research, presentation of results.

Pre- or Corequisites: BUS 456 or BUS 457, and MGT 335

**BUS 496 - Senior Project**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Students finalize project plan and complete data gathering and analysis portion of a project for a client or an independent research project. Topics include completing research, data gathering and analysis. Interim project report is written.

Prerequisite: BUS 495

**BUS 497 - Senior Project**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Students complete project started in BUS 496 including preparing a detailed project report and delivering a final presentation.

Periodic progress reports required.

Instructor functions as a consultant.

Prerequisite: BUS 496 with grade of "C" or better

Pre- or Corequisite: BUS 356

**BUS 525 - Marketing Management**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Topics include concepts related to the marketing management function of segmentation, brand equity, customer value analysis, integrated marketing, internal marketing and various organizational roles in moving a firms' products or services to end-users profitability and with value to the customers.

**Civil Engineering****CE 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**CE 203 - Engineering Graphics**

(W,S)

Lecture Hours: 1

Lab Hours: 6

Credit Hours: 3

Graphical communication in civil engineering using computer-aided drafting and design software. Includes development of drawings related to civil engineering projects such as roads, subdivisions and buildings, development of scaled plots and reading of engineering drawings.

**CE 205 - Computational Methods**

(S)

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

Solve applied problems involving formulas, functions, summation and iteration using Excel and VBA. Use built-in functions and graphing capabilities.

Prerequisite: MATH 112 with grade "C" or better

**CE 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**CE 212 - Civil Engineering Materials**

(F,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Study of the engineering properties of soil as well as Portland cement and asphaltic concretes. Field and laboratory testing methods for classifying soil. Mix design of concretes.

Prerequisites: ENGR 102 and MATH 111, both with grade "C" or better

**CE 299 - Independent Studies**

Credit Hours: (Hours to be arranged each term.)

**CE 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**CE 308 - Principles of Professional Practice**

(W)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Civil engineering professional practice topics including project acquisition, development, management and delivery. Business in civil engineering including ethics, economics, leadership, communication and legal matters. Current and emerging trends in practice.

Prerequisites: ENGR 102 and MATH 111, both with grade "C" or better

**CE 311 - Introduction to Geotechnical Engineering**

(F,W)

Lecture Hours: 4

Lab Hours: 3

Credit Hours: 5

Soil permeability, seepage, filters, effective stress, consolidation, settlement, shear strength, slope stability, stresses in soils, and stresses under loaded areas. Includes laboratory testing.

Prerequisites: CE 212 and ENGR 213, both with grade "C" or better

**CE 312 - Earth Pressures and Foundations**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Analysis and design of shallow footings, deep foundations including piles, caissons and earth retaining structures design. Use of computer applications for design of these structures.

Prerequisite: CE 311 with grade "C" or better

**CE 331 - Structural Analysis**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Structural loads according to ASCE 7. Analysis of statically determinate trusses and frames. Shear and moment diagrams, deflections, and influence lines for statically determinate structures. Analysis of statically indeterminate structures by force and displacement methods. Software applications emphasized in labs. Prerequisite: ENGR 213 with grade "C" or better

**CE 341 - Elementary Structural Design**

(W)

Lecture Hours: 4

Lab Hours: 3

Credit Hours: 5

Fundamentals of structural element design: emphasis on structural steel, reinforced concrete, and timber beams and short columns as well as reinforced masonry lintels and walls due to gravity loads. Labs include construction, material and destructive testing, and software applications. Prerequisite: CE 331 with grade "C" or better

**CE 351 - Introduction to Transportation Engineering**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introduction to the design, planning, operation, management and maintenance of transportation systems with a focus on the highway and railway modes. Principles for planning multi-modal transportation systems, layout of roadways, traffic flow modeling and capacity analyses. Prerequisites: ENGR 211 and GME 161, both with grade "C" or better

**CE 354 - Traffic Engineering**

(F,S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Principles of traffic engineering and operation, traffic engineering studies, signalized intersection design, traffic analysis software. Prerequisite: CE 351 with grade "C" or better

**CE 371 - Closed Conduit Design**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Population and factors influencing water supply demands, fire flows, peaking factors and storage requirements. Flows in pressure pipe systems, pipe networks analysis and design techniques. Estimation of wastewater flows including I/I considerations. Gravity-fed collection system design, construction and maintenance. Prerequisite: ENGR 318 with grade "C" or better

**CE 374 - Hydrology**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Study of the hydrologic cycle, measurement of rainfall, runoff and streamflow. Curve fitting, hydrographic analysis, statistical analyses of extreme flows, flood routing and storage capacity. Runoff modeling and design of hydrologic structures and systems. Prerequisite: CE 371 with grade "C" or better  
Corequisite: MATH 361

**CE 401 - Civil Engineering Project I**

(F)

Lecture Hours: 3

Lab Hours: 6

Credit Hours: 5

First term of a two-term sequence integrating civil engineering design, group dynamics and technical communications. Students receive two credit hours in civil engineering (CE 401) and three credit hours in communication for general education (COM 401). Prerequisites: WRI 227 and advisor consent

**CE 402 - Civil Engineering Project II**

(W)

Lecture Hours: 5

Lab Hours: 6

Credit Hours: 7

Second term of a two-term sequence integrating civil engineering design, group dynamics and technical communications. Students receive four credit hours in civil engineering (CE 401) and three credit hours in communication for general education (COM 401). Prerequisites: CE 401 and COM 401, both with grade "C" or better

**CE 405 - Sustainability and Infrastructure**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Integrating sustainability concepts and key social, economic and environmental issues and processes relevant to civil engineering. Sustainable design practices in each civil engineering sub-discipline will be studied and existing and proposed infrastructure projects will be evaluated. Corequisite: CE 401

**CE 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**CE 408 - Workshop**

Credit Hours: (Hours to be arranged each term.)

**CE 411 - Engineering Geology**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

A study of the interaction of geology, including structure, geologic processes (current and historic), lithology and mineralogy with civil engineering structures.

Prerequisites: CE 311 and GEOL 201, both with grade "C" or better

**CE 413 - Advanced Soils**

(W)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Advanced laboratory and in situ techniques for characterizing soils for use in civil engineering applications. Prerequisites: CE 311 and GEOL 201, both with grade "C" or better

**CE 421 - Seepage and Earth Structures**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Covers material related to analyzing steady state and transient seepage conditions, erosion and piping, and the stability of earth slopes and embankments.

Prerequisites: CE 311, CE 312, and GEOL 201, all with grade "C" or better

**CE 422 - Advanced Shear Strength of Soils**

(W)  
Lecture Hours: 3  
Lab Hours: 0  
Credit Hours: 3

This course is designed to give students an advanced understanding of the shear strength of soils including drained and undrained strength of fine and coarse grained soils.

Prerequisites: CE 311 and GEOL 201, both with grade "C" or better

**CE 423 - Deep Foundations**

(W)  
Lecture Hours: 3  
Lab Hours: 0  
Credit Hours: 3

This course covers the design of deep foundation systems including driven piles and drilled shafts. These systems are designed for both axial and lateral loading.

Prerequisites: CE 311, CE 312, and GEOL 201, all with grade "C" or better

**CE 432 - Structural Loading and Lateral Forces**

(F)  
Lecture Hours: 4  
Lab Hours: 0  
Credit Hours: 4

Gravity loads (dead, live, roof live, and snow) and lateral loads (wind and seismic) according to ASCE 7 and Oregon Structural Specialty Code. Introduction and design of basic lateral force resisting systems.

Prerequisite: CE 341 with grade "C" or better

**CE 433 - Structural Matrix Analysis**

(W)  
Lecture Hours: 2  
Lab Hours: 3  
Credit Hours: 3

Static analysis of determinate and indeterminate structures using the direct stiffness method with heavy emphasis on computer models and solutions. Students will design and develop their own structural analysis program.

Prerequisite: CE 331 with grade "C" or better

**CE 439 - Highway Bridge Rating**

(F)  
Lecture Hours: 2  
Lab Hours: 3  
Credit Hours: 3

Introduction to bridge types, bridge design philosophies and bridge rating procedures. Load rating of short-span highway bridges using AASHTO provisions and ODOT procedures. Software applications.

Prerequisite: CE 341 with grade "C" or better

**CE 442 - Advanced Reinforced Concrete Design**

(S)  
Lecture Hours: 4  
Lab Hours: 0  
Credit Hours: 4

Design, analysis, and detailing of reinforced concrete elements, including: T-beams, doubly-reinforced beams, continuous beams, shear walls, slender columns, slabs, footings, and moment frames. Seismic resistance and the development, anchorage, and splicing of steel reinforcement are introduced.

Prerequisite: CE 341

**CE 444 - Intermediate Steel Design**

(S)  
Lecture Hours: 3  
Lab Hours: 3  
Credit Hours: 4

Design of structural steel tension members, frameworks, composite beams, and bolted and welded connections. Application of the AISC Steel Construction Manual structural stability provisions and software applications.

Prerequisite: CE 341 with grade "C" or better

**CE 447 - Masonry Design**

(S)  
Lecture Hours: 3  
Lab Hours: 0  
Credit Hours: 3

Analysis and design of masonry beams, walls and columns using computer solutions with emphasis on lateral design considerations.

Prerequisites: CE 341 with grade "C" or better, and gravity elements with software applications as appropriate

**CE 448 - Timber Design**

(W,S)  
Lecture Hours: 3  
Lab Hours: 0  
Credit Hours: 3

Analysis and design of simple (determinate) timber beams, columns, trusses and connections using dimensioned lumber, plywood and laminated members, with an emphasis on lateral force design. Computer solutions introduced.

Prerequisite: CE 341 with grade "C" or better

**CE 449 - Bridge Design**

(W)  
Lecture Hours: 3  
Lab Hours: 3  
Credit Hours: 4

Design and analysis of short and medium span highway bridge superstructures including reinforced concrete, slab bridges, steel deck girder bridges, and prestressed concrete bridges. Software applications.

Prerequisite: CE 341 with grade "C" or better

**CE 450 - Transportation Structures**

(S)  
Lecture Hours: 2  
Lab Hours: 3  
Credit Hours: 3

Design and analysis of common transportation structures including culverts, sign structures, light poles, and railings according to current AASHTO provisions and ODOT procedures. Software applications.

Prerequisite: CE 341 with grade "C" or better

**CE 456 - Pavement Engineering**

(S)  
Lecture Hours: 2  
Lab Hours: 3  
Credit Hours: 3

Hot mixed asphalt materials testing and mixture design. Methods of manufacture, transport and placement of rigid and flexible pavements. Structural design of rigid and flexible pavements. Pavement rehabilitation and management.

Prerequisites: CE 212, CE 351, and ENGR 213, all with grade "C" or better

**CE 457 - Transportation and Land Development**

(W)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Study of interactions between land development activity and the transportation network. Application of planning and engineering design techniques to manage the impacts of development upon the transportation system.

Prerequisite: CE 354 with grade "C" or better

**CE 458 - Transportation Safety**

(W)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Safety concepts in highway engineering including highway design, operation, and maintenance, as well as human factors, statistical analysis, traffic control and public policy. Design concepts of intersections, interchanges, signals, signs and pavement markings.

Prerequisite: CE 354 with grade "C" or better

**CE 468 - Travel Demand Modeling**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introduction to travel demand analysis and forecasting. Models studied from a theoretical, applied and practical perspective. Students will become familiar with the traditional four-step travel forecasting process, including model development, application and interpretation of outputs.

Prerequisite: CE 351 with grade "C" or better

**CE 472 - Hydrometry**

(F)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Measurement of variables in the hydrologic cycle. Principles, methods, instruments, and equipment for obtaining surface and ground water quantity and quality data in nature to support design and water management efforts.

Prerequisite: CE 374 with grade "C" or better

**CE 473 - Groundwater**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Offers an introduction to the physical properties and principles of groundwater. Topics include groundwater and the hydrologic cycle, fundamental fluid flow laws, groundwater resource evaluation, and groundwater contamination.

Prerequisite: CE 311 with grade "C" or better

**CE 476 - Applied Hydraulic Design**

(W)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Flow analysis for constructed channels; principles of hydraulic design of culverts, bridge waterway openings, highway inlets, rundowns, and appurtenant water control structures. Computer modeling of bridge and culvert hydraulics. Design of appropriate Best Management Practices (BMPs) for storm water quality and erosion control. Design project.

Prerequisite: CE 374 with grade "C" or better

**CE 481 - Environmental Engineering I**

(F,W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to environmental engineering principles, fundamental concepts and supporting calculations. Physical, chemical and biological elements of the natural environment. Environmental impacts of anthropogenic activities. Control and pollution prevention technologies. Legal and regulatory framework governing environmental management.

Prerequisites: CHE 221 and ENGR 318, both with grade "C" or better

**CE 489 - Treatment Wetlands**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Treatment wetland features; biological, chemical and physical properties. Planning, design and performance assessment principles for municipal, agricultural and storm water treatment wetlands. Considers vegetation and microbiology, aerobic and anaerobic biogeochemistry, hydraulics and treatment efficiencies. Local case studies.

Prerequisites: CHE 221 and ENGR 318, both with grade "C" or better

**CE 499 - Independent Studies**

Credit Hours: (Hours to be arranged each term.)

**CE 501 - Civil Engineering Graduate Seminar**

(S)

Lecture Hours: 1

Lab Hours: 0

Credit Hours: 1

Civil Engineering graduate students will meet regularly with faculty members to share progress on their graduate project selection and report writing.

Prerequisite: Advisor consent

**CE 511 - Seepage and Earth Structures**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Covers material related to analyzing steady state and transient seepage conditions, erosion and piping, and the stability of earth slopes and embankments.

Prerequisites: CE 311, CE 312, and GEOL 201, all with grade "C" or better

**CE 512 - Earthquake Engineering**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

This course describes basic earthquake engineering in terms of regional seismicity, predicted ground motions, probabilistic methods for seismic analysis, liquefaction and steady-state shear strength analysis.

Prerequisites: CE 311 and GEOL 201, both with grade "C" or better

**CE 513 - Deep Foundations**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

This course covers the design of deep foundation systems including driven piles and drilled shafts. These systems are designed for both axial and lateral loading.

Prerequisites: CE 311, CE 312, and GEOL 201, all with grade "C" or better

**CE 522 - Advanced Shear Strength of Soils**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

This course is designed to give students an advanced understanding of the shear strength of soils including drained and undrained strength of fine and coarse grained soils.

Prerequisites: CE 311 and GEOL 201, both with grade "C" or better

**CE 533 - Structural Matrix Analysis**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Static analysis of determinate and indeterminate structures using the direct stiffness method with heavy emphasis on computer models and solutions. Students will design and develop their own structural analysis program.

Prerequisite: CE 331 with grade "C" or better

**CE 534 - Advanced Solid Mechanics**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Three-dimensional stress and strain, failure theories, elasticity and plasticity, curved beams, beams on elastic foundations, un-symmetric bending and shear centers.

Prerequisite: CE 442 or CE 444 with grade "C" or better

**CE 535 - Structural Dynamics**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 4

Analysis of single degree of freedom structural systems to harmonic and general dynamic loading. Free vibrating and forced vibration of multiple degree of freedom systems, modal superposition, earthquake engineering, current IBC methods.

Prerequisite: CE 331 with grade "C" or better

**CE 539 - Highway Bridge Rating**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Introduction to bridge types, bridge design philosophies and bridge rating procedures. Load rating of short-span highway bridges using AASHTO provisions and ODOT procedures. Software applications.

Prerequisite: CE 341 with grade "C" or better

**CE 542 - Prestressed Concrete Design**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Analysis, behavior, and design of prestressed concrete structures and elements including beams, composite beams, box-girders and flanged beams, continuous beams and indeterminate frames, slabs, and compression members. Precast member design and behavior also introduced.

Prerequisite: CE 442 with grade "C" or better

**CE 544 - Advanced Steel Design**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Torsion members, plate girders, and lateral force resisting systems. AISC Seismic Provisions for Structural Steel Buildings. Advanced topics in structural stability and connection design.

Prerequisite: CE 444 with grade "C" or better

**CE 549 - Bridge Design**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Design and analysis of short and medium span highway bridge superstructures including reinforced concrete slab bridges, steel deck girder bridges, and prestressed concrete girder bridges. Software applications.

Prerequisite: CE 341 with grade "C" or better

**CE 550 - Transportation Structures**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Design and analysis of common transportation structures including culverts, sign structures, light poles, and railings according to current AASHTO provisions and ODOT procedures. Software applications.

Prerequisite: CE 341 with grade "C" or better

**CE 551 - Geometric Design of Roadways**

(W)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

This course will provide students with an understanding of the principles and techniques of highway design. Topics include laying out potential routes, design of the alignment and intersections, evaluation of earthwork requirements, and safety considerations.

Prerequisite: CE 354 with grade "C" or better

**CE 554 - Advanced Traffic Engineering**

(W)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Traffic studies including volume, speed, travel time and delay. Freeway and rural highway facility design, signing and marking. Urban un-signalized and signalized intersection design. Arterial planning and design.

Prerequisite: CE 354 with grade "C" or better

**CE 556 - Advanced Pavement Design (S)**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

This course covers advanced topics in the design and analysis of pavement materials and structures.

Prerequisite: CE 456 with a grade "C" or better

**CE 558 - Transportation Safety (W)**

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Safety concepts in highway engineering including highway design, operation, and maintenance, as well as human factors, statistical analysis, traffic control and public policy. Design concepts of intersections, interchanges, signals, signs and pavement markings.

Prerequisite: CE 354 with grade "C" or better

**CE 568 - Travel Demand Modeling (W)**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introduction to travel demand analysis and forecasting. Models studied from a theoretical, applied and practical perspective. Students will become familiar with the traditional four-step travel forecasting process, including model development, application and interpretation of outputs.

Prerequisite: CE 351 with grade "C" or better

**CE 571 - Open-Channel Hydraulics (S)**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Application of basic principles of hydraulics to open channel flow. Theory and analysis of critical, uniform, unsteady, and gradually and rapidly varied flow. Flow characteristics in natural and constructed channels.

Computer modeling of open-channel flow systems. Floodplain delineation methods. Prerequisite: CE 371 with grade "C" or better

**CE 572 - Hydrometry (F)**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Measurement of variables in the hydrologic cycle. Principles, methods, instruments, and equipment for obtaining surface and ground water quantity and quality data in nature to support design and water management efforts.

Prerequisite: CE 374 with grade "C" or better

**CE 574 - Environmental River Mechanics**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

River response to watershed modification and infrastructure, including introduction to fluvial geomorphology, sediment transport and stream restoration. Management of waterways and floodplains.

Prerequisite: CE 374 with grade "C" or better

**CE 576 - Applied Hydraulic Design**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Flow analysis for constructed channels; principles of hydraulic design of culverts, bridge waterway openings, highway inlets, rundowns, and appurtenant water control structures. Computer modeling of bridge and culvert hydraulics. Design of appropriate Best Management Practices (BMPs) for storm water quality and erosion control. Design project.

Prerequisite: CE 374 with grade "C" or better

**CE 586 - Water and Wastewater Treatment**

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Water and wastewater characteristics, chemistry, quality and supply. Engineering design and water demand projection. Theory of individual treatment processes, design guidelines for components for water/wastewater treatment.

Prerequisites: CE 371 and CHE 221, both with grade "C" or better

**CE 587 - Environmental Remediation Technologies**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Potential human activity effects on natural systems (air, soil, water). Physical, chemical, and biological processes in contaminant fate and transport.

Regulatory aspects of environmental assessment, monitoring, and prioritization. Remediation/restoration technologies and strategies.

Prerequisite: CE 481 with grade "C" or better

**CE 590 - Civil Engineering Graduate Project**

(F,W,S)

Credit Hours: (Vary 1-9)

Research and preparation pertaining to the master's project.

Prerequisite: Advisor consent

**Chemistry****CHE 101 - Introduction to General Chemistry**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

A brief presentation of introductory chemical concepts including atomic structure, the chemical equation, the behavior of gases, the chemistry of solution and acid-base chemistry. For students with good knowledge of algebra.

Corequisite: CHE 104 (lab)

Pre- or Corequisite: MATH 100

**CHE 102 - Introduction to Organic Chemistry**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Continuation of CHE 101 with emphasis on organic chemistry. The role of organic chemistry in life and industrial processes is discussed.

Prerequisite: CHE 101 with grade "C" or better or instructor consent

Corequisite: CHE 105 (lab)

**CHE 103 - Introduction to Biochemistry**

(S)  
Lecture Hours: 3  
Lab Hours: 0  
Credit Hours: 3

A continuation of CHE 102 with emphasis on biochemistry. The organic chemistry of biochemicals including proteins, carbohydrates and fats, as well as nucleic acids is discussed. Basic elements of metabolism are also explored. Prerequisite: CHE 102 with grade "C" or better or instructor consent  
Corequisite: CHE 106 (lab)

**CHE 104 - Introduction to General Chemistry Laboratory**

(F,W,S)  
Lecture Hours: 0  
Lab Hours: 3  
Credit Hours: 1  
Lab accompanying class content in CHE 101.  
Corequisite: CHE 101

**CHE 105 - Introduction to Organic Chemistry Laboratory**

(W)  
Lecture Hours: 0  
Lab Hours: 3  
Credit Hours: 1  
Lab accompanying class content in CHE 102.  
Corequisite: CHE 102

**CHE 106 - Introduction to Biochemistry Laboratory**

(S)  
Lecture Hours: 0  
Lab Hours: 3  
Credit Hours: 1  
Lab accompanying class content in CHE 103.  
Corequisite: CHE 103

**CHE 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**CHE 201 - General Chemistry I**

(F)  
Lecture Hours: 3  
Lab Hours: 0  
Credit Hours: 3  
Atomic structure, chemical compounds, chemical equations and reaction stoichiometry, reactions in aqueous solution (including acid/base, redox, and precipitation reactions) gas laws and kinetic-molecular theory, and thermochemistry. Emphasis on engineering applications.  
Prerequisite: CHE 101 and CHE 104, or high school chemistry or equivalent  
Corequisite: CHE 204 (lab)  
Pre- or Corequisite: MATH 111

**CHE 202 - General Chemistry II**

(W)  
Lecture Hours: 3  
Lab Hours: 0  
Credit Hours: 3  
Electronic structure of atoms, periodic trends, chemical bonding, molecular geometry, intermolecular forces, phase transitions, and properties of solutions. Emphasis on engineering applications.  
Prerequisite: CHE 201 and CHE 204, or CHE 221  
Corequisite: CHE 205 (lab)

**CHE 203 - General Chemistry III**

(S)  
Lecture Hours: 3  
Lab Hours: 0  
Credit Hours: 3  
Chemical kinetics and equilibrium, applications of aqueous equilibria (including acid-base reactions, buffers, solubility, and complexation reactions), thermodynamics, entropy and free energy, electrochemistry, and nuclear chemistry.  
Prerequisite: CHE 202 and CHE 205, or CHE 222  
Corequisite: CHE 206 (lab)

**CHE 204 - General Chemistry I Laboratory**

(F)  
Lecture Hours: 0  
Lab Hours: 3  
Credit Hours: 1  
Laboratory experiments to accompany CHE 201.  
Corequisite: CHE 201

**CHE 205 - General Chemistry II Laboratory**

(W)  
Lecture Hours: 0  
Lab Hours: 3  
Credit Hours: 1  
Laboratory experiments to accompany CHE 202.  
Corequisite: CHE 202

**CHE 206 - General Chemistry Laboratory**

(S)  
Lecture Hours: 0  
Lab Hours: 3  
Credit Hours: 1  
Laboratory experiments to accompany CHE 203.  
Corequisite: CHE 203

**CHE 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**CHE 210 - Clinical Pharmacology**

(F)  
Lecture Hours: 3  
Lab Hours: 0  
Credit Hours: 3  
The drug action of selected pharmaceutical. Emphasis is placed on drug interactions, routes of administration and effects on body systems.  
Prerequisites: BIO 231 and BIO 232

**CHE 221 - General Chemistry I**

(F)  
Lecture Hours: 4  
Lab Hours: 3  
Credit Hours: 5  
Atomic structure, chemical compounds, chemical equations and reaction stoichiometry, reactions in aqueous solution (including acid/base, redox, and precipitation reactions) gas laws and kinetic-molecular theory, and thermochemistry. Includes lab component.  
Prerequisite: CHE 101 and CHE 104, or high school chemistry or equivalent  
Pre- or Corequisite: MATH 111

**CHE 222 - General Chemistry II**

(W)  
Lecture Hours: 4  
Lab Hours: 3  
Credit Hours: 5  
Electronic structure of atoms, periodic trends, chemical bonding, molecular geometry, intermolecular forces, phase transitions, and properties of solutions. Includes lab component.  
Prerequisite: CHE 201 and CHE 204, or CHE 221

**CHE 223 - General Chemistry III**  
(S)

Lecture Hours: 4

Lab Hours: 3

Credit Hours: 5

Chemical kinetics and equilibrium, applications of aqueous equilibria (including acid-base reactions, buffers, solubility, and complexation reactions), thermodynamics, entropy and free energy, electrochemistry, and nuclear chemistry. Includes lab component.

Prerequisite: CHE 202 and CHE 205, or CHE 222

**CHE 260 - Electrochemistry for Renewable Energy Applications**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Development of electrochemistry concepts, including thermodynamics, reaction kinetics, charge transport and mass transport. Topics are presented in the context of fuel cells, electrolysis, electroplating and batteries. Also discussed, the chemistry of hydrogen; its properties, production, storage and transportation.

Prerequisite: CHE 202 and CHE 205, or CHE 222

**CHE 305 - Nanoscience and Nanotechnology**

(F)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Survey of chemical and physical phenomena as applied to nanoscale materials, including metal and semiconductor nanoparticles and carbon nanostructures. Discussion of major synthesis and characterization techniques. Biological and engineering applications of nanoscale materials.

Prerequisites: CHE 202 and CHE 205, or CHE 222, and PHY 222 or PHY 223

**CHE 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**CHE 315 - Environmental Chemistry and Toxicology**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Mechanisms and toxicological effects of chemical reactions in water, soil and air. Global and regional concerns about atmospheric and marine contaminants, thermal pollution, pesticide and heavy metal disposal, radioisotope properties and effects of pollutants on living organisms. Organic nomenclature and selected biochemistry principles.

Prerequisite: CHE 331 or instructor consent

**CHE 331 - Organic Chemistry I**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

The structures and reactions of carbon compounds with emphasis on thermodynamics, reaction pathways and spectroscopy.

Prerequisite: CHE 203 and CHE 206, or CHE 223

**CHE 332 - Organic Chemistry II**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Organic stereochemistry with emphasis on biologically important molecules.

Prerequisite: CHE 331

**CHE 333 - Organic Chemistry III**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Free radical chemistry, pharmaceutical chemistry and the mechanistic aspects of enzymatic catalysis.

Prerequisite: CHE 332

**CHE 335 - Bioorganic Chemistry**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

An overview of common organic chemistry mechanisms that occur in mammalian metabolism with a focus on molecular structure and reactivity of biological molecules and metabolites.

Prerequisite: CHE 331

**CHE 341 - Instrumental Methods/Data Acquisition I**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

An introduction to the theory and practical applications of computer/instrument interfacing and data acquisition techniques and software. Includes a survey of optical measurement techniques.

Prerequisite: CHE 235

Corequisite: CST 116 or MIS 115 or instructor consent

**CHE 342 - Instrumental Methods/ Data Acquisition II**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Principles and techniques of instrumental methods and data analysis. Methods appropriate for chemical analysis including spectroscopy, gas chromatography, potentiometric and flame photometric methods. Emphasis on sample preparation, instrumental response, sensitivity and accuracy.

Prerequisite: CHE 341

**CHE 345 - Corrosion Chemistry**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

A survey of the chemical kinetics and thermodynamics of corrosion, the various types of corrosion, inhibition of corrosion and industrial applications.

Prerequisites: CHE 101 and CHE 104, CHE 201 and CHE 204, or CHE 221, and PHY 202 or instructor consent

**CHE 346 - Corrosion Chemistry Laboratory**

(S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Laboratory accompanying CHE 345. Providing practical experience with electrochemical equipment used to measure corrosion processes.

Corequisite: CHE 345

**CHE 350 - Clinical Pharmacology for Nuclear Medicine**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Principles of pharmacokinetics, pharmacodynamics and a survey of the major drug families developing familiarity with commonly prescribed drugs, their clinical application, mechanism of action and side effects. Emphasis is on drugs of importance to nuclear medicine and the common radiopharmaceuticals.

Prerequisite: BIO 233 or BIO 333 or instructor consent

**CHE 360 - Clinical Pharmacology for the Health Professions**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Principles of pharmacokinetics, pharmacodynamics and a survey of the major drug families developing familiarity with the most commonly prescribed drugs, their clinical application, mechanism of action and side effects.

Prerequisite: BIO 233 or BIO 333 or instructor consent

**CHE 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**CHE 450 - Biochemistry I**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Molecular and cellular biochemistry with emphasis on DNA structure, replication, the process and cellular regulation of RNA transcription, and analyzing and constructing DNA.

Prerequisites: BIO 213 and CHE 332

**CHE 451 - Biochemistry II**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Molecular biochemistry with emphasis on protein conformation and function, mechanisms of enzyme action and control, and energy production via glycolysis.

Prerequisite: CHE 450

**CHE 452 - Biochemistry III**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Molecular and cellular biochemistry with emphasis on cell membranes, lipid metabolism, aerobic energy metabolism, anabolism and the role of biochemistry in cellular signaling processes.

Prerequisite: CHE 451

**CHE 465 - Fate and Transport of Pollutants**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Mass balance. The use of equilibrium and chemical kinetics in the modeling of pollutant transport in water, soil and air. Mixing zone analysis, the use of Darcy's law, flow nets and the Gaussian Plume approximation. Discussion, development and use of selected modeling scenarios.

Prerequisite: CHE 203 and CHE 206, or CHE 223, or MATH 252

**Communication****COM 104 - Introduction to Communication**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduces Communication Studies. Principles and applications developed in context of career exploration, interpersonal, group, organizational and technical communication. Includes history and structure of communication field, career paths, research skills and role of technology. Required for majors.

**COM 105 - Introduction to Communication Theory**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduces basic theories and concepts in the Communication discipline. Acquaints students with major theories fundamental to communication research and to communication interactions including interpersonal, organizational, media and intercultural.

Prerequisite: COM 104

Pre- or Corequisite: WRI 122

**COM 106 - Introduction to Communication Research**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduces research in the communication discipline. Students find and analyze quantitative, qualitative and critical research. Introduces communication research as a process composed of methods, data-gathering, analysis, conclusions.

Prerequisite: COM 105

**COM 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**COM 109 - Introduction to Communication Technology**

(S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Introduction to the use of communication technology. Emphasis on the use of various communication technologies including social media, instant messaging, and visual communication technologies. Features projects using technology to effectively communicate to various audiences.

**COM 115 - Introduction to Mass Communication**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Provides an introduction to mass media. Focuses on understanding how media operate with emphasis on contemporary social, economic, political, cultural and ethical issues.

**COM 205 - Intercultural Communication**

(F,W,S) C

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduces basic theories and concepts of intercultural communication. Builds understanding and skills enabling students to analyze intercultural interactions and develop and practice effective communication strategies.

**COM 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**COM 215 - Creativity in Communication**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Define and learn how personal and group creativity can be enhanced. Study the lives of creative individuals in the arts, sciences, and industry. Individual and group exercises designed to enhance the creative process.

**COM 216 - Essentials of Grammar and Punctuation**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Involves learning basic and advanced grammar and punctuation to provide a firm foundation for any type of writing. Prerequisite: WRI 121 with grade "C" or better

**COM 225 - Interpersonal Communication**

(F,W,S) C

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduces interpersonal communication theory and practice. Students apply course concepts to analyze and practice dyadic communication to develop more effective work and personal relationships.

**COM 237 - Introduction to Visual Communication**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduces theory and rhetoric through several perspectives: personal, historical, technical, ethical, cultural, and critical. Emphasizes relationships between form/content, word/ image, and societal role of visual communication. Prerequisite: WRI 122

**COM 248 - Digital Media Production**

(S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Study of the technical aspects of digital media design and production. Hands-on experience in creating and editing video and audio. Production of video and audio for specific contexts.

**COM 255 - Communication Ethics**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Examines typical communication situations involving ethics. Provides methodologies for critically evaluating ethical situations. Uses case approach with emphasis on application. Prerequisite: WRI 122

**COM 256 - Public Relations**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduces history and practice of public relations; emphasizes practical accomplishment of public relations campaigns. Topics: internal/external audiences, brochures, press releases, internal documents, pitches, issue management, and project design, execution. Service learning course. Prerequisite: WRI 122

**COM 276 - Democracy and Media**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Provides introduction to ownership/structure of media, politics, objectives, and links to the corporate and national economy. Introduces project analysis through ownership, sourcing, flak, advertising, ideology filters. Prerequisites: COM 115 and WRI 122

**COM 301 - Rhetorical Theory and Application**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduces rhetorical theories and applications to personal, business and industrial settings. Focuses on evolution of rhetoric. Examines rhetorical effects on individual, group and mass communication. Prerequisites: SPE 111 and WRI 227

**COM 305 - Contemporary Rhetorical Theory**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Explores contemporary rhetorical theory in its development over the 20th century. Topics range from the need for a new rhetoric to critical rhetorical theories of power, race, and gender. Prerequisites: SPE 111 and WRI 121

**COM 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**COM 309 - Communication Technology in Use**

(S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Advanced use of communication technology. Emphasis on the use of communication technology to achieve specific communication goals. Features a large project using multiple communication technologies to reach specific audiences. Prerequisites: COM 109, MIS 101, MIS 102, and MIS 103

**COM 320 - Advanced Intercultural Communication**

(W,S) C

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Builds on theories from COM 205. Focuses on analyzing intercultural interactions in specific work contexts, for example health care, education, social services, business and technology. Prerequisite: COM 205

**COM 325 - Gender and Communication**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduces basic theories and concepts of culturally-derived gendered communication patterns and behaviors. Builds understanding and skills enabling students to analyze those patterns and behaviors in order to develop and practice effective communication strategies. Prerequisite: COM 205

**COM 326 - Communication Research**  
(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to research methods and design. Design of both quantitative and qualitative research. Emphasis on communication based methodologies: focus groups, directed interviews, and ethnomethodologies. Includes a research project and written and oral research reports.

Pre- or Corequisite: WRI 227

**COM 336 - Nonverbal Communication**  
(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Nonlinguistic aspects of human communication. Examines the relationships between nonverbal and verbal communication behavior and nonverbal communication skill. Topics include space, distance, environment, touch, gesture, facial expression and gaze as communication.

Prerequisites: COM 225 and SPE 111

**COM 345 - Organizational Communication I**  
(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Studies communication in organizations, including message movement, exchange and interpretation, identification of variables, roles and patterns influencing communication in organizations.

**COM 346 - Health Communication**  
(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Overview of interpersonal, social and cultural issues in health communication, including family interaction, roles of patients and caregivers, communication in health organizations and the role of media.

Prerequisites: WRI 122 with "C" or better, and COM 205 or equivalent

**COM 347 - Negotiation and Conflict Resolution**  
(F,S) C

(F,S) C

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Examines theories and strategies for conduct of conflict and negotiation across contexts. Topics: destructive conflict cycles, confronting/managing conflict, social/psychological aspects, conflict analysis, causes and promoting constructive conflict.

Prerequisite: SPE 321 or instructor consent

**COM 348 - Facilitation**  
(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Provides experience leading small groups through deliberative processes including participatory decision making and conflict resolution. Provides theoretical and practical understanding of facilitation focusing on building skills in group leadership.

Prerequisite: SPE 321

**COM 358 - Communication and the Law**  
(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Issues involved in establishing legal parameters within which professional communicators work. Evolving interpretations of the first amendment, balancing conflicting first amendment claims, libel, limits of a free press, prior restraint, licensing and regulation.

Prerequisites: SPE 111 and WRI 227

**COM 365 - Electronic Communication and Society**  
(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Explores the Internet as a mediator of human communication and its effect on society. Topics include social media, informatics, entertainment/workplace contexts, and the convergence of technology as a global village.

Prerequisite: WRI 227

**COM 401 - Civil Engineering Project I**  
(F) C

Lecture Hours: 4

Lab Hours: 6

Credit Hours: 6

First term of a two-term sequence integrating civil engineering design, group dynamics and technical communications. Students receive three credit hours in civil engineering design (CE 401) and three credit hours in communication for general education (COM 401). Students will be introduced to a major civil engineering project, prepare a professional engineering proposal and function effectively in engineering design teams. Formal written proposal and oral presentation of the proposal are required.

Prerequisite: Civil Engineering advisor consent

Corequisite: CE 401

**COM 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**COM 415 - Developing Multimedia**  
(W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Course introducing students to the tools and skills associated with designing, developing, presenting, and disseminating state-of-the-art multimedia. Hands-on experience with graphics, digital/audio video, animation, and text.

Pre or Corequisites: CST 102 or equivalent, or instructor consent; PWR 220

**COM 420 - Externship**  
(F,W,S)

Credit Hours: (Variable to a total of 15 credits)

Students work in applied settings in their emphasis under the supervision of an on-site mentor. Regular contact with extern advisor. Written externship reports required.

Prerequisite: Senior standing

**COM 421 - Senior Project I**  
(F,W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Allows students to initiate research on a significant capstone project in the communication field. Focuses on development of a proposal and presentation.

Prerequisite: Senior standing

**COM 422 - Senior Project II**

(W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Continues work of COM 421, focusing on project research methodologies.

Prerequisite: COM 421

**COM 423 - Senior Project III**

(F,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Focuses on completion of project, including final documentation and presentation.

Prerequisite: COM 422

**COM 424 - Capstone Course**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Communication Studies majors complete a significant research project that bridges education with future profession or graduate school. Students collaboratively produce a project or portfolio reflecting strong critical thinking and application of communication theory and practice. Project topics vary by instructor.

Prerequisites: WRI 227 and Senior standing

**COM 425 - Mediation**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Prepares students to mediate in public and private settings. Covers conflict management strategies, processes and issues including gender and cultural awareness.

Prerequisite: COM 225 or instructor consent

**COM 426 - Mediation Practicum**

(S)

Credit Hours: (Variable Credit 1-3)

Mediation practice and observation with experienced mediators through the Klamath Mediation Center. Students will progress from observation, to co-mediation, and finally, mediation of real disputes. Builds on the theoretical insights and practice of COM 425.

Pre- or Corequisite: COM 425

**COM 437 - Communication Training and Development**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Prepares students to facilitate communication skills workshops and differentiate between organizational structure and communication training needs. Topics include audience analysis, learning theory, curriculum design, presentation skills, classroom dynamics and assessment.

Prerequisite: SPE 321

**COM 445 - Organizational Communication II**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Examines organizational communication systems and the design of communication audit procedures. Synoptic reports of findings and recommendations.

Prerequisite: COM 345 or instructor consent

**COM 446 - Communication and Leadership**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Explores the relationship between communication and leadership within organizations and the development and application of communication competencies associated with effective leadership.

Prerequisite: SPE 321 or instructor consent

**Clinical Sleep Health****CSH 201 - Human Development and Behavioral Health**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Normal sleep architecture over the lifespan. Behavioral, physiological, and environmental patterns that contribute to healthy sleep.

**CSH 220 - Sleep Disorders and Co-Morbidities**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Pathophysiology, epidemiology, and clinical presentation of abnormal sleep. Understanding and recognition of major co-morbidities associated with sleep disorders.

**CSH 225 - Impact of Neurologic Disorders on Sleep**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Effect and management of chronic neurological disorders on sleep quality and therapy outcomes.

**CSH 231 - Pharmacology of Sleep**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Different classes of medication, dependency, addiction, long term effect on sleep, and prognosis for other sleep therapies.

**CSH 233 - Sleep Therapies and Compliance**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Non-prescription sleep therapies, PAP, CBT, Light Therapy, Chronotherapy and other treatment modalities. Patient compliance issues, predictors of outcomes, and psychological theories.

**CSH 242 - Evaluation and Measurement Tools**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Physiological, psychological, and psychomotor evaluation and measurement tools to assess severity of sleep disorders and patient response to therapy.

**CSH 268 - Learning, Health Literacy, and Community Education**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Adult education theories, appropriate communication strategies for health literacy, development of programming for patients, families, allied health providers, and community groups.

**CSH 276 - Capstone Project**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Students develop, plan and implement a project for community sleep education. Instructor functions as a consultant.  
Prerequisite: CSH 268

**CSH 277 - Clinical Sleep Health Externship**

(F,W,S)

Lecture Hours: 0

Lab Hours: 40

Credit Hours: 13

Clinical skills essential for the practice of sleep case management. Patient assessment, creation of individualized care plans, long term compliance monitoring, and identification of changes in the status of other chronic diseases. Students must be employed in a clinical facility that treats sleep disordered patients. (400 contact hours).  
Prerequisite: CSH 268

**Computer Systems Engineering Technology****CST 102 - Introduction to Computer Systems**

(F)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Concepts, terms, and trends related to the computer engineering technology (hardware) and software engineering technology (software) curriculums. Includes discussions on fundamental aspects of the computer field. Laboratory component will introduce students to micro-computers, programming concepts and various computer/engineering related software.

Prerequisite: CSET major or instructor consent

**CST 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**CST 116 - C++ Programming I**

(F,W,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Computer concepts and problem solving methods using C++ programming language. Topics include: algorithms, simple data types, conditional and iterative structures, function definition, structured programming and documentation. Cannot be taken for graduation credit if student has completed MIS 116.

Pre- or Corequisite: MATH 111

**CST 120 - Embedded C**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

C programming concepts for embedded platforms such as cross-compilation, storage classes, dynamic memory allocation, bitwise operations and masking. Embedded systems topics such as I/O ports, interrupts, timers and hardware interfacing will also be explored.

Prerequisites: CST 126 and CST 162

**CST 126 - C++ Programming II**

(F,W,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Solving complex problems using advanced features of the C++ language. Topics include function usage, pointer data type, dynamic memory allocation, string manipulation, and structure and union data types. Emphasis is on structured program design techniques. Cannot be taken for graduation credit if student has completed MIS 126.  
Prerequisite: CST 116 with grade "C" or better

**CST 130 - Computer Organization**

(W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduces computer elements, organization, and instruction sets, computer arithmetic, ALU, Registers, Datapath, memory and Control unit functions.

Prerequisite: CST 162 with grade "C" or better

**CST 131 - Computer Architecture**

(F,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Continuation of CST 130. Topics include main memory, cache, virtual memory, memory management, secondary storage, networks, operating system functions, and pipelining.

Prerequisite: CST 130 with grade "C" or better

**CST 133 - Digital Logic II**

(F,W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introduction to sequential logic, latches, flip-flops, registers, counters, timers, finite state machines. Implementation in programmable logic devices using HDL. DC and AC parameters, timing analysis. Laboratory is integral to class.

Prerequisite: CST 162 or EE 131, both with grade "C" or better

**CST 134 - Instrumentation**

(F,W)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Lecture/laboratory course that provides students experience in measuring, calibrating, and testing digital and analog systems. Uses various test equipment for test and measurement of digital and analog components.

Pre- or Corequisite: CST 133

**CST 136 - Object-Oriented Programming with C++**

(F,W,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

A study of object oriented programming with C++. Beginning and intermediate concepts are covered including classes, objects, member functions, overloading, inheritance, polymorphism, templates, and virtual functions. This course prepares students with a strong C background for upper-division coursework using C++. Cannot be taken for graduation credit if student has completed MIS 136.

Prerequisite: CST 126 with grade "C" or better

**CST 162 - Digital Logic I**

(F,W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introduction to combinational logic. Includes introduction to number systems, Boolean algebra, logic gates, Muxes, Decoders, Adders, Subtractors. Logic design using a hardware description language. Laboratory integral to the class. Pre- or Corequisite: MATH 100

**CST 204 - Introduction to Microcontrollers**

(W,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

An introduction to microcontrollers (uC). Signals and data flow within simple systems. Introduction to instruction set, software development tools and I/O techniques, both programmed and interrupt-driven. Experiments using uC plus external circuits in applications. Prerequisites: CST 131 and CST 250, both with grade "C" or better, or instructor consent

**CST 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**CST 211 - Data Structures**

(F,W,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Discussion of efficient methods of data representation such as stacks, queues, linked-lists, binary trees, B-trees. Emphasis is on data representation and algorithm analysis. Prerequisite: CST 136 with grade "C" or better

**CST 223 - Concepts of Programming Languages**

(S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Study of principles and fundamental concepts characterizing high-level programming languages, including history and survey of programming paradigms, syntax and semantic rules, data types, control flow and data abstraction. Prerequisite: CST 126 with grade "C" or better

**CST 229 - Introduction to Grammars**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

The concepts involving alphabet words and languages will be discussed. Related topics in automata and regular expression will be explored. Emphasis is on context free grammars, parse tree and parsing techniques. Prerequisites: CST 136, and CST 223 or CST 231

**CST 231 - Digital Systems Design I**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Concepts, terminology and techniques in design and implementation of digital system components. Synchronous sequential logic design with emphasis on state machines. System design process including synthesis using Verilog HDL and implementation in programmable logic devices. Lab integral to course. Prerequisite: CST 133 with grade "C" or better

**CST 236 - Engineering for Quality Software**

(W,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

This course teaches industry standard tools to enforce best practices to ensure quality software. Topics include project management, the Agile methodology, build management, and testing methodologies. Prerequisite: CST 136 with grade "C" or better

**CST 238 - Graphical User Interface Programming**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introduction to HCI and GUI design in a rapid application development environment. Prerequisite material in delegation, events, and multithreaded programming included. Topics: forms, containers, components, controls, modal/modeless windows, fixed/ dynamic layouts, SDI/MDI applications, application internationalization, and data binding. Pre- or Corequisite: CST 211

**CST 240 - Linux Programming**

(W,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Students will study the structure of the Linux Operating System, including: file structure, input/output processing, commands and utilities, shell configuration, communications, and script programming languages. Students will write programs using processes, threads, and sockets. Prerequisite: CST 126 with grade "C" or better

**CST 250 - Computer Assembly Language**

(F,W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Concepts of assembly language programming applied to a modern computer; data and instruction formats, address generation; data definition, storage allocation and program control statements; sub-routine library; CPU instruction set; control records; and writing of sub-routines. Prerequisites: CST 126 and CST 130 with grade "C" or better

**CST 262 - Digital Design Using HDL**

(F,W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Advanced digital circuit design. HDL is used in designing sequential logic circuits such as registers, counters, and synchronous finite state machines. Basic digital circuit design and analysis with semiconductor devices is also covered. Laboratory is integral to the class. Prerequisites: CST 162 with grade "C" or better, or EET 101 and EET 102

**CST 276 - Software Design Patterns**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Design patterns establish a common terminology allowing developers to use a common vocabulary and share a common viewpoint of the problem. Design patterns provide a common point of reference during the analysis and design phase of a project. Prerequisite: CST 136 with grade "C" or better

**CST 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**CST 315 - Embedded Sensor Interfacing and I/O**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introduction to Data Acquisition Systems. Sampling Theory, ADC, DAC, Signal Conditioning, Filters, Amplifiers, Noise. Transducers and sensors, including Bio-sensors. Sensor Interfacing, Smart Sensors, and Busses. Lab integral to course.

Prerequisites: CST 204 and EE 221

**CST 316 - Junior Team-Based Project Development I**

(F,W,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

In this three-term sequence, students will work in teams to gather requirements, model, analyze, develop and integrate an n-tiered architecture software product. Students will learn about project management, software development lifecycle tools and processes, and quality assurance processes.

Prerequisite: CST 211 with grade "C" or better

Pre- or Corequisites: CST 324 with grade "C" or better, and at least two of CST 236, CST 238, CST 276, all with grade "C" or better

**CST 320 - Compiler Methods**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Basic concepts of compiler design and operation. Topics include lexical and syntactical analysis, parsing, translation, data flow analysis and code generation, and implementation of a small compiler.

Prerequisite: CST 211 and CST 229 with grade "C" or better

**CST 321 - Introduction to Microprocessors**

(F)

Lecture Hours: 3

Lab Hours: 6

Credit Hours: 5

Hardware and assembly level software needed to interface a microprocessor to I/O ports, memory and interrupt sources. Topics include bus controller design, timing analysis, programmed I/O and interrupts. Extensive lab provides experience with system design, test and debugging using the 80386DX microprocessor.

Prerequisites: CST 204 and CST 231, with grade "C" or better, or instructor consent

**CST 324 - Database Systems and Design**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

An overview of Data Base Management Systems including requirements analysis methodology for data base design, conceptual DB design methodology including formulation of entity-relationship models, review of query language characteristics, and a comparison of commonly available DBMS.

Prerequisite: CST 211 with grade "C" or better

**CST 326 - Junior Team-Based Project Development II**

(F,W,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

In this three-term sequence, students will work in teams to gather requirements, model, analyze, develop and integrate an n-tiered architecture software product. Students will learn about project management, software development lifecycle tools and processes, and quality assurance processes.

Prerequisite: CST 316

**CST 328 - Graphics, Games, and Simulations Programming**

(S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Introduction to games and simulations programming using a high end game development engine. Graphics topics: geometric transformations, physics simulation, collision detection/handling, and ray tracing/casting. Artificial intelligence topics: game theory, probability, steering behaviors, flocking behaviors, path-finding, and behavior trees.

Prerequisite: CST 238 or instructor consent

**CST 331 - Microprocessor Peripheral Interfacing**

(W)

Lecture Hours: 3

Lab Hours: 6

Credit Hours: 5

Expansion of processor based systems through off chip parallel bus interfacing. Adding off chip I/O ports, memory and parallel I/O devices. I/O port expansion through serial interface. In depth interface timing analysis. Extensive lab provides continued experience with system design, test and debugging techniques.

Prerequisites: CST 231 with grade "C" or better, and CST 321 or CST 337

**CST 334 - Project Proposal**

(S)

Lecture Hours: 1

Lab Hours: 0

Credit Hours: 1

Description of senior project; time management techniques; task assignment; development of in-depth senior project proposal and preparation of formal senior project. Includes use of PC-based planning.

Pre- or Corequisite: CST 336 or CST 373

**CST 335 - I/O Device Interfacing Techniques**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Application of opto-couplers, peripheral drivers, A-D converters, and operational amplifiers to microprocessor/microcontroller based applications. Survey of transducer theory and available devices. An embedded system is used as a development platform in laboratory experiments.

Prerequisites: CST 204 and EE 223, or EET 237 and EET 238, or instructor consent

**CST 336 - Junior Team-Based Project Development III**

(F,W,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

In this three-term sequence, students will work in teams to gather requirements, model, analyze, develop and integrate an n-tiered architecture software product. Students will learn about project management, software development lifecycle tools and processes, and quality assurance processes.

Prerequisite: CST 326

**CST 337 - Embedded System Architecture**

(F)

Lecture Hours: 3

Lab Hours: 6

Credit Hours: 5

Configuration, programming, testing, debugging of embedded systems. Serial interfaces including RS232, 12C and SPI. I/O methods including programmed I/O, interrupts and DMA. Interfacing issues related to timing and protocol. Impact of processor architecture and I/O methods on system performance.

Prerequisite: CST 204 with grade "C" or better

**CST 340 - Advanced UNIX**

(S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Advanced facets of the UNIX operating system will be explored. Topics of study will include: interprocess communication, programming, system administration. Students will use Oregon Tech computers operating under UNIX.

Prerequisite: CST 240

**CST 344 - Intermediate Computer Architecture**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Register level design of a computer system, including the processor and memory structures. Cache and virtual memory. Includes analysis of both CISC (Complex Instruction Set Computer) and RISC (Reduced Instruction Set Computer) architectures.

Prerequisite: CST 204

**CST 346 - .NET Programming in C#**

(F)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Essentials of programming using the C# language. It emphasizes C# programming structure, syntax, design, and implementation essentials, as well as a brief overview of the .NET framework. Creating Windows Forms and accessing ADO.NET are also examined.

Prerequisite: CST 211

**CST 347 - Real-Time Embedded Operating Systems**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

OS Kernel Constructs and Problem Scaling, Small Scale Environment Specification, Process, Threads, Fibers, Synchronization Primitives, Small Scale Memory Management, Scheduling Paradigms, Real-Time Scheduling, I/O and Debugging. Lab integral to course.

Prerequisites: CST 211 and CST 240, both with grade "C" or better

**CST 350 - Introduction to VLSI Design**

(S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

An introduction to the various aspects of Very Large Scale Integration circuits. Includes modern design techniques using CAD/CAE software tools, Design using Standard Cell techniques, discussion of full custom design and VLSI testing concepts. Demonstrations are included to supplement lectures. The course will include laboratory experience.

Prerequisites: CST 231, CST 232, and EE 321, or instructor consent

**CST 351 - Digital Systems Design II**

(S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Continuation of Digital Systems Design I. Focus on timing, test benches, testing, and security in programmable logic devices. Laboratory includes analysis, design, synthesis, simulation and testing of complete digital systems.

Prerequisite: CST 231

**CST 352 - Operating Systems**

(F,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Issues in Operating Systems Design. Topics include: processes, threads and fibers, privilege modes, preemptive multitasking, process state machine, scheduling paradigms, system calls/ traps, shared resources and synchronization primitives, memory management schemes/virtual memory, deadlock detection, handling, and avoidance, I/O management.

Prerequisites: CST 211 and CST 240, both with grade "C" or better

**CST 356 - Web Design and Development**

(F)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Basic components of Web development which include aspects of design as well as current development technologies. Development technologies include, but are not limited to, HTML/XHTML, JavaScript, and CSS. Other technologies discussed may include Java Applets, CGI programming, ASP.NET and PHP.

Prerequisite: CST 211

**CST 371 - Embedded Systems Development I**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

A three-term sequence covering design, implementation, test and documentation techniques used for embedded computer systems. Each student is required to work on and complete a project as a member of a team. The entire sequence must be completed in three consecutive terms.

Prerequisite: CST 204

Corequisite: CST 315 or CST 335

**CST 372 - Embedded Systems Development II**

(W)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

A three-term sequence covering design, implementation, test and documentation techniques used for embedded computer systems. Each student is required to work on and complete a project as a member of a team. The entire sequence must be completed in three consecutive terms. Prerequisite: CST 371

**CST 373 - Embedded Systems Development III**

(S)

Lecture Hours: 1

Lab Hours: 3

Credit Hours: 2

A three-term sequence covering design, implementation, test and documentation techniques used for embedded computer systems. Each student is required to work on and complete a project as a member of a team. The entire sequence must be completed in three consecutive terms. Prerequisite: CST 372

**CST 374 - Embedded Project Proposal**

(S)

Lecture Hours: 1

Lab Hours: 0

Credit Hours: 1

Development of formal, in-depth embedded senior project proposal. Guidelines for an acceptable project; project and time management techniques; task assignment. Individual creativity will be encouraged by allowing the student to select an appropriate embedded systems project. Pre- or Corequisite: CST 373

**CST 405 - Directed Study**

(F,W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Advanced study under the guidance of faculty. Topics and learning objectives arranged between students and instructor. Students will meet with instructor weekly to discuss progress and provide evidence of their performance. Prerequisites: Junior standing in CSET and instructor consent

**CST 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**CST 412 - Senior Development Project**

(F)

A three-term sequence giving the student major responsibility for planning and carrying out a computer-oriented project. Individual creativity will be encouraged by allowing the student to select an appropriate project.

Prerequisites: CST 334, and CST 336 or CST 373

**CST 415 - Computer Networks**

(F,W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Current issues in computer networks and distributed systems. Topics include network protocols, interface standards, and transmissions mode. Network layers detailing Internet Protocol Suite and correlations with 7 layer abstract communication model. Routing and WAN Architectures.

Prerequisite: CST 352 with grade "C" or better

**CST 417 - Embedded Networking**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Network Protocol in a Small Scale embedded environment, Physical characteristic specification, Network Interface Controller interface, TCP/IP, Application interface, Packet Routing, Network Architecture. Lab integral to course.

Pre- or Corequisite: CST 336 or CST 373 with grade "C" or better

**CST 418 - Data Communications and Networks**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Provides students with an introduction to data communications and computer networks. Students acquire knowledge of communications components and their use in implementing a network. Emphasis is on the practical aspects of network configuration, operations, and detection, isolation and correction of problems.

Prerequisites: CST 204, and EE 223 or EET 237

**CST 420 - Effective C++ and STL**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Emphasis is on techniques to apply the C++ language and library effectively toward the implementation of object-oriented systems. Specific ways to improve design and program will be covered as well as purpose and use of the C++ Standard Library.

Prerequisite: CST 320 or instructor consent

**CST 422 - Senior Development Project**

(W)

Lecture Hours: 2

Lab Hours: 5

Credit Hours: 3

A three-term sequence giving the student major responsibility for planning and carrying out a computer-oriented project. Individual creativity will be encouraged by allowing the student to select an appropriate project.

Prerequisites: CST 334, and CST 336 or CST 373

**CST 426 - Introduction to Artificial Intelligence**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Concepts and techniques of AI with considerable use of the LISP interpreter. Includes discussion of "search" methods, knowledge representation, natural language processing, models of cognition, vision, and "The Blocks World."

**CST 432 - Senior Development Project**

(S)

Lecture Hours: 1

Lab Hours: 3

Credit Hours: 2

A three-term sequence giving the student major responsibility for planning and carrying out a computer-oriented project. Individual creativity will be encouraged by allowing the student to select an appropriate project.

Prerequisites: CST 334, and CST 336 or CST 373

**CST 435 - Microprogramming**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

The concepts and methods involved in programming the computer's control unit. Coverage includes a review of computer organization, microprogram operations such as floating point arithmetic, translator/simulator development, and emulation techniques.

Prerequisite: Software Engineering Technology Senior standing or instructor consent

**CST 441 - Logic Synthesis with VHDL**

(F)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

This course will show students how to use the hardware description language, VHDL, with hierarchical design techniques to manage a complex design. In this process, students will create a design using the VHDL modeling tools, simulate the design using advanced simulation techniques, synthesize and test the design. Laboratory integral with the course.

Prerequisite: CST 351 or instructor consent

**CST 442 - Advanced Computer Architecture**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Advanced concepts in computer architectures including pipelined, super-pipelined, superscalar, and dynamically pipelined processor architectures, Parallel processors, Multiprocessors, Cache and Cache coherency.

Prerequisite: CST 344 or instructor consent

**CST 445 - Advanced Microprocessors and Applications**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

This class examines the architecture of the Motorola 680X0 microprocessor family. The course investigates advanced design techniques used in developing interfaces to the 680X0 microprocessor family, along with the use of coprocessors and special device controllers. Advanced design concepts in both software and hardware will be examined.

Prerequisite: CST 331 or instructor consent

**CST 451 - ASIC Design using FPGAs**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

FPGA senior project design specifications; presentation of the project in a design review to peers; application of formal hardware/software design techniques when designing with FPGAs; and verification of FPGAs.

Prerequisite: CST 441 or instructor consent

**CST 455 - System on a Chip Design**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

System level design representations and modeling languages. Target architecture models. Intra-chip communication. Partitioning algorithms. Task time measurement. Back annotation of timing. Synthesis of SoC components.

Prerequisites: CST 231 and CST 373

**CST 456 - Embedded System Testing**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Testing of complete embedded systems including hardware and software. Topics include unit testing for both hardware and software, UVM testing framework for hardware and test driven design practices as they apply to both hardware and software.

Prerequisites: CST 136, CST 204, and CST 231

**CST 461 - Advanced Topics in VLSI Design**

(S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Conclusion of a three-course sequence in Very Large Scale Integration design. This course focuses on testing methodology, especially boundary scan. In addition, an alternative synthesis tool is introduced. Current issues in VLSI design are discussed. Laboratory experiments form an essential part of the course.

Prerequisite: CST 441

**CST 464 - RISC-Based Microprocessor Systems**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

RISC architecture and applications. Includes i960 microprocessor features, instruction set, and i960 support software. Laboratory focus on applications.

Prerequisites: CST 331 and CST 344

**CST 465 - Web Development with ASP.NET**

(W,S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Dynamic Web site creation and development strategies using ASP.NET are discussed and practiced. Focus on the importance of databases in the creation of a dynamic Web site is heavily emphasized.

Pre- or Corequisite: CST 324 or instructor consent

**CST 466 - Embedded System Security**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Fundamental theories and applications of cryptography relevant to computer and embedded system security.

Prerequisites: CST 126 and MATH 112

**CST 471 - Embedded Senior Project**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

A three-term sequence giving the student major responsibility for planning, implementing and testing an embedded systems project.

Prerequisites: CST 373 and CST 374

**CST 472 - Embedded Senior Project (W)**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

A three-term sequence giving the student major responsibility for planning, implementing and testing an embedded systems project.

Prerequisites: CST 373 and CST 374

**CST 473 - Embedded Senior Project (S)**

Lecture Hours: 1

Lab Hours: 3

Credit Hours: 2

A three-term sequence giving the student major responsibility for planning, implementing and testing an embedded systems project.

Prerequisites: CST 373 and CST 374

**CST 490 - Co-op Field Practice**

(F,W,S)

Credit Hours: (Variable Credit)

An approved work program related to the student's field of specialization for a continuous three-month or six-month period. The employer and the type, level, and difficulty of the particular job must be approved by the student's engineering technology department prior to the employment period. A written comprehensive report of each season's activity must be submitted during the following term of residence.

Prerequisites: Associate degree and two terms of residence

**Cybersecurity****CYB 201 - Cybersecurity Fundamentals**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introduces fundamental concepts used in Cybersecurity. Topics covered include: threats, attacks, and vulnerabilities; confidentiality, integrity, and availability; common cybersecurity technologies and tools; security architecture and design principles; identity and access management; risk management; and cryptography.

Prerequisites: MIS 240, MIS 251, and MIS 273, all with grade "C" or better

**CYB 301 - Hacker Tools and Techniques**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introduces how "hackers" operate and the techniques, tools and processes they use to gain unauthorized access to systems, and how to best protect and defend systems from these same types of attack. Students will learn how to conduct basic security testing or "ethical hacking" to identify potential weaknesses in an organization's network and computer systems. Students will also learn how to prepare a formal written report of their findings for management.

Prerequisites: CYB 201, MIS 130, MIS 285, all with grade "C" or better, and WRI 227

**CYB 302 - System Defenses and Incident Response**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introduces the CIS 20 Critical Controls and the fundamental concepts of operating system hardening and other defensive strategies to secure networks and information systems. Students will also learn how to investigate suspicious activity on computer systems to determine if it has been compromised, and how to respond to security incidents and data breaches.

Prerequisites: CYB 301, both with grade "C" or better

**CYB 303 - Security Operations and Analysis**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introduces the concept of a Security Operations Center (SOC) and the role of a Security Analyst. Students will learn about Security Information and Event Management (SIEM) systems, Intrusion Detection Systems (IDS), log management and analysis, packet capture analysis, vulnerability analysis and patch management. Students will complete a team project during the course where they must monitor and defend systems as a group.

Prerequisites: CYB 302 with grade "C" or better, and SPE 321

**CYB 351 - Network Security**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Examines tools and techniques used for securing IP based networks, with a specific focus on Firewalls and VPNs. Topics include stateful inspection firewall basics, explicit proxy, deep-packet inspection, intrusion detection and prevention systems, network based anti-virus, email filtering, data loss prevention, application control, traffic shaping, packet capture and analysis, and SSL and IPSec VPNs.

Prerequisites: CYB 201 and , both with grade "C" or better

**CYB 411 - Managing Risk in Information Systems**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Focus on the risk assessment and analysis processes as they are applied to information systems. Details of how confidentiality, integrity and availability are maintained in an organization's complex information systems are explored. Topics include quantitative and qualitative risk analysis, risk mitigation/transference/acceptance, disaster recovery and business continuity planning, security program management, and security awareness training.

Prerequisites: BUS 215 or BUS 304, and MIS 206 or MIS 311, all with grade "C" or better

**CYB 412 - Security and Privacy Laws, Ethics and Compliance**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Explores the legal and regulatory landscape as applied to information security and privacy. National and international privacy and data protection laws are examined along with industry based security and privacy standards. Ethical standards for information management and security are also discussed in depth. Basic legal topics such as jurisdiction, civil and criminal codes, and contract are also covered.

Prerequisite: PHIL 331 or PHIL 342

**CYB 413 - Cybersecurity Management and Leadership**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Focus on the management aspects of Cybersecurity. Students will learn about the various roles and responsibilities in a security organization, and how security is integral to both the strategic and tactical management of an organization. Students will examine common administrative controls in detail and learn to develop effective security policies and strategies necessary for a successful security program.

Prerequisites: CYB 303, CYB 411, and CYB 412, all with grade "C" or better

**CYB 495 - Cybersecurity Capstone Orientation**

Lecture Hours: 1

Lab Hours: 0

Credit Hours: 1

Provides students an introduction to the Oregon Tech Cyber Defense Center and the Cybersecurity Capstone requirements. Students will learn basic policies and procedures for working as a Security Analyst in the CDC's Security Operations Center (SOC) or other internship site. Students must satisfactorily demonstrate their proficiency in professional communications, customer service, and teamwork, along with an appropriate level of skill using the tools required by the CDC prior to being allowed to move into their capstone experience.

Prerequisites: CYB 303 with grade "C" or better, and instructor consent

**CYB 499 - Cybersecurity Capstone**

Lecture Hours: 0

Lab Hours: 12

Credit Hours: 4

Professional practice program where students gain real-world experience working in Oregon Tech's Cyber Defense Center (CDC) Security Operations Center (SOC) as a "Resident" Security Analyst. Students will gain hands-on experience working with network and security monitoring tools, intrusion detection systems, end-point security, vulnerability scanning and analysis tools, security incident reporting and remediation, and managing network security devices. Students will work with real customers under the supervision of experienced industry professionals.

Prerequisite: CYB 495 with grade "C" or better

**Dental Hygiene****DH 100 - Introduction to Dental Hygiene**

(F)

Lecture Hours: 1

Lab Hours: 3

Credit Hours: 2

Orientation to the theory and practice of all aspects of the dental hygiene profession. The history of dental hygiene, professional organization and career opportunities are discussed. Hands-on activities involving basic dental hygiene skills. Opportunities to experience normal oral anatomy.

**DH 101 - Introduction to Dental Hygiene II**

(W)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Hands-on activities involving the procedures and skills learned in DH 100. Students will practice basic dental hygiene skills. Opportunities to experience normal oral anatomy.

Prerequisite: DH 100

**DH 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

Review, discussion, evaluation, and problem solving of the students' clinical experience.

**DH 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

Review, discussion, evaluation, and problem solving of the students' clinical experience.

**DH 221 - Dental Hygiene Clinical Practice and Seminar I**

(F)

Lecture Hours: 2

Lab Hours: 6

Credit Hours: 4

Sequential courses designed to provide clinical skills essential for the practice of dental hygiene. Skill development of patient assessment, basic instrumentation, and individualized preventive care emphasized.

Prerequisite: Admission to the Dental Hygiene program

**DH 222 - Dental Hygiene Clinical Practice and Seminar II**

(W)

Lecture Hours: 2

Lab Hours: 6

Credit Hours: 4

Sequential courses designed to provide clinical skills essential for the practice of dental hygiene. Skill development of patient assessment, basic instrumentation, and individualized preventive care emphasized.

Prerequisite: DH 221

**DH 223 - Dental Hygiene Clinical Practice and Seminar III**

(S)

Lecture Hours: 1

Lab Hours: 6

Credit Hours: 3

Sequential courses designed to provide clinical skills essential for the practice of dental hygiene. Skill development of patient assessment, basic instrumentation, and individualized preventive care emphasized.

Prerequisites: CHE 360, DH 222, and DH 252

**DH 225 - Head and Neck Anatomy, Histology and Embryology**

(F)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Lecture and lab course that provides an in-depth study of head and neck anatomy, histology, and embryology for the dental professional. Emphasis on human development, anatomy in relation to facial and oral structures, and histology of hard and soft dental tissues.

**DH 240 - Prevention I**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Beginning discussions about healthcare for the provider as a part of holistic healthcare, and foundations for preventing oral disease. Focus on strategies for improving oral health.

Prerequisite: Admission to the Dental Hygiene program  
Corequisite: DH 221

**DH 241 - Prevention II**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Second of a five-term series emphasizing prevention and management of caries; oral health education for individual patients and groups; and wellness for the healthcare provider.

Prerequisite: DH 240

**DH 242 - Prevention III**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Third of a five term series emphasizing dental management and oral health education for a variety of age demographics including pregnancy, infants, children, and special needs children.

Prerequisite: DH 241

**DH 244 - General and Oral Pathology**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to general pathology and common oral pathologies. Basic pathology, inflammation, immune system, and neoplasia. Etiology and recognition of benign and malignant oral and skin lesions. Descriptive terminology and differential diagnosis introduced.

**DH 252 - Oral Radiology I**

(W)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

The first of a two course series that includes didactic and pre-clinical instruction in the principles and techniques of dental radiography.

**DH 253 - Oral Radiology II**

(S)

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

The second of a two course series that includes didactic instruction in the principles and techniques of dental radiography with emphasis on image interpretation.

Prerequisites: DH 244 and DH 252

**DH 254 - Introduction to Periodontology**

(S)

Lecture Hours: 1

Lab Hours: 0

Credit Hours: 1

Introduction to periodontology with emphasis on etiology and pathogenesis of periodontal disease, disease classification, and assessment procedures.

Prerequisite: DH 244

**DH 267 - Emergency Procedures**

(S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Prevention, preparation, and management of emergency situations common in the dental environment. Individual and team practice in carrying out emergency procedures.

Prerequisite: DH 244

**DH 275 - Dental Ethics**

(W)

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

Professional ethics and legal requirements of the dental profession.

**DH 299 - Laboratory Practice**

Credit Hours: (Hours to be arranged each term.)

**DH 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

Review, discussion, evaluation, and problem solving of the students' clinical experience.

**DH 321 - Dental Hygiene Clinical Practice and Seminar IV**

(F)

Lecture Hours: 2

Lab Hours: 6

Credit Hours: 4

Sequential courses designed for the continued development of dental hygiene skills necessary for entry into professional clinical practice. Ultrasonic, advanced instrumentation, and expanded dental hygiene functions are practiced, in addition to observations in dental practice settings.

Prerequisite: DH 223

**DH 322 - Dental Hygiene Clinical Practice and Seminar V**

(W)

Lecture Hours: 1

Lab Hours: 6

Credit Hours: 3

Sequential courses designed for the continued development of dental hygiene skills necessary for entry into professional clinical practice. Ultrasonic, advanced instrumentation, and expanded dental hygiene functions are practiced, in addition to observations in dental practice settings.

Prerequisite: DH 321

**DH 323 - Dental Hygiene Clinical Practice and Seminar VI**

(S)

Lecture Hours: 1

Lab Hours: 12

Credit Hours: 5

Sequential courses designed for the continued development of dental hygiene skills necessary for entry into professional clinical practice. Ultrasonic, advanced instrumentation, and expanded dental hygiene functions are practiced, in addition to observations in dental practice settings.

Prerequisite: DH 322

**DH 340 - Prevention IV**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Fourth of a five term series emphasizing oral health education and dental management of common conditions found in the adolescent through geriatric population.

Prerequisite: DH 242

**DH 341 - Prevention V**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

The last of a five term series emphasizing oral health education and dental management of patients with medically compromised status. A variety of systemic conditions are discussed in depth in regards to the unique needs and prevention strategies for each individual.

Prerequisite: DH 340

**DH 344 - Advanced General and Oral Pathology**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Further study of general and oral pathology. Developmental, hereditary, and congenital disorders. Endocrine, cardiovascular, hematopoietic, respiratory, gastrointestinal, neurological, and skeletal disorders. Tooth abnormalities, radiographic lesions, and oral tissue enlargements. Systemic and oral complications of HIV and AIDS. Lesion description emphasized.

Prerequisite: DH 244

**DH 351 - Pain Management I**

(W)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

The first of a two course series. Lecture: Study of pharmacology, solutions, dosages, vasoconstrictors, drug interactions, medical history evaluation and contraindications. Laboratory practice in techniques of local anesthesia include basic injection technique including block and infiltration.

Prerequisites: CHE 360 and DH 267

**DH 352 - Pain Management II**

(S)

Lecture Hours: 1

Lab Hours: 3

Credit Hours: 2

A continuation course of the pain management series. Coordinated lecture and laboratory practice in the recognition of dental anxiety; behavioral management; complications with anesthesia; nitrous oxide sedation techniques are practiced; advanced techniques in the administration of local anesthetics.

Prerequisite: DH 351

**DH 354 - Periodontology**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Evidence-based approach for treatment of periodontal disease including nonsurgical and surgical treatment. Root anatomy relating to effective instrument adaptation. Treatment planning for patients with all types of classifications of periodontal disease.

Prerequisite: DH 254

**DH 363 - Dental Materials**

(S)

Lecture Hours: 2

Lab Hours: 6

Credit Hours: 4

General properties, composition and manipulation of common dental and restorative materials. Expanded functions including denture relines and amalgam polishing are practiced.

\*Note: Chemeketa dental hygiene must complete Dental Materials courses as outlined on the Oregon Tech Dental Hygiene curriculum for the Salem campus.

**DH 366 - Dental Anatomy**

(W)

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

In-depth study of crown and root morphology of primary and permanent dentitions with tooth restoration considerations. The temporomandibular joint and occlusion will also be studied.

**DH 370 - International Externship**

(S)

Lecture Hours: 1

Lab Hours: 0

Credit Hours: 1

Sequential courses preparing for and providing dental hygiene care at an international site using portable dental equipment. Cultural issues, teamwork, financing, needs assessment, goal setting and delivery of program.

Prerequisites: DH 321 and DH 381

**DH 371 - International Externship**

(Su)

Lecture Hours: 1

Lab Hours: 0

Credit Hours: 1

Sequential courses preparing for and providing dental hygiene care at an international site using portable dental equipment. Cultural issues, teamwork, financing, needs assessment, goal setting and delivery of program.

Prerequisite: DH 370

**DH 372 - International Externship**

(F)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Sequential courses preparing for and providing dental hygiene care at an international site using portable dental equipment. Cultural issues, teamwork, financing, needs assessment, goal setting and delivery of program.

Prerequisite: DH 371

**DH 380 - Community Dental Health I**

(S)

Lecture Hours: 1

Lab Hours: 3

Credit Hours: 2

First in a four course sequence using a service learning approach. Students work in teams, identify target groups and conduct a needs assessment. Introduction to public health agencies and their functions; and to the role of the dental hygienist in public health.

Prerequisite: DH 241

Corequisite: DH 242

**DH 381 - Community Dental Health II**

(F)

Lecture Hours: 1

Lab Hours: 3

Credit Hours: 2

Service learning and systematic approach to developing community oral health programs continues. Teams complete a program plan based on the needs assessment. Community health education and health literacy are emphasized. Grant writing for program funding is practiced.

Prerequisite: DH 380

**DH 382 - Community Dental Health III**

(W)

Lecture Hours: 1

Lab Hours: 3

Credit Hours: 2

Service learning and systematic approach for implementing community oral health programs continues. Teams implement programs they designed. Health education occurs in the community. A broad view of public health including advocacy, epidemiology, biostatistics, research; controversy of water fluoridation.

Prerequisite: DH 381

**DH 383 - Community Dental Health IV (S)**

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Service learning and systematic approach for community oral health programs is continued. Teams complete implementation and evaluation of programs. Teams share results of programs and recommendations for future in public presentations and written documentation in a portfolio and year-end report.

Prerequisite: DH 382

**DH 399 - Laboratory Practice**

Credit Hours: (Hours to be arranged each term.)

**DH 401 - Overview of Advanced Dental Hygiene**

(F,W,S,Su)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to the online degree completion program. Career opportunities, roles of the dental hygienist, and the different emphases within the program are explored. Prerequisite: Admission to the BDHO program

**DH 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

Review, discussion, evaluation, and problem solving of the students' clinical experience.

**DH 421 - Dental Hygiene Clinical Practice and Seminar VII**

(Su)

Lecture Hours: 2

Lab Hours: 6

Credit Hours: 4

Further refinement of clinical instrumentation and assessment skills. Emphasis on individualized care for patients with diverse oral health needs. Variety of off campus practice settings experienced.

Prerequisite: DH 323

**DH 422 - Dental Hygiene Clinical Practice and Seminar VIII**

(F)

Lecture Hours: 1

Lab Hours: 12

Credit Hours: 5

Further refinement of clinical instrumentation and assessment skills. Emphasis on individualized care for patients with diverse oral health needs. Variety of off campus practice settings experienced.

Prerequisite: DH 421

**DH 423 - Dental Hygiene Clinical Practice and Seminar IX**

(W)

Lecture Hours: 1

Lab Hours: 12

Credit Hours: 5

Further refinement of clinical instrumentation and assessment skills. Emphasis on individualized care for patients with diverse oral health needs. Variety of off campus practice settings experienced.

Prerequisite: DH 422

**DH 430 - Dental Hygiene Board Review**

(F)

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

Designed to help students prepare for their national board exam. Multiple-choice test-taking skills are practiced. Mock tests simulating the real exam are used.

**DH 453 - Research and Evidence Based Dentistry I**

(F,W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

First in a two-course sequence exploring evidence-based decision making in dentistry and secondary research. Current issues affecting dental hygiene practice are explored. The process of evidence-based decision making is introduced with emphasis on writing questions and accessing quality research.

Prerequisite: Admission to the BDHO program

**DH 454 - Dental Practice Management**

(W for Klamath and Salem; F,S for Degree Completion)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Profitability of the Dental Hygiene Department; practice models, office design; patient satisfaction; financing options for the patient. Technology's impact on practice management.

Prerequisite: DH 323

**DH 455 - Research and Evidence Based Dentistry II**

(W,S,Su)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Second in a two-course sequence.

Emphasis is on critical appraisal of research and application of research findings. Students write critical summaries and apply findings to clinical practice.

Prerequisites: DH 453, MATH 243 and admission to the BDHO program

**DH 461 - Restorative Dentistry I**

(Su)

Lecture Hours: 1

Lab Hours: 3

Credit Hours: 2

Emphasis on restoration placement techniques. Practical experience using restorative dental materials. Placement and finishing of amalgam and composite restoration on typodonts in Restorative Dentistry I and on patients in Restorative Dentistry II and III.

Prerequisite: DH 363

**DH 462 - Restorative Dentistry II**

(F)

Lecture Hours: 1

Lab Hours: 3

Credit Hours: 2

Emphasis on restoration placement techniques. Practical experience using restorative dental materials. Placement and finishing of amalgam and composite restoration on typodonts in Restorative Dentistry I and on patients in Restorative Dentistry II and III.

Prerequisite: DH 461

**DH 463 - Restorative Dentistry III (W)**

Lecture Hours: 0

Lab Hours: 6

Credit Hours: 2

Emphasis on restoration placement techniques. Practical experience using restorative dental materials. Placement and finishing of amalgam and composite restoration on typodonts in Restorative Dentistry I and on patients in Restorative Dentistry II and III.

Prerequisite: DH 462

**DH 465 - Dental Hygiene Entrepreneurship (S)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to self-employed dental hygiene practice. Various practice opportunities are explored. Students develop and submit a detailed dental hygiene practice business plan.

**DH 467 - Restorative Functions Endorsement**

Lecture Hours: 2

Lab Hours: 2

Credit Hours: 4

This course fulfills the Oregon Board of Dentistry (OBD) requirements for dental assistants and dental hygienists. Lecture, lab practice on typodonts and clinical practice with patients. Additional testing is required by the OBD following course completion.

Prerequisite: AS or BS in Dental Hygiene or EFDA (Expanded Function Dental Assistant)

**DH 470 - Community Assessment and Program Planning (F,W)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Dental public health, social determinants of health, and the impact of current events affecting access to care are examined. A community oral health assessment and strategic program plan using local solutions will be developed.

Prerequisite: Admission to the BDHO program

**DH 471 - Community Program Implementation & Evaluation (W,S)**

Lecture Hours: 1

Lab Hours: 6

Credit Hours: 3

Based upon community assessment findings in DH 470, students implement and evaluate a program plan or project within their community

Prerequisites: AHED 450, DH 470, and admission to the BDHO program

**DH 475 - EBDM in Healthcare I (F)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

First in a two-course sequence. Course emphasizes evidence-based decision making, identifying clinical treatment questions, describing types of research designs and sources of evidence, discussing importance of statistics, and conducting computerized searches. Critical appraisal of research introduced.

Prerequisite: DH 323

**DH 476 - EBDM in Healthcare II (W)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Second in a two-course sequence. Emphasis on analysis of research studies for validity, reliability, statistical and clinical significance, and bias. Given clinical questions, students will conduct searches, critically analyze, and write summaries/reflections using EBDM guidelines.

Prerequisite: DH 475

**DH 477 - Dental Hygiene Research Methods III (W)**

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

Third in a series of three courses focusing on evidence-based decision making and critical analysis of current literature. In small groups, students will research a clinical question in PICO format, conduct and analyze research, and write a Systematic Review.

Prerequisite: DH 476

**DH 480 - Community Health Practicum (S)**

Lecture Hours: 0

Lab Hours: 9

Credit Hours: 3

Students gain practical experience in public health by working in a public health setting. Individual goals and objectives are set by the student in consultation with the instructor.

Prerequisites: AHED 450, DH 471, and admission to the BDHO program

**DH 495 - Individual Studies**

Credit Hours: (Hours to be arranged each term.)

**DH 499 - Laboratory Practice**

Credit Hours: (Hours to be arranged each term.)

**DHE 100 - Introduction to Dental Hygiene I (F,W,S)**

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

Orientation to the theory and practice of all aspects of the dental hygiene profession. The history of dental hygiene, professional organization and career opportunities are discussed.

**Diagnostic Medical Sonography****DMS 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**DMS 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**DMS 223 - Applications of Abdominal Sonography I (F)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

History of sonography. Orientation to patient history, abdominal cross-sectional anatomy, scanning and normal sonographic presentation.

Prerequisite: MIT 103 with grade "C" or better

**DMS 224 - Applications of Abdominal Sonography II**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Orientation to cross-sectional abdominal anatomy and pathology of organs and vessels. Procedures and techniques, including scanning.

Prerequisite: DMS 223 with grade "C" or better

**DMS 225 - Applications of Abdominal Sonography III**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Advanced abdominal scanning procedures and techniques. Emphasis on superficial structures invasive procedures and Doppler correlation, including scanning.

Prerequisites: DMS 224 and DMS 253 with grade "C" or better

**DMS 234 - Pelvic Sonography**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Orientation to male and female pelvic cross-sectional anatomy and pathology, differentiating between normal variations and abnormalities to include first trimester obstetrics and trans-vaginal scanning.

Prerequisites: DMS 224 and DMS 253 with grade "C" or better

**DMS 235 - Diagnostic Medical Sonography Patient Care**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Sonographic management and applications of cognitive, psychomotor, and interpersonal skills as they relate to the health care consumer. Patient assessment and communication, body mechanics, medical and surgical asepsis, medical emergencies, pharmacology and analysis of ethical and legal issues.

Prerequisite: DMS 223 with grade "C" or better

**DMS 252 - Sophomore Laboratory I**

(F)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Applied scanning of right upper quadrant anatomy stressing imaging planes. Gray scale instrumentation, system-optimization, preventive maintenance, and quality hard copy imaging.

Prerequisite: Sophomore standing in the DMS program

Corequisite: DMS 223

**DMS 253 - Sophomore Laboratory II**

(W)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Applied scanning of the remainder of the abdominal cavity stressing anatomy, standard imaging planes, Doppler correlation and hard copy quality.

Imaging review of prior anatomical areas.

Prerequisites: BIO 335, DMS 223, and DMS 252, all with grade "C" or better

Corequisites: DMS 224 and MIT 231

**DMS 254 - Sophomore Laboratory III**

(S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

DMS orientation to cross-sectional pelvic anatomy and pathology of the male and female pelvis. Procedures and techniques, including scanning.

Prerequisites: DMS 224 and DMS 253 both with grade "C" or better

Corequisite: DMS 225

**DMS 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**DMS 316 - Survey of Vascular Technology**

(W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Orientation to vascular physics, equipment, and color flow imaging. Explanation of Doppler imaging in relation to vascular anatomy.

Prerequisites: DMS 234, DMS 235, and DMS 352, all with grade "C" or better

**DMS 337 - Breast Sonography**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Breast sonographic scanning procedures with an emphasis on sonographic applications. Correlation with other imaging modalities.

Prerequisite: DMS 225 with grade "C" or better

**DMS 342 - Survey of Adult Echocardiography**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Survey of adult echocardiographic imaging applications with emphasis on parasternal, apical, subcostal and suprasternal 2-D views. Standard M-Mode measurements, Doppler and color Doppler. Common cardiac pathology.

Prerequisite: DMS 352 with grade "C" or better

**DMS 343 - Fetal Echo, Neonatal, and Pediatric Sonography**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Fetal cardiac development and normal anatomy. Fetal echocardiographic 2D views, M-Mode, Doppler and Color Doppler. Common fetal cardiac pathology and anomalies. Neonatal topics include hip, abdominal and neurological sonographic applications. General sonographic pediatric pathologies and anomalies will be discussed.

Prerequisite: DMS 342 with grade "C" or better

**DMS 346 - Musculoskeletal Sonography**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Survey of sonographic musculoskeletal imaging with emphasis on normal and abnormal findings.

Prerequisite: DMS 225 with grade "C" or better

**DMS 352 - Junior Laboratory I**

(F)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Topics to include the male/female pelvis, first trimester, musculoskeletal, and breast stressing sonographic anatomy, standard imaging planes, and image quality.

Prerequisite: DMS 254 with grade "C" or better

**DMS 353 - Junior Laboratory II**

(W)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Topics to include normal first, second, third trimester, and cardiovascular stressing anatomy, standard imaging planes, and image quality.

Prerequisite: DMS 352 with grade "C" or better

**DMS 354 - Junior Laboratory III**

(S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Applied sonographic laboratory procedures and techniques. Emphasis on protocols and case reviews.

Prerequisite: DMS 353 with grade "C" or better

**DMS 365 - Sonographic Pathology**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Differential diagnosis and concepts of disease processes as applied to sonographic examination.

Prerequisite: Junior standing in the DMS program

**DMS 370 - Obstetrical Sonography**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Orientation to obstetrical scanning procedures and techniques. Emphasis on normal obstetrical anatomy and fetal development.

Prerequisites: DMS 224, DMS 225, and DMS 234 all with grade "C" or better

**DMS 373 - Obstetrical Pathology**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Advanced obstetrical scanning of second and third trimester obstetrical patients with emphasis on pathology.

Prerequisite: DMS 370 with grade "C" or better

**DMS 388 - Externship Preparation**

(S)

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

Presentation of key concepts related to Diagnostic Medical Sonography externship and required in-services. Focus is on patient care and interpersonal scenarios the externship student will likely face while in the clinical environment. Review and discussion of the DMS Externship Handbook.

Prerequisites: DMS 316, DMS 353, and DMS 370, all with grade "C" or better

**DMS 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**DMS 430 - Diagnostic Medical Sonography Externship**

(F,W,S)

Lecture Hours: 0

Lab Hours: 40

Credit Hours: 15

All BS students must complete four terms (12 months) of clinical experience in sonography at an Oregon Tech approved clinical site. Students will work under the direct supervision of registered sonographers.

Prerequisite: All academic coursework in the DMS curriculum

**DMS 430A - Diagnostic Medical Sonography Externship**

(F,S)

Lecture Hours: 0

Lab Hours: 22

Credit Hours: 8

This two-term special externship is designed for the degree completion student. Students working in a clinical ultrasound setting will prepare clinical case studies.

Prerequisites: Be an ARDMS Sonographer in good standing and have completed all academic coursework in the Medical Imaging curriculum with grade "C" or better

**DMS 430B - Diagnostic Medical Sonography Externship**

(W,S)

Lecture Hours: 0

Lab Hours: 18

Credit Hours: 7

This two-term special externship is designed for the degree completion student. Students working in a clinical ultrasound setting will prepare clinical case studies.

Prerequisites: Be an ARDMS

Sonographer in good standing and have completed all academic coursework in the Medical Imaging curriculum with grade "C" or better

**Echocardiography****ECHO 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**ECHO 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**ECHO 225 - Cardiopulmonary Patient Management Practices**

(S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Current issues in the practice of echocardiography with emphasis on the technologist's responsibilities to the patient, the patient's family and the professions of echocardiography. Transporting critically ill patients and recognizing emergency situations.

Prerequisite: ECHO 231

**ECHO 227 - Basic ECG Recognition and Testing**

(F,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Basics of ECG testing, heart pressures, blood volume/physiology and the electrical conduction system. Focus on interpretation of ECG rhythms: normal ECG, ventricular hypertrophy, bundle branch block, AV block, myocardial ischemia, bradycardia, tachycardia, atrial fibrillation, ventricular fibrillation and irregular rhythms.

**ECHO 231 - Echocardiography I**  
(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

An introduction to scanning techniques and tomographic views according to the American Society of Echocardiography standards. B-mode image, pulsed and continuous wave Doppler, and color-flow imaging.

Prerequisite: ECHO 320

**ECHO 232 - Echocardiography II**  
(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

An intermediate level of instruction in scanning techniques and tomographic views according to the American Society of Echocardiography standards. Emphasis on cardiac pathology and the echocardiography evaluation.

Prerequisite: ECHO 231

**ECHO 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**ECHO 320 - Cardiographic Methods**  
(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Recognition of ECG tracing with normal and abnormal arrhythmias, treadmill testing, Holter monitoring, phonocardiography, and heart auscultation. Review of case examples for analysis and synthesis. Integration of cardiographic monitoring methods with cardiac ultrasound imaging. Review of cardiac anatomy.

Prerequisite: ECHO 232

**ECHO 321 - Stress and Transesophageal Echo**  
(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Cardiac applications, protocols, and techniques related to stress echo and transesophageal echo. TEE anatomy, acquisition of images and the cardiovascular operating room. Particular emphasis on the mitral valve and surgical repairs.

Prerequisite: Admission to the Echocardiography program

**ECHO 325 - Pediatric Echocardiography**  
(F,W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Congenital heart disease, including neonate/infant and adult disorders. Congenital disorders including cardiac situs, ventricular morphology, great artery connections, valvular and subvalvular obstruction, atrial septal defect, ventricular septal defect.

Prerequisite: ECHO 333

**ECHO 332 - Invasive Cardiology**  
(F,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Cardiac catheterization testing. Coronary artery interventions such as percutaneous coronary intervention (PCI) and chamber pressure measurements.

Prerequisite: ECHO 231

**ECHO 333 - Echocardiography III**  
(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

An advanced level of instruction in scanning techniques and tomographic views according to the American Society of Echocardiography standards. Cardiac pathology, and advanced methods in echocardiography.

Prerequisite: ECHO 232

**ECHO 334 - Echocardiography IV**  
(F,W,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

An advanced level of instruction in scanning techniques and tomographic views according to the American Society of Echocardiography standards. Special topics including 3-D, 4-D, tissue Doppler, cardiac resynchronization and other technological advances.

Prerequisite: ECHO 333

**ECHO 365 - Abdominal/Renal Testing**  
(F,W,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Abdominal vascular anatomy and common disease processes. Students will be asked to perform basic abdominal vascular tests following very specific protocols and interpretations.

Prerequisites: ECHO 325 and ECHO 376

Corequisites: ECHO 385 and ECHO 388

**ECHO 376 - Survey of Vascular Testing**  
(W,S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Basic vascular pathophysiology in carotid, arterial, and venous testing. Waveform recognition, interpretation, and protocols for testing.

Prerequisite: ECHO 333

**ECHO 385 - Echocardiography Laboratory Management**  
(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Focus on human resource skills as necessary to manage an echocardiography laboratory. Includes the interview process, hiring and firing, as well as employee performance evaluation. Other topics will include reimbursement, licensure, accreditation and other management issues.

**ECHO 388 - Externship Preparation**  
(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Review and summarization of key concepts in Echocardiography. Focus is on patient care and interpersonal scenarios the externship student will likely face while in the hospital environment or independent echo lab. Review and discussion of the Echocardiography Externship Handbook.

Corequisite: ECHO 334

**ECHO 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**ECHO 420 - Echocardiography Externship**

(F,W,S)

Lecture Hours: 0

Lab Hours: 40

Credit Hours: 15

Students work as registered professionals in the field and must complete nine months (three terms) of experience in Echocardiography.

Prerequisite: Admission to the Echocardiography Degree Completion program

**ECHO 420A - Echocardiography Externship**

(F,W,S)

Lecture Hours: 0

Lab Hours: 22

Credit Hours: 8

Students work as registered professionals in the field. Patient echo exams with normal and abnormal stress tests, normal and abnormal wall motion. Case study presentation.

Prerequisite: Admission to the Echocardiography Degree Completion program

**ECHO 420B - Echocardiography Externship**

(F,W,S)

Lecture Hours: 0

Lab Hours: 18

Credit Hours: 7

Students work as registered professionals in the field. Cardiac surgical echoes (TEE) and contrast studies using various pharmacological agents. Case study presentation.

Prerequisite: Admission to the Echocardiography Degree Completion program

**ECHO 421 - Echo Senior Project**

(F,W,S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Students design a research-based senior project in the field of echocardiography, including interviews, research, literature review and formal presentation of the project.

Prerequisites: ECHO 420, and WRI 123 or WRI 227

**Economics****ECO 107 - Seminar**

SS

Credit Hours: (Hours to be arranged each term.)

**ECO 201 - Principles of Microeconomics**

(F,W,S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Topics include scarcity, consumer choice, supply and demand, elasticity, cost and pricing theory, theory of market structures (competition, monopoly, monopolistic competition, oligopoly).

Prerequisite: College level math

**ECO 202 - Principles of Macroeconomics**

(F,W,S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

An introduction to the economic problem.

Topics include gross domestic product, unemployment, monetary policy, fiscal policy, macro equilibrium, inflation, and supply and demand.

Prerequisite: College level math

**ECO 203 - Principles of Economics, Special Topics**

(W,S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

A survey of micro- and macroeconomic topics of current interest. Topics may include labor practices, international economics, natural resource economics, urban planning, and economic policy issues. Students prepare a research paper and present results to the class.

Prerequisites: ECO 201 and ECO 202

**ECO 207 - Seminar**

SS

Credit Hours: (Hours to be arranged each term.)

**ECO 307 - Seminar**

SS

Credit Hours: (Hours to be arranged each term.)

**ECO 357 - Energy Economics and Policy**

(W) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Explores the role of energy and energy resources from the economic perspective. Analyzes U.S. and global energy markets and policy; traditional and alternative energy sources; pricing of externalities and public goods; the use of market instruments, subsidies and taxes; and the political economy.

Prerequisites: ECO 201 or ECO 202, and MATH 243 or MATH 361

**ECO 367 - International Economics and Finance Management**

(W) SS

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Financial management involving international monetary environment; foreign exchange risk management; source and availability of funds to finance trade and multinational operations; taxation planning and control; international portfolio diversification; international banking; capital budgeting; political risk evaluation of performance.

Prerequisites: BUS 308, and ECO 201 or ECO 202

**ECO 407 - Seminar**

SS

Credit Hours: (Hours to be arranged each term.)

**Electrical Engineering****EE 101 - Introduction to Engineering I**

(F)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

A three course sequence introducing the field of engineering, focusing on electrical engineering and renewable energy. Success strategies. Engineering and scientific notation. Ohm's Law. Problem solving, communication skills, ethics in engineering. Professional development and lifelong learning. Introduction to the design process culminating in a team design experience.

**EE 102 - Introduction to Engineering II (W)**

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

A three course sequence introducing the field of engineering, focusing on electrical engineering and renewable energy. Success strategies. Engineering and scientific notation. Ohm's Law. Problem solving, communication skills, ethics in engineering. Professional development and lifelong learning. Introduction to the design process culminating in a team design experience.

**EE 103 - Introduction to Engineering III (S)**

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

A three course sequence introducing the field of engineering, focusing on electrical engineering and renewable energy. Success strategies. Engineering and scientific notation. Ohm's Law. Problem solving, communication skills, ethics in engineering. Professional development and lifelong learning. Introduction to the design process culminating in a team design experience.

**EE 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**EE 121 - Fundamentals of Electric Circuits I**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

DC Analysis and First-Order transients. Ohm's Law, Kirchhoff's laws, nodal analysis, mesh analysis, source transformations, Thévenin and Norton equivalents, maximum power transfer, superposition, introduction to op-amps, inductance and capacitance, transient response of RC and RL circuits.

Prerequisite: MATH 111

**EE 123 - Fundamentals of Electric Circuits II**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

AC analysis, second-order transients, introduction to electric power. Transient response of second-order circuits, sinusoids and phasors, sinusoidal steady-state analysis, nodal analysis, mesh analysis, source transformations, Thévenin and Norton equivalents, sinusoidal steady-state power calculations, balanced three-phase circuits, mutual inductance, transformers. Prerequisites: EE 121 and MATH 112

**EE 131 - Digital Electronics I**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introduction to combinational logic, gates, Boolean Algebra, Karnaugh Mapping, Number Systems/Codes, arithmetic circuits, decoders/ encoders, mux/demux, comparators, basic sequential gates (Latches/FF) introduction to HDL (Verilog/VHDL), PLD HW implementation.

Pre- or Corequisite: MATH 111

**EE 133 - Digital Electronics II**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introduction to sequential logic, with HDL, Review latches and flip/flops, timers, counters/ registers, HDL implementation, PLD HW Implementation, finite state machine design/ analysis, logic testing and timing analysis.

Prerequisites: EE 131 or CST 162 either with grade "C" or better, and MATH 111

**EE 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**EE 219 - Introduction to Semiconductor Devices and Amplifiers**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introduction to semiconductor devices, characteristics of biasing of diodes and transistors, analysis and design of circuits using diodes, bipolar junction transistors and field-effect transistors. Applications of transistors as amplifiers and switches. Prerequisite: EE 123

**EE 221 - Circuits I**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introductory course in linear circuit analysis. Topics include: Ohm's law, Kirchhoff's laws, nodal analysis, mesh analysis, source transformations, Thévenin and Norton equivalent circuits, maximum power transfer, operational amplifiers, inductance, capacitance, and first-order transient circuit response. Students must also register for a laboratory section. Corequisite: MATH 252

**EE 223 - Circuits II**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introductory course in linear circuit analysis. Second-order transient circuit analysis, phasors, sinusoidal steady-state analysis, phasor-domain nodal, mesh analysis; phasor Thévenin and Norton equivalent circuits, AC power, three-phase circuits, magnetically coupled circuits and transformers. Students must register for a laboratory section. Prerequisites: EE 221 and MATH 252, both with a grade of "C" or better

**EE 225 - Circuits III**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introductory course in linear circuit analysis. Transfer functions, frequency response, Bode plots, passive and active filters, Laplace transforms, Fourier series, Fourier transforms, and two-port networks. Students must also register for a laboratory section.

Prerequisite: EE 223 with grade "C" or better

Corequisite: MATH 321

**EE 236 - LabVIEW Programming**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

An object oriented programming course using National Instruments LabVIEW programming language designed for programming data-logging, instrumentation and control applications. Basic flow-charting is introduced. Logical constructs as implemented by LabVIEW are investigated. Example control problems are investigated and programmed using LabVIEW. Prerequisite: MATH 112

**EE 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**EE 311 - Signals and Systems**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Spectrum. Fourier Series. Time-Frequency Spectrum. Sampling and Aliasing. Reconstruction. Sampling Theorem. Discrete-Time Signals and Systems. Convolution Sum. Continuous-Time Signals and Systems. Frequency Response. Continuous-Time Fourier Transform. Relationship between CTFT, DTFT, DFT, and FFT. Spectrogram. Z-Transform.

Prerequisite: EE 225 with grade "C" or better

**EE 320 - Advanced Circuit and Systems Analysis (F,S)**

Lecture Hours: 4

Lab Hours: 3

Credit Hours: 5

Methods of circuit analysis and circuit theorems. Introduction to the Laplace transform and its applications. Advanced circuit analysis using Laplace transforms techniques. Transfer function analysis. Impulse and frequency response of circuits and systems. Bode plots. Stability. Prerequisites: EE 123 or EE 223, and MATH 252

**EE 321 - Electronics I**

Lecture Hours: 4

Lab Hours: 3

Credit Hours: 5

Basic semiconductor theory. Diodes and diode circuits. Bipolar-junction transistor (BJT). Ebers-Moll model. BJT amplifiers (CE, CB & CD). Multistage and differential amplifiers. Metal Oxide-Semiconductor Field-Effect Transistor (MOSFET). MOSFET amplifiers (CS, CG & CD). Multistage MOSFET amplifiers. OP-amps.

Prerequisites: EE 123 or EE 223, and MATH 252

Corequisites: EE 225 or EE 320

**EE 323 - Electronics II**

Lecture Hours: 4

Lab Hours: 3

Credit Hours: 5

Current sources. Current mirrors. Cascode active loads. Multistage amplifiers. Differential amplifiers. Frequency response. Miller's theorem. Negative feedback amplifier types: Voltage, Current, transconductance and transresistance. Stability and pole location. Gain and phase margins. Frequency compensation. Prerequisites: EE 321 with grade "C" or better, EE 225 or EE 320

**EE 325 - Electronics III**

Lecture Hours: 4

Lab Hours: 3

Credit Hours: 5

Real operational amplifiers and basic circuits. Output stages. Power amplifiers. Filters, passive and active. Oscillators. Wave-shaping circuits. D/A and A/D circuits.

Prerequisite: EE 323 with grade "C" or better

**EE 331 - Digital System Design with HDL**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introduction to digital systems design with Hardware Description Languages (HDL). Topics include dataflow, behavioral and structural modeling, hierarchical design, programmable logic, IO standards, and timing diagrams. Students will design and implement digital circuits which include counters, state machines, digital arithmetic, and external interfaces.

Prerequisite: EE 133 with grade "C" or better

**EE 333 - Introduction to Microcontrollers**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introductory course in microcontroller design. Topics include interrupt controllers, timer/counters, A/D converters, PWM channels, USARTs, SPI, two-wire interfaces, LEDs, LCDs, motors, and various sensors. Hands-on projects or lab assignments require C and/or assembly language programming to develop applications.

Prerequisite: CST 116

Corequisite: EE 131 or EE 133 or EET 216

**EE 335 - Advanced Microcontrollers**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Advanced course in design and development of microcontroller-based systems. Topics include internal peripheral devices, external device interfacing, and microcontroller systems design. Learning objectives are accomplished through design of fully integrated projects or lab assignments using C and/or assembly language programming.

Prerequisite: EE 333 with grade "C" or better

**EE 341 - Electricity and Magnetism with Transmission Lines**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Review vector calculus. Flux, potential, gradient, divergence, curl and field intensity. Static electric and magnetic fields. Maxwell's equations. Boundary conditions. Uniform plane waves in media and free space. Reflection and transmission at interfaces. Propagation of guided waves. Transmission line. Antennas.

Prerequisites: EE 123 or EE 221, MATH 252, MATH 254, and PHY 202 or PHY 222

**EE 343 - Solid-State Electronic Devices**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Crystal properties and growth of semiconductors. Atoms and electrons. Energy bands and charge carriers in semiconductors. Excess carriers in semiconductors. P-n junctions. FETs and BJTs. Optoelectronic devices. High-frequency and high-power devices. Prerequisites: MATH 252, and PHY 202 or PHY 222

Corequisite: EE 321

**EE 347 - Digital Logic**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Number systems; combinational logic including Boolean algebra, DeMorgan's Theorems and Karnaugh Maps; digital TTL, CMOS IC characteristics; conventional IC functions; sequential logic including flip-flops, counters, registers and state diagrams. Combinational and sequential logic circuits will be simulated, built and tested. Prerequisite: MATH 112

**EE 401 - Communication Systems**

Lecture Hours: 4

Lab Hours: 3

Credit Hours: 5

Signal Analysis, Fourier series, Fourier Transforms; Analog signal transmission and Reception (AM, FM, PM); effects of noise in Analog Systems. Digital Data and Communication Systems; effects of noise in Digital Systems.

Prerequisite: EE 311 or EE 430

**EE 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**EE 419 - Power Electronics**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Power electronic device characterization. Rectifiers, DC-DC converters and Inverters design, modeling, and build.

Prerequisite: EE 321

**EE 421 - Analog Integrated - Circuit Design**

Lecture Hours: 4

Lab Hours: 3

Credit Hours: 5

Models of IC active devices. Review single-transistor and multiple-transistor amplifiers. Current mirrors, active loads, and references. Output stages. Operational amplifiers with single-ended outputs. Frequency response of ICs, noise in ICs, bipolar, MOS and BiCMOS IC technology.

Prerequisite: EE 323

Corequisite: EE 325

**EE 423 - CMOS Digital Integrated-Circuit Design**

Lecture Hours: 4

Lab Hours: 3

Credit Hours: 5

MOSFETs, threshold voltage, body effect, channel length, CMOS, inverter characteristics, transmission gates, performance (latch-up, parameter estimation, capacitance), domino logic, registers, scan test, layout.

Prerequisites: CST 133 or EE 133, and EE 321

**EE 425 - Wireless Communication**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Baseband digital systems, messages, characters and symbols, sampling theorems. Noise sources, M-ray signals, baseband formatting including PCM waveforms, digital filters including FIR and IIR. Matched filters, band-pass modulation and demodulation techniques, and an introduction to spread spectrum transmission.

Prerequisites: EE 133/CST 133 and EE 223, both with grade "C" or better

**EE 426 - RF/Wireless Systems**

Lecture Hours: 4

Lab Hours: 3

Credit Hours: 5

Hardware components, system parameters, and architectures of RF and microwave wireless systems. Topics include microwave transmission lines, Smith charts, impedance matching networks, antenna systems, microwave components, receivers and transmitters, radar systems and sensors, and wireless communication systems.

Prerequisite: EE 341

**EE 430 - Linear Systems and Digital Signal Processing**

Lecture Hours: 4

Lab Hours: 3

Credit Hours: 5

Introduction to signals and systems. Spectral analysis techniques. Fourier Series and the continuous-time Fourier transform (CTFT). Discrete-time Fourier transform (DTFT) and digital Fourier transform (DFT). Computational spectral analysis using the FFT. FIR and IIR filters. Z-transform. Practical implementation of digital filters and computational spectral analysis using MATLAB.

Prerequisite: EE 225 or EE 320

**EE 431 - Digital Signal Processing**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Discrete systems and signals, linear time invariant systems, difference equations, frequency response, Z-transforms, analysis software, discrete Fourier transforms.

Prerequisites: EE 311 and EE 335, both with grade "C" or better

**EE 432 - Advanced Digital System Design**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Advanced digital system design with Field Programmable Gate Arrays (FPGAs). Students implement designs with pre-generated and custom digital logic functions using VHDL and/or Verilog hardware description languages. Projects include digital system design, simulation, and hardware implementation. Prerequisites: CST 116 and EE 331, both with grade "C" or better

**EE 441 - Biomedical I - Introduction to Biomedical Engineering**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introduction to biomedical engineering, anatomy and physiology for engineers, bioelectric phenomena, biomedical sensors, biomedical instrumentation, biosignal processing, cardiovascular mechanics, biomaterials, tissue engineering, biomedical imaging and clinical engineering.

Prerequisite: EE 311 with grade "C" or better

**EE 443 - Biomedical II - Signal Processing**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Fundamental problems of biomedical signal processing; signal analysis; signal modeling, sources and types of biomedical signals. Arterial and ambulatory blood pressure (ABP/ABPM); intracranial pressures (ICP); pulse oximetry (SpO<sub>2</sub>); electrocardiogram (ECG). Stochastic, harmonic models, spectrum analysis and time-frequency analysis.

Prerequisite: EE 311 with grade "C" or better

**EE 445 - Biomedical III - Instrumentation**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Review of biological systems (human), signals, measurements and transducers; bioelectrical signals and amplifiers; electrocardiograph (ECG); blood pressure; ultrasonography; x-ray; radiology and nuclear medicine equipment; power sources; electro-magnetic interference (EMI) effects; and electrical safety.

Prerequisite: EE 311 with grade "C" or better

**EE 448 - Geometric Optics**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Reflection and refraction at plane and curved surfaces; imaging properties of lenses; first order Gaussian optics and thin-lens system layout; matrix optics; ray-tracing software; spherical and chromatic aberrations.

Prerequisite: PHY 223

**EE 449 - Radiometry & Optical Detection**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Fundamentals of radiometry and photometry; detection of light using thermal and photon (photoemissive, photoconductive, and photovoltaic) methods; noise processes; blackbodies; charge transfer devices; spectroradiometry.

Prerequisites: EE 223 and PHY 223

**EE 450 - Physical Optics**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Spherical and planar waves; scalar diffraction theory; Fresnel and Fraunhofer diffraction and application to measurement; interference and interferometers; optical transfer functions; coherent optical systems and holography.

Prerequisite: PHY 223

**EE 451 - Lasers**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Laser radiation properties, laser cavities, coherence, atomic spectra, pumping rate, power gain, threshold conditions, beam shape, mode structure; ion, molecular, solid-state, dye, semiconductor, and fiber lasers.

Prerequisite: EE 450 or PHY 450

**EE 452 - Waveguides and Fiber Optics**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Light propagation in fibers and waveguides; termination, coupling, and splicing of fibers; fiber optic communication; optical time domain reflectometry, fiber amplifiers, and fiber sensors.

Prerequisite: EE 450 or PHY 450

**EE 453 - Optical Metrology**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Modern optical metrology with emphasis on non-destructive testing; Fourier optics; Moiré and polarization methods; classic and holographic interferometry; speckle techniques; fringe analysis.

Prerequisite: EE 450 or PHY 450

**EE 461 - Control System Engineering**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

An introduction to the analysis of linear control systems using classical and modern control theories. Feedback control of first- and second-order systems, controller sensitivity, disturbance rejection, stability, frequency response methods, and state feedback control. Computer modeling and simulation of feedback systems.

Prerequisites: EE 225, ENGR 266 or ENGR 267, and MATH 321, all with grade "C" or better

**EE 465 - Sensors and Instrumentation**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Advanced course in sensors and instrumentation for embedded applications. Topics include a study of transducers, medical sensors, position sensors, automotive sensors, and sensor arrays. Students will also study sensor synchronization, A/D converters, linearization, sampling, error sources/budget, and noise margin analysis.

Prerequisite: EE 331 with grade "C" or better

Corequisite: PHY 223

**EE 471 - Machine Learning I**

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Theory and practice of Genetic Algorithms, Evolution Strategies, Backprop, Kernel Methods, Naïve Bayes, Bayesian Belief Nets, Fuzzy Inference; brief discussion of Genetic Programming, Swarm Intelligence, Reinforcement Learning, Bayes Optimal.

Prerequisite: EE 430, or CST

116 and MATH 341, or ENGR 267 and MATH 341

**EE 473 - Machine Learning II**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Integration of Information Theory and Statistical Learning into a generalized framework including Support-Vector Machines, Adaptive Resonance, and Adaptive Critics, plus project.

Prerequisite: EE 471

**EE 475 - Micropower Systems**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Advanced course in low-power solutions for embedded systems. Topics will include low-power processor architectures, power management subsystems, processor sleep modes, power circuits, power supply sequencing, battery technology, rechargeable power sources, charge capacity models, IoT applications.

Prerequisite: EE 323 with grade "C" or better

**EE 485 - Printed Circuit Board Design**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

A course on modern PCB technology and design skills required for successful implementation of PCB designs in industry. This course provides direct, hands-on experience with industry standards, tools, and design techniques. Students will learn schematic capture and PCB layout.

Prerequisites: EE 335 and EE 341, both with grade "C" or better

**EE 501 - Communication Systems**

(S)

Lecture Hours: 4

Lab Hours: 3

Credit Hours: 5

Signal Analysis, Fourier series, Fourier Transforms; Analog signal transmission and Reception (AM, FM, PM); effects of noise in Analog Systems. Digital Data and Communication Systems; effects of noise in Digital Systems. Cross-listed with EE 401.

Prerequisite: Graduate standing

**EE 507 - Seminar**

(Hours to be arranged each term.)

**EE 525 - Wireless Communications**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Baseband digital systems, messages, characters and symbols, sampling theorems. Noise sources, M-ray signals, baseband formatting including PCM waveforms, digital filters including FIR and IIR. Matched filters, band-pass modulation and demodulation techniques, and an introduction to spread spectrum transmission. Cross-listed with EE 425.

Prerequisite: Graduate standing

**EE 526 - RF/Wireless Systems**

(S)

Lecture Hours: 4

Lab Hours: 3

Credit Hours: 5

Hardware components, system parameters, and architectures of RF and microwave wireless systems. Topics include microwave transmission lines, Smith charts, impedance matching networks, antenna systems, microwave components, receivers and transmitters, radar systems and sensors, and wireless communication systems.

Prerequisite: Graduate standing

**EE 530 - Linear Systems & Digital Signal Processing**

Lecture Hours: 4

Lab Hours: 3

Credit Hours: 5

Introduction to signals and systems. Spectral analysis techniques. Fourier Series and the continuous-time Fourier transform (CTFT). Discrete-time Fourier transform (DTFT) and digital Fourier transform (DFT). Computational spectral analysis using the FFT. FIR and IIR filters. Z-transform. Practical implementation of digital filters and computational spectral analysis using CAD tools.

**EE 532 - Advanced Digital System Design**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Advanced digital system design with Field Programmable Gate Arrays (FPGAs). Students implement designs with pre-generated and custom digital logic functions using VHDL and/or Verilog hardware description languages. Projects include digital design, simulation, and hardware implementation. Cross-listed with EE 431.

Prerequisite: MSE Graduate standing

**EE 535 - Embedded Systems I**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Advanced course in embedded systems design and development. Topics include an introduction to operating systems, cross-compilation, device tree overlays, ARM processor architecture, embedded networking, inter process communications, external hardware interfaces, and development of graphic user interfaces.

Prerequisite: MSE Graduate standing

**EE 548 - Geometric Optics**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Reflection and refraction at plane and curved surfaces; imaging properties of lenses; first order Gaussian optics and thin-lens system layout; matrix optics; ray-tracing software; spherical and chromatic aberrations.

Prerequisite: PHY 223

**EE 549 - Radiometry & Optical Detection**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Fundamentals of radiometry and photometry; detection of light using thermal and photon (photoemissive, photoconductive, and photovoltaic) methods; noise processes; blackbodies; charge transfer devices; spectroradiometry.

Prerequisite: PHY 223

**EE 550 - Physical Optics**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Spherical and planar waves; scalar diffraction theory; Fresnel and Fraunhofer diffraction and application to measurement; interference and interferometers; optical transfer functions; coherent optical systems and holography.

Prerequisite: PHY 223

**EE 551 - Lasers**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Laser radiation properties, laser cavities, coherence, atomic spectra, pumping rate, power gain, threshold conditions, beam shape, moved structure; ion, molecular, solid-state, dye, semiconductor, and fiber lasers.

Prerequisite: EE 450/PHY 450 or EE 550/PHY 550

**EE 553 - Optical Metrology**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Modern optical metrology with emphasis on non-destructive testing; Fourier optics; Moiré and polarization methods; classic and holographic interferometry; speckle techniques; fringe analysis.

Prerequisite: EE 450/PHY 450 or EE 550/PHY 550

**EE 555 - Embedded Systems II**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Advanced course in embedded systems design and development. Topics include bootloaders, interrupts, embedded operating systems, memory management systems, file systems, device drivers, makefiles, software revision control, software profiling, software debugging, and development of embedded software applications.

Prerequisite: MSE Graduate standing

**EE 560 - Computational Data Science & Big Data**

(S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Applied data science, statistical techniques for data science, applied machine learning, big data analysis, big data processing, visualization and representation, applied computational & mathematical methods for data science, data analytics, applied text mining and network analysis.

Prerequisite: Graduate standing

**EE 565 - Sensors and Instrumentation**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Advanced course in sensors and instrumentation for embedded applications. Topics include a study of transducers, medical sensors, position sensors, automotive sensors, and sensor arrays. Students will also study sensor synchronization, A/D converters, linearization, sampling, error sources/budget, and noise margin analysis. Cross-listed with EE 465.

**EE 575 - Micropower Systems**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Advanced course in low-power solutions for embedded systems. Topics will include low-power processor architectures, power management subsystems, processor sleep modes, power circuits, power supply sequencing, battery technology, rechargeable power sources, charge capacity models, IoT applications. Cross-listed with EE 475.

Prerequisite: MSE Graduate standing

**EE 585 - Printed Circuit Board Design**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

A course on modern PCB technology and design skills required for successful implementation of PCB designs in industry. This course provides direct, hands-on experience with industry standards, tools, and design techniques. Student will learn schematic capture and PCB layout. Cross-listed with EE 485.

Prerequisite: MSE Graduate standing

**EE 595 - Selected Graduate Topics in Electrical Engineering**

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Selected electrical, computer, and embedded engineering topics at the graduate level. Course may be repeated for credit.

**EE 596 - Graduate Research & Development**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Research and development in electrical, computer, and embedded engineering topics at the graduate level. Course may be repeated for credit.

**EE 597 - Graduate Project**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Graduate project in electrical, computer, and embedded engineering topics. Course may be repeated for credit.

**EE 598 - Graduate Thesis**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Graduate thesis in electrical, computer, and embedded engineering topics. Course may be repeated for credit.

**EE 599 - Practicum**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Supervised practical experience in electrical, computer, and embedded engineering topics at the graduate level. Course may be repeated for credit.

**Electronics Engineering Technology****EET 215 - Digital Circuits I**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introduction to combinational logic, gates, Boolean Algebra, Karnaugh mapping, number systems/codes, arithmetic circuits, encoders/decoders, multiplexers/demultiplexers, comparators, parity, code conversions, introduction to HDL, PLD HW implementation.

Prerequisite: MATH 111

**EET 216 - Digital Circuits II**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introduction to sequential logic, latches, flip-flops, timers, counters, registers, finite state machines, logic testing. DC parameters and timing analysis.

Prerequisite: EET 215

**EET 217 - Electric Circuits I**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

DC Analysis and First-Order Transients. Ohm's law, Kirchhoff's laws, nodal analysis, mesh analysis, source transformations, Thévenin and Norton equivalents, maximum power transfer, superposition, introduction to op-amps, inductance and capacitance, transient response of RC and RL circuits.

Prerequisite: MATH 111

**EET 218 - Electric Circuits II**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

AC Analysis, Second-Order Transients, introduction to electric power. Transient response of second-order circuits, sinusoids and phasors, sinusoidal steady-state analysis, nodal analysis, mesh analysis, source transformations, Thévenin and Norton equivalents, sinusoidal steady-state power calculations, balanced three-phase circuits, mutual inductance, transformers.

Prerequisites: EET 217 and MATH 112

**EET 219 - Semiconductor Devices and Amplifiers**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introduction to semiconductor devices, characteristics and biasing of diodes and transistors, analysis and design of circuits using diodes, bipolar junction transistors and field-effect transistors. Applications of transistors as diodes and switches.

Prerequisite: EET 218

**EET 237 - AC Circuits, Filters and Signals**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

RC transient analysis, sinusoidal AC voltage, phasors, average and effective value, the decibel, simple RC transfer functions, low-pass, high-pass and band-pass filters, periodic and aperiodic signals in time and frequency, bandwidth. For non-EET majors.

Prerequisites: EE 221 or EET 115 with grade "C" or better, and MATH 252

Corequisite: EET 238

**EET 238 - AC Circuits, Filters and Signals Laboratory**

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Lab to accompany EET 237. For non-EET majors.

Prerequisites: EE 221 or EET 115 with grade "C" or better, and MATH 252

Corequisite: EET 237

**EET 308 - Introduction to MOS Microelectronics**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to microelectronics, semiconductor physics, integrated circuit (IC) technology, p-n junction and MOS (Metal- Oxide-Semiconductor) electrostatics, MOS FETs (Field-Effect Transistors), selected digital circuits using CMOS (Complementary MOS) FETs, PSPICE modeling of IC MOSFETs.

Prerequisites: CST 262 and EET 237, or instructor consent

Corequisite: EET 309

**EET 309 - Introduction to MOS Microelectronics Laboratory**

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Laboratory companion to EET 308.

Theoretical concepts discussed in lecture verified using available components and instrumentation. Computer simulation using PSPICE. Written and oral laboratory reports required.

Prerequisites: CST 262, and EET 238 or EET 246, or instructor consent

Corequisite: EET 308

**Emergency Medical Technology-Paramedic****EMS 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**EMS 115 - Introduction to EMS (S)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduces the fundamentals of an emergency medical services system, history, and professional roles and responsibilities. Discusses medical/legal and ethical issues, research and evidence based practice.

**EMS 135 - Wilderness First Aid (Su)**

Lecture Hours: 1

Lab Hours: 0

Credit Hours: 1

Basic First Aid and CPR training for the outdoor adventurer or world traveler. Scenario based learning using medical equipment improvised for wilderness settings. Course completion earns Wilderness First Aid and CPR certifications meeting the outdoor industry requirements. Customized group courses available.

**EMS 151 - Emergency Medical Technician (EMT) I (F)**

Lecture Hours: 3

Lab Hours: 9

Credit Hours: 6

The first of two courses required for an entry-level career in emergency medical services. The course introduces students to the EMS system, professional attributes of an EMT, ambulance operations and the basic knowledge and skills of an EMT. Prerequisite: Current CPR certification

**EMS 152 - Emergency Medical Technician (EMT) II (W)**

Lecture Hours: 3

Lab Hours: 9

Credit Hours: 6

The second of two course focuses on the basic recognition and treatment of specific illnesses and injuries. The course includes 16-hours clinical and ambulance experience. Students successfully completing the course are eligible for Oregon and national certification examinations.

Prerequisite: EMS 151

**EMS 190 - Emergency Medical Technician Externship**

Lecture Hours: 0

Lab Hours: 12

Credit Hours: 4

EMS field experience with an affiliated transport agency. Students work at a BLS level under the direct supervision on one of the local EMS agency ambulances.

Prerequisite: EMS 152 or Oregon EMT certification

**EMS 200 - Medical Terminology (F)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Students build a strong medical vocabulary using prefixes, suffixes, and Greek and Latin verbs and adjectives. Students learn anatomical roots and examine anatomical structures, disease, procedures, tumors, and descriptive terms using simple word analysis.

**EMS 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**EMS 211 - Prehospital Emergency Pharmacology (W)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Lectures relating specific emergencies to the types of medications used for treatment. Includes classifications, actions, indications, administration and dosages, precautions and side effects of each of the medications used in prehospital treatment of medical and traumatic emergencies. In addition, students learn common prescription medications found in the home.

Prerequisite: CHE 210

**EMS 218 - Trauma Emergencies**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduces the epidemiology and kinematics of trauma, and integrates the assessment findings with pathophysiology in the management of the acutely injured patient. Discusses considerations for special patient populations and includes a Prehospital Trauma Life Support certification course.

**EMS 231 - Medical Emergencies I**

(F)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

The first in a series of three courses addressing the epidemiology and pathophysiology of various medical complaints; integrates assessment findings with the formulation of a treatment plan for the acute illness.

**EMS 232 - Medical Emergencies II**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

A continuation of the series of three courses addressing the epidemiology and pathophysiology of various medical complaints; integrates assessment findings with the formulation of a treatment plan for the acute illness.

Prerequisite: EMS 231

**EMS 233 - Medical Emergencies III**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

The conclusion of the sequence in medical emergencies where the epidemiology, pathophysiology and assessment findings are integrated to form a treatments plan for acute illnesses in the emergency setting.

Prerequisite: EMS 232

**EMS 235 - Basic Electrocardiography**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Fundamentals of electrocardiography and interpretation of normal and abnormal ECG patterns. Normal and abnormal wave patterns, presentation and treatment of common cardiac diseases.

**EMS 236 - Advanced****Electrocardiography**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Building upon basic EKG knowledge, this course advances into 12-lead EKG interpretation and prehospital treatment. Focusing on signs and symptoms of ischemia or infarction, axis deviation, and other EKG anomalies, students learn about various treatment modalities.

**EMS 241 - Paramedic Crisis Resource Management I**

(F)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

The first in a series of 3 courses addressing human factors contribution to EMS scene management. PCRMI focuses on human error, perception modalities, human emotion and motivation, and teamwork theory.

**EMS 242 - Paramedic Crises Resource Management II**

(W)

Lecture Hours: 1

Lab Hours: 0

Credit Hours: 1

The second class in a series of 3 courses addressing the theory and practice of human factors contribution to EMS scene management. PCRMI focuses on the following human factor contributions to scene performance; review of acute healthcare environment challenges, cognitive attention, and crisis communication strategies.

Prerequisite: EMS 241

**EMS 243 - Paramedic Crises Resource Management III**

(S)

Lecture Hours: 1

Lab Hours: 0

Credit Hours: 1

The third class in a series of 3 courses addressing the theory and practice of human factors contribution to EMS scene management. PCRMI focuses on the following human factor contributions to scene performance; stress and coping on decision-making, on scene leadership characteristics, and organizational influences on error.

Prerequisite: EMS 242

**EMS 271 - Paramedic Skills****Laboratory I**

(F)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

The first of three courses reviews EMT level skills and introduces the advanced level paramedic skills. Students learn safe and effective skills performance and begin to integrate assessment, management and skills performance.

**EMS 272 - Paramedic Skills****Laboratory II**

(W)

Lecture Hours: 1

Lab Hours: 3

Credit Hours: 2

The second course in the series continues the development of advanced level skills proficiency. Students integrates knowledge of specific patient complaints with assessment and management skills.

Prerequisite: EMS 271

**EMS 273 - Paramedic Skills****Laboratory III**

(S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

The third course in the series of advanced level skills development. Students demonstrate proficiency and prepare for paramedic licensing examinations.

Prerequisite: EMS 272

**EMS 283 - Clinical Practicum I**

(W,S)

Lecture Hours: 0

Lab Hours: 18

Credit Hours: 6

Focusing on the emergency medical practices of a paramedic, students integrate classroom studies into clinical practices while working under the direct supervision of health care professionals.

Prerequisites: CHE 210, EMS 218, EMS 231, EMS 235, EMS 241, and EMS 271

**EMS 284 - Clinical Practicum II**

(W,S)

Lecture Hours: 0

Lab Hours: 18

Credit Hours: 6

Students integrate knowledge and skills with patient care practices as they rotate through clinical experience in a variety of medical specialties. Students work under the direct supervision of health care professionals in each medical specialty.

Prerequisites: CHE 210, EMS 218, EMS 231, EMS 235, EMS 241, and EMS 271

**EMS 291 - Paramedic Field Externship Practicum I**

(S)  
Lecture Hours: 0  
Lab Hours: 12  
Credit Hours: 4

The first of two field experience courses with an affiliated advanced life support agency. Students complete an orientation to the field and work under the direct supervision of a paramedic preceptor responding to 911 emergency calls.

**EMS 292 - Paramedic Field Externship Practicum II**

(Su)  
Lecture Hours: 0  
Lab Hours: 36  
Credit Hours: 12

The continuation of the field experience courses with an affiliated advanced life support agency. Students work in the field and work under the direct supervision of a paramedic preceptor responding to 911 emergency calls.

Prerequisite: EMS 291

**EMS 321 - Community Paramedic I**

(W)  
Lecture Hours: 4  
Lab Hours: 0  
Credit Hours: 4

First course in a two course series addressing the management of chronic illness, social service connection, and healthcare system navigation as it relates to the prehospital environment.

Prerequisite: Current National or State Paramedic Certification

**EMS 322 - Community Paramedic II**

Lecture Hours: 4  
Lab Hours: 0  
Credit Hours: 4

Second course in a two course series addressing the management of chronic illness, social service connection and healthcare system navigation as it relates to the prehospital environment.

Prerequisite: Current National or State Paramedic Certification

**EMS 331 - Critical Care Transport I**

(W)  
Lecture Hours: 4  
Lab Hours: 0  
Credit Hours: 4

The first of 2 courses is designed to prepare paramedics to provide advanced critical care during transports, including performing advanced clinical patient assessments and providing invasive care beyond the standard scope of advanced pre-hospital care.

Prerequisite: Paramedic credentials or instructor consent

**EMS 332 - Critical Care Transport II**

(S)  
Lecture Hours: 3  
Lab Hours: 0  
Credit Hours: 3

The second of 2 courses is designed to prepare paramedics to provide advanced critical care during transports, including performing advanced clinical patient assessments and providing invasive care beyond the standard scope of advanced pre-hospital care.

Prerequisites: EMS 331 and EMS 381

**EMS 341 - Community Paramedic Clinical I**

(F)  
Lecture Hours: 0  
Lab Hours: 6  
Credit Hours: 2

The first course in a series of two courses addressing the management of chronic illness, social service connection, and health care system navigation as it relates to the prehospital environment. This course focuses on the management of chronic/sub-acute illness.

Prerequisite: Current National or State Paramedic Certification  
Corequisite: EMS 321

**EMS 342 - Community Paramedic Clinical II**

(W)  
Lecture Hours: 0  
Lab Hours: 6  
Credit Hours: 2

The second course in a series of two courses addressing the management of chronic illness, social service connection, and health care system navigation as it relates to the prehospital environment. This course focuses on the management of chronic/sub-acute illness.

Corequisite: EMS 322

**EMS 381 - Critical Care Clinical Practicum I**

(W)  
Lecture Hours: 0  
Lab Hours: 3  
Credit Hours: 1

The first of two practicum classes that exposes students to critical care transport topics focusing on psychomotor skills and the science behind them. This practicum is designed to prepare the student for EMS 382 ICU and critical care transport experience.

Corequisite: EMS 331

**EMS 382 - Clinical Care Clinical Practicum II**

(S)  
Lecture Hours: 0  
Lab Hours: 9  
Credit Hours: 3

The second of two practicum classes that exposes students to critical care transport environments that may include experiences with intensive care units, fixed wing transport, rotor wing transport, critical care ground transport, as well as various specialty critical care teams.

Prerequisite: EMS 331

Corequisite: EMS 332

**EMS 444 - EMS Systems Leadership and Management**

(F)  
Lecture Hours: 3  
Lab Hours: 0  
Credit Hours: 3

Explores the fundamental skills of managing and leading in EMS: concepts, principles and practices of leaders in the EMS industry. Case study discussions and analysis. Examines EMS systems, operations, resources and regulation of EMS. Industry leaders provide guest lectures.

Prerequisites: BUS 317 and PSY 347

**EMS 456 - Research Methods in EMS**

(S)  
Lecture Hours: 2  
Lab Hours: 0  
Credit Hours: 2

An introductory course in EMS research covering hypothesis formulation, design and use of data-gathering instruments, data collection, and methods of data analysis and presentation. Research and technical reports appearing in professional publications and archives are examined.

Prerequisite: MATH 361

**EMS 496 - Capstone Project I**

(W)

Lecture Hours: 1

Lab Hours: 6

Credit Hours: 3

Students formulate a detailed plan for a project or independent research study within the EMS industry. Project plan will include topic outline and goals, timeline, industry contacts. Faculty advisor will be assigned.

Prerequisites: MATH 361 and WRI 227

**EMS 497 - Capstone Project II**

(S)

Lecture Hours: 1

Lab Hours: 6

Credit Hours: 3

Implementation and completion of student project planned in EMS 496. Project results to be delivered in a report presented to an audience of EMS peers. Students will have scheduled meetings with a faculty advisor to track progress and determine readiness for presentation.

Prerequisite: EMS 496

**Engineering****ENGR 101 - Introduction to Engineering I**

(F)

Lecture Hours: 1

Lab Hours: 3

Credit Hours: 2

Introduces the student to engineering with a focus on academic success, professional development, ethics, communication, creative problem solving techniques, engineering tools (CAD/CAE), and design concepts. A discipline-specific team-based laboratory experience encourages consideration of a chosen engineering discipline.

**ENGR 102 - Introduction to Engineering II**

(W)

Lecture Hours: 1

Lab Hours: 3

Credit Hours: 2

The student will focus on their chosen discipline through an interdisciplinary team-based design project including problem identification, measurement, analysis and presentation to peers.

Emphasis will be placed on proper usage of engineering tools and instruments and sound design practices.

Prerequisite: ENGR 101

**ENGR 111 - MMET Orientation**

(F)

Lecture Hours: 1

Lab Hours: 3

Credit Hours: 2

Topics include: survey of the engineering profession, educational and professional development, standards of practice; engineering information, calculations, and analysis. An engineering design project will be incorporated. This course provides knowledge and skills to engineering students which will benefit their future academic and professional endeavors.

Prerequisite: Declared major in the BSME, BSMET, or BSMFG program

**ENGR 120 - Fundamentals of Engineering Design, Analytical Tools, and CAD**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Fundamentals of engineering design, including analytical and computational tools that introduce design concepts and build a foundation of engineering knowledge that will be helpful to students starting off in engineering and technology disciplines. Computer aided design and drafting, problem solving, documentation, analysis, teamwork, and multi-step engineering calculations.

**ENGR 121 - Engineering Principles and Problem Solving**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Topics include modeling of real-world concepts and systems, basic statics, electronics, energy generation, and robotics. Using both analytical and computational tools to represent, analyze, and improve on real-world situations. Identifying the correct type of system to employ, improving the efficiency of existing systems, working in multi-disciplinary groups, developing and presenting ideas, prototyping as well as testing iteratively.

**ENGR 122 - Electronics and Computation in Engineering**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Fundamental electrical and computational topics in engineering. Building and analyzing circuits, using mathematical concepts to develop solutions, and using both analytical and computational tools to gain knowledge and hands-on skills. Troubleshooting and testing of ideas as well as presenting ideas in an organized and systematic manner to others. Provides a basic foundation of knowledge and skills that will transfer well to continued education, technical jobs and self-confidence.

**ENGR 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**ENGR 211 - Engineering Mechanics: Statics**

(F,W,S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Fundamental principles of mechanics of rigid bodies and the application of these principles to engineering problems.

Prerequisite: PHY 201 or PHY 221

Pre- or Corequisite: MATH 252

**ENGR 212 - Engineering Mechanics: Dynamics**

(W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Kinematics of particles and rigid bodies. Kinetics of particles and rigid bodies in plane motion, including Newton's second law, work and energy, and impulse and momentum.

Prerequisites: ENGR 211 and MATH 252

**ENGR 213 - Engineering Mechanics: Strength of Materials**

(F,W,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Internal stresses and deformations of structural members and machines when subjected to external forces.

Prerequisites: ENGR 211 and MATH 252

**ENGR 236 - Fundamentals of Electric Circuits**

(F,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Resistive circuits, operational amplifiers, capacitors, inductors, transient analysis, sine waves, AC circuit analysis, resonance, transformers. Not for Electronics Engineering Technology and Computer Engineering Technology students.

Prerequisites: MATH 252, and PHY 202 or PHY 222

**ENGR 266 - Engineering Computation**

(F,W,S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Programming and problem solving using current computer software. General programming techniques using conditional statements, looping, subroutines, and data input/output will be stressed. Consideration of features specific to the software being used will also be presented.

Prerequisite: MATH 112

**ENGR 267 - Engineering Programming**

(W,S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Computer programming principles. Control structures. Structural programming principles. Functions and scripts. MATLAB programming. LabVIEW programming. Application of engineering programming principles in projects.

Prerequisite: MATH 251

**ENGR 305 - Nanoscience and Nanotechnology**

(F)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Survey of chemical and physical phenomena as applied to nanoscale materials, including metal and semiconductor nanoparticles and carbon nanostructures. Discussion of major synthesis and characterization techniques. Biological and engineering applications of nanoscale materials.

Prerequisites: CHE 202 or CHE 222, and PHY 222 or PHY 223

**ENGR 318 - Engineering Mechanics: Fluids**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Fundamental properties of fluids, fluid statics and pressure variation, flow characterization, momentum and forces due to fluid motion, energy of fluids in motion, and flow in conduits. Emphasis on civil and mechanical engineering applications of fluid mechanics principles.

Prerequisites: ENGR 211 and MATH 252

**ENGR 326 - Electric Power Systems**

(F,W,S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Study related to theory and application of industrial electric power systems. Topics covered include transformers, motors, generators, motor controls, and protective devices.

Prerequisite: ENGR 236

**ENGR 355 - Thermodynamics**

(F,W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

An introductory course in thermodynamics, the science of heat energy conversion. Develops understanding of energy, heat, work, efficiency, and ideal thermodynamic cycles. Teaches first and second laws of thermodynamics and perfect gas law.

Prerequisites: MATH 252, and PHY 202 or PHY 222

**ENGR 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**ENGR 415 - Occupational Safety**

(S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Topics include current occupational safety and health issues. Practical application of regulations in the industrial setting. Compliance to Industrial Hygiene and General Safety Standards. Common safety violations and implementation of safety programs.

Prerequisite: Junior standing in any MMET program

**ENGR 420 - Engineering Modeling and Simulation of Dynamic Systems**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Conservation laws of physics are used to develop lumped-parameter models of dynamic systems. Modeling, mathematical analysis, and computer simulation of systems containing mechanical, electrical, electromechanical, fluid, and thermal components. Dynamic behavior and performance criteria characterization of continuous-time models.

Prerequisites: EE 225, ENGR 266 or ENGR 267, MATH 321, MATH 322 or MATH 341, and PHY 223, all with grade "C" or better

**ENGR 421 - Automation for Robotics**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

A capstone course in the automation, robotics, and control system engineering sequence. A unified treatment using dynamics, modeling, simulation, and linear control for the automation of robots. Trajectory planning, stability, controllability, and how these topics form key concepts of automation.

Prerequisites: ENGR 423 and MATH 341, both with grade "C" or better

**ENGR 422 - Process Control**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Design of continuous and batch process control systems. Advanced control schemes, including model-based methods.

Prerequisite: ENGR 421

**ENGR 423 - Motion Control in Mechanisms and Robotics**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Motion control components, beginning with the study of the function, classification, position, velocity, and acceleration of fundamental mechanisms and robot kinematic chains. Dynamic response of open- and closed-loop mechanisms to periodic and non-periodic loading. Sensors and actuators in motion control.

Prerequisites: ENGR 212, ENGR 424, and REE 253, all with grade "C" or better

**ENGR 424 - Advanced Control Engineering**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Advanced modeling of continuous and discrete processes suitable for use in control system design. State functions, state equations, transfer matrices. State-space model building, state-feedback control and observation, pole placement, linear transformations of state vectors. Introduction to discrete-time control systems.

Prerequisites: ENGR 420, both with grade "C" or better

**ENGR 445 - Engineering Project Management**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Applications of the Critical Path Method to organization and control of engineering projects. Applications software will be used to create and evaluate project networks to develop management reports.

Prerequisite: Junior standing in Engineering or Engineering Technology

**ENGR 465 - Capstone Project**

(F,W,S)

Lecture Hours: 0

Lab Hours: 6

Credit Hours: 2

Students apply material learned in other courses, develop expertise on a specific topic, work closely with a faculty member to implement the project and improve professional communication skills by writing a project report. Course may be repeated for credit.

Prerequisites: Junior standing and instructor consent

**ENGR 485 - Fundamentals of Engineering Exam Preparation**

(S)

Lecture Hours: 1

Lab Hours: 0

Credit Hours: 1

A preparation course covering the requirements of, and providing a review for, the NCEES FE exam.

Prerequisite: Senior standing in an MMET program

**ENGR 491 - MMET Senior Projects I**

(F)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

The first course of a three-term sequence that offers a capstone experience for students in an MMET program. This experience involves the application of knowledge and skills acquired from prior coursework to an engineered system, system optimization, project management, and material related to a group engineering project. This course will be focused on the proposal and planning stages of the project assigned.

Prerequisites: Senior standing in an MMET program and instructor consent

**ENGR 492 - MMET Senior Projects II**

(W)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

The second course of a three-term sequence that offers a capstone experience for students in an MMET program. This experience involves the application of knowledge and skills acquired from prior coursework to an engineered system, system optimization, project management, and material related to a group engineering project. This course will be focused on the design and analysis of the project assigned.

Prerequisite: ENGR 491

**ENGR 493 - MMET Senior Projects III**

(S)

Lecture Hours: 1

Lab Hours: 6

Credit Hours: 3

The third course of a three-term sequence that offers a capstone experience for students in an MMET program. This experience involves the application of knowledge and skills acquired from prior coursework to an engineered system, system optimization, project management, and material related to a group engineering project. This course will be focused on the implementation and assessment stages of the project assigned.

Prerequisite: ENGR 492

**ENGR 507 - Seminar**

(Hours to be arranged each term.)

**ENGR 511 - Research Methods & Innovation: Intellectual Property**

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Intellectual property (IP) development, evaluation, and strategy. IP fundamentals, patent fundamentals, conducting patentability searches, state-of-the-art searches, evaluating the patentability potential of an invention, drafting invention disclosures and patent applications, assessing the value of a patent or patent portfolio, and IP licensing fundamentals.

**ENGR 512 - Research Methods & Innovation: Research Methods**

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Fundamental concepts of scientific research. An introduction to the concepts underlying peer-reviewed research, evaluating the relevance and impact of sources, conducting literature reviews, evaluating published findings, using research productivity tools, using statistical methods, designing research studies, and writing scholarly articles.

**ENGR 513 - Research Methods & Innovation: Strategy & Innovation**

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Strategy and innovation concepts with a focus on technology commercialization. Business strategy frameworks, strategic execution, project management, technology forecasting, financial analysis, technical marketing, operations management, business models, business law, and entrepreneurship.

**ENGR 520 - Engineering Modeling and Simulation of Dynamic Systems**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Conservation laws of physics are used to develop lumped-parameter models of dynamic systems. Modeling, mathematical analysis, and computer simulation of systems containing mechanical, electrical, electromechanical, fluid, and thermal components. Dynamic behavior and performance criteria characterization of continuous-time models.

Prerequisite: Graduate standing in Engineering

**ENGR 521 - Automation for Robotics**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

A capstone course in the automation, robotics, and control system engineering sequence. A unified treatment using dynamics, modeling, simulation, and linear control for the automation of robots. Trajectory planning, stability, controllability, and how these topics form key concepts of automation.

Prerequisites: ENGR 523 with grade "C" or better, and graduate standing in Engineering

**ENGR 522 - Process Control**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Design of continuous and batch process control systems. Advanced control schemes, including model-based methods. Prerequisites: ENGR 520 and ENGR 521

**ENGR 523 - Motion Control in Mechanisms and Robotics**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Motion control components, beginning with the study of the function, classification, position, velocity, and acceleration of fundamental mechanisms and robot kinematic chains. Dynamic response of open- and closed-loop mechanisms to periodic and non-periodic loading. Sensors and actuators in motion control.

Prerequisites: ENGR 524 with grade "C" or better, and graduate standing in Engineering

**ENGR 524 - Advanced Control Engineering**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Advanced modeling of continuous and discrete processes suitable for use in control system design. State functions, state equations, transfer matrices. State-space model building, state-feedback control and observation, pole placement, linear transformations of state vectors. Introduction to discrete-time control systems.

Prerequisites: EE 461 or an equivalent undergraduate course in control system engineering, and ENGR 520 both with grade "C" or better

**ENGR 596 - Graduate Research & Development**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Research and development in engineering at the graduate level. Course may be repeated for credit.

**ENGR 597 - Graduate Project**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Graduate project in engineering topics. Course may be repeated for credit.

**ENGR 598 - Graduate Thesis**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Graduate thesis in engineering topics. Course may be repeated for credit.

**ENGR 599 - Practicum**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Supervised practical experience in engineering topics at the graduate level. Course may be repeated for credit.

**Engineering Technology****ENGT 101 - Engineering Technology Techniques**

Lecture Hours: 2

Lab Hours: 6

Credit Hours: 4

Engineering terminology and problem solving tools including computer aided drafting, technical sketching, word processing, spread sheets, multi-view projections, significant figures, and engineering problem solving techniques. Prerequisite: MATH 100

**ENGT 103 - Engineering Terminology (F)**

Lecture Hours: 3

Lab Hours: 2

Credit Hours: 4

Terminology, symbols, and units commonly used in the engineering field. Interpretation and reproduction techniques of engineering drawings and graphs. A brief overview of the field of civil engineering. This course is designed primarily for the Office Systems Technology program.

**ENGT 104 - Electrical and Electronic Nomenclature and Symbols**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

A survey course in basic electricity and electronics, emphasizing terminology and nomenclature. This course is designed primarily for the Office Systems Technology program.

**ENGT 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**ENGT 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**ENGT 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**ENGT 310 - Introduction to Geothermal Energy**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Overview of geothermal energy: distribution, geology, hydrology, and geochemistry; exploration and extraction techniques; uses including power generation, space heating, agriculture, process and multistage utilization; and environmental, economic, and legal considerations. Field trips to local sites.

**ENGT 311 - Passive Solar and Solar Cell Design**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Residential passive solar heating and superinsulation construction techniques including heat load calculations using the Balcomb SHF method. Technical and economic analysis of solar electric cells, storage batteries, and inverter technology. Prerequisite: PHY 202 or instructor consent

**ENGT 312 - Critical Path Techniques**  
(F)

Lecture Hours: 1

Lab Hours: 3

Credit Hours: 2

Scheduling techniques used by management on engineering and industrial projects. The course will concentrate on the Critical Path Method (CPM), but will also include comparisons with Gantt charts and Program Evaluation Review Technique (PERT). Concepts will be applied to mini-projects in class and expanded through the use of selected computer software packages.

**ENGT 370 - Introduction to Automation and Robotics**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

A survey of automation and all areas of robotics with an emphasis on the industrial robot. It will include history, terminology, use, future, impact on society, and hands-on laboratories.

Prerequisites: MATH 112 and a programming course

**ENGT 390 - Co-op Field Practice**  
(F,W,S)

Credit Hours: (Variable Credit)

An approved work program related to the student's field of specialization for a continuous three-month or six-month period. The employer and the type, level, and difficulty of the particular job must be approved by the student's Engineering Technology Department prior to the employment period. A written comprehensive report of each season's activity must be submitted during the following term of residence.

Prerequisites: Associate degree and two terms of residence

**ENGT 391 - Co-op Field Practice**  
(F,W,S)

Credit Hours: (Variable Credit)

An approved work program related to the student's field of specialization for a continuous three-month period.

**ENGT 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**ENGT 415 - Occupational Safety**  
(S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Topics include current occupational safety and health issues. Practical application of regulations in the industrial setting.

Compliance to Industrial Hygiene and General Safety Standards. Common safety violations and implementation of safety programs.

Prerequisite: Junior standing in MFG

**ENGT 471 - Microprocessor Application in Automation and Robotics**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

This is an applied course in using microprocessors to support controlling motion, such as in robotic manipulators and automated equipment and interfacing sensor inputs.

Prerequisites: CST 331 and ENGT 370

**ENGT 490 - Co-op Field Practice**  
(F,W)

Credit Hours: (Variable Credit)

An approved work program related to the student's field of specialization for a continuous three-month or six-month period. The employer and the type, level, and difficulty of the particular job must be approved by the student's Engineering Technology Department prior to the employment period. A written comprehensive report of each season's activity must be submitted during the following term of residence.

Prerequisites: Associate degree and two terms of residence

**ENGT 491 - Co-op Field Practice**  
(Su)

Credit Hours: (Variable Credit)

An approved work program related to the student's field of specialization for a continuous three-month period.

**ENGT 500 - Research Methods**  
(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Study of industrial analytical techniques used to develop new technologies, including the use of computer aided engineering systems and software for design purposes. Examination of research and development methods, current industrial practices and applications of new technologies.

**ENGT 507 - Seminar**

Credit Hours: (Hours to be arranged each term.)

In-depth examination of current theories, research, trends and processes of industry. Individual study, information exchange, and research of selected industrial topics.

**ENGT 518 - Data Communications**  
(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Data communications and computer network protocols, hardware elements, and software algorithms. Error handling, routing, flow control, host-to-host communications, and local area networks.

**ENGT 521 - ASIC Design I**  
(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Techniques for designing Application Specific Integrated Circuits (ASICs). Comprehensive study of computer concepts using computer aided design tools. Implementation of ASIC devices in digital computing systems including: modeling (using VHDL), digital synthesis, place and routing functions, and layout. Design exercises accomplished using hardware description languages and simulation.

Prerequisite: VLSI or ASIC coursework or experience

**ENGT 522 - ASIC Design II**  
(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Techniques used to transform hardware description language-based designs to physical layout. Applications of synthesis tools for floor planning and layout of Application Specific Integrated Circuits. Comprehensive study of logic design, layout generated design, and advanced CMOS circuit techniques used when designing with standard cells.

Prerequisite: ENGT 521

**ENGT 523 - Advanced ASIC Design (S)**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introduction to very large scale integration (VLSI) technology and design of CMOS integrated circuits including: the device fabrication process and design rules as they apply to device layout.

Analysis, design, simulation and layout rules presented. Logic gates and function design, simulation and physical layout.

Prerequisite: ENGT 522

**ENGT 545 - Advanced Microcomputers (S)**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Microprocessor technology and its application to the design of practical digital computing systems. Design techniques used to develop and design newer generation microprocessor-based computing systems. Assembly language programming and interfacing of microprocessor-based systems.

Prerequisite: Microprocessor coursework or experience

**ENGT 546 - Advanced Computer Architectures (W)**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Advanced topics in computer architectures including design of computer hardware, organizational structures, and architectural properties of parallel, vector and multiprocessing systems. Computer organizational structures of memory and I/O subsystems, multiprocessor computer architectures, and data flow computers.

Prerequisite: Course work or experience in computer architecture and organization

**ENGT 565 - Semiconductor Device Physics and Processes**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Simple models and physical insight to solid state physics. Crystal structure and symmetry, crystal lattices, reciprocal lattices, equilibrium and non-equilibrium processes in semiconductors. Thermal properties, energy band, and semiconductor properties.

**ENGT 581 - Master's Project I (F,W)**

Lecture Hours: 1

Lab Hours: 9

Credit Hours: 4

Students prepare the proposal for the Master's project under the guidance of a project advisor. Project proposal guidelines and accepted format presented. Approval of the proposal by the student's project committee constitutes completion of the course.

**ENGT 582 - Master's Project II (F,W,S)**

Lecture Hours: 1

Lab Hours: 9

Credit Hours: 4

Students complete task specified by the project advisor. Preliminary results of the student's project presented to the student's project committee. Acceptance of these results constitutes completion of the course.

Prerequisite: ENGT 581

**ENGT 583 - Master's Project III (W,S)**

Lecture Hours: 1

Lab Hours: 9

Credit Hours: 4

Students produce the final report demonstrating the completion of the project. Final results of the student's Master's project presented to the student's project committee. Acceptance of the report by the student's project committee constitutes completion of the course.

Prerequisite: ENGT 582

**Environmental Sciences****ENV 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

Prerequisite: ENV major or instructor consent

**ENV 111 - Introduction to Environmental Sciences (F)**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

A topical overview of environmental sciences stressing the integration of the social, natural and physical sciences. Emphasis on active learning.

**ENV 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

Prerequisite: ENV major or instructor consent

**ENV 214 - Watershed Science & Technology (F,S)**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Science and technology of watershed processes, monitoring, and assessment. Applications and case studies focused on sustainable management and restoration of water resources and their associated aquatic, riparian, and upland ecosystems. Local and regional sites of interest are highlighted.

Prerequisite: ENV 111 or GEOG 105, or instructor consent

**ENV 224 - Scientific Reasoning and Methodology (W)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Fundamental principles and practices of scientific reasoning and methodology, including contrasts with other ways of making knowledge, the power of questions, theories versus hypotheses, understanding experiments, supporting claims, drawing inferences, reproducibility, and coping with uncertainty in typical uncontrolled natural experiments.

Prerequisite: ENV 111 or GEOG 105, or instructor consent

**ENV 226 - Environmental Data Analysis (S)**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Introduction to compilation, manipulation, and analysis of datasets common to environmental analysis. Includes measures of central tendency and spread; characterizing data distribution; linear regression; exceedance probability and cumulative frequency functions; understanding time series; and basic principles of graphical data displays. Prerequisite: ENV 111 or GEOG 105, or instructor consent

**ENV 265 - Field Methods in Environmental Sciences**

(F)

Lecture Hours: 1

Lab Hours: 6

Credit Hours: 3

Basic principles of experimental design, site and instrument selection for field research. Basic instrumentation and data acquisition techniques are used to contribute to authentic research programs at different locations alongside environmental science professionals.

**ENV 275 - Careers in Environmental Sciences**

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

Survey of specialties and careers in environmental sciences, including educational requirements. Jobs in government, non-government (non-profit), and private sectors are presented and discussed. Faculty support for student job searches.

**ENV 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

Prerequisite: ENV major or instructor consent

**ENV 314 - Environmental Management and Restoration**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Overview of legislative, regulatory, and policy-based activities involving the development, management, and restoration of natural resources and ecosystem services. Emphasis on the National Environmental Policy, Clean Water, and Endangered Species Acts, with illustrative case studies from local and regional environments.

Prerequisite: ENV 275

**ENV 336 - Environmental Hydrology**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Study of the hydrologic cycle; quantitative measurement of precipitation, infiltration, runoff, streamflow and storage in watersheds. Curve fitting, hydrographic analysis, statistical analysis of extreme flows, flood routing and runoff modeling for small and urban watersheds.

Prerequisites: MATH 252 and MATH

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**ENV 365 - Advanced Field Methods in Environmental Sciences**

(F)

Lecture Hours: 1

Lab Hours: 6

Credit Hours: 3

Advanced principles of experimental design, site and instrument selection for field research. Advanced instrumentation and data acquisition techniques are used as part of authentic research programs at different locations alongside environmental science professionals.

Course may be repeated for credit.

Prerequisites: MATH 112 and WRI 122

**ENV 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

Prerequisite: ENV major or instructor consent

**ENV 427 - Greenhouse Gas Accounting/Footprints**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Course topics include US and international greenhouse gas (GHG) management policies. GHG assessment methods and tools, emissions trading programs, climate risk and risk management, data and information sources, measurement standards and protocols and related sustainability concepts and policies. Course also listed as REE 427 (cannot be used for graduation credit by students who have taken REE 427).

Prerequisites: Junior or Senior standing

**ENV 434 - Advanced Data Analysis**

(W,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Advanced concepts and methods of data analysis from field projects, data archives and other sources. Statistical hypothesis testing; analysis of variance; multi-variate, regression, spatial- and time-series; principle component analysis; data visualization; and infographics.

Prerequisites: MATH 252 and MATH

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**ENV 465 - Ecological Restoration & Monitoring**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Principles and practices of ecological restoration, including ecosystem assessment; evaluation; and restoration planning, design, implementation, and monitoring. Labs include field visits and evaluation of local restoration projects.

Prerequisite: ENV 314

**ENV 469 - Treatment Wetlands**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Treatment wetland features; biological, chemical and physical properties. Planning, design and performance assessment principles for municipal, agricultural and storm water treatment wetlands. Considers vegetation and microbiology, aerobic and anaerobic biogeochemistry, hydraulics and treatment efficiencies. Local case studies.

Prerequisites: CHE 202 and MATH 251

**ENV 475 - Professionalism & Job Readiness**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Practical seminar focusing on professional standards, culture, ethics, and skills to enhance communication, collegiality, and positive projection of values and self-image. Assists students with workforce transition, including job search, preparation of resume packages and portfolios, interviewing tips, and job-offer negotiation.

Prerequisites: ENV 275 and ENV 314

**ENV 484 - Sustainable Human Ecology**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Investigation of global interconnections between humans and natural systems through the study and application of ecological principles. Ethical and ecological considerations are used to solve complex environmental problems. Laboratories involve field work with local experts.

Prerequisite: BIO 337 or BIO 367 or BIO 377 or CE 481 or instructor consent

**ENV 485 - Ecoregional Studies**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Provides a synthetic, team-project experience focusing on landscape change, human-environment relations, and natural resource development, management, and restoration in selected ecoregions.

Geographical, historical, and ecological approaches are emphasized.

Prerequisites: BIO 337, BIO 367 or BIO 377, and ENV 314

**ENV 495 - Research in Environmental Sciences**

(F,W,S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Supports student-initiated research projects in environmental sciences. Topic and scope must be reviewed and accepted by a faculty advisor. Registration by instructor consent. Counts as technical elective credit. May be repeated for up to nine total credits.

**Geography****GEOG 105 - Physical Geography**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Comprehensive introduction to physical geography, including maps and representation of the earth's surface, the climate system and weather phenomena, plate tectonics, landform evolution and interpretation, and human-landscape interactions. Satisfies lab science.

**GEOG 106 - Cultural Geography I**

(F,W) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Cultural geography of the major world developed regions other than the United States - Europe, Australia and New Zealand, the former Soviet Union, Canada and Japan. The course emphasizes the regional approach.

**GEOG 107 - Cultural Geography II**

(W) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Cultural geography of the world's underdeveloped realms - the countries of Middle and South Americas, Africa and Asia. The course emphasizes the regional approach.

**GEOG 108 - Cultural Geography III**

(S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

An introduction to cultural geography of selected world realms, namely The Middle East, South Asia, East Asia, Southeast Asia, and The Pacific Realm. Cultural imprints on the physical landscape will be discussed and regional approach emphasized.

**GEOG 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**GEOG 305 - Geomorphology**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Principles and practices of land-form and landscape analysis, focusing on processes, patterns, and their interactions. Emphasis on tectonic interactions; mountains; rivers; fans and deltas; glacial and periglacial landscapes; and coastlines.

Prerequisite: GEOG 105 or GEOL 201

**GEOG 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**GEOG 315 - Climatology & Atmospheric Science**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Overview and analysis of earth's climate system, focusing on radiative processes; heat distribution and budgeting; atmospheric chemistry, circulation, and precipitation; ocean-land-atmospheric interactions; and long- and short-term climate change.

Prerequisite: GEOG 105 or GEOL 201

**GEOG 335 - Soils**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Processes and patterns of soil genesis and evolution, including weathering; profile development and identification; soil classification and mapping; abiotic-biotic components and interactions; and tilth, soil quality, and conservation.

Prerequisite: GEOG 105 or GEOL 201

**GEOG 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**Geology****GEOL 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**GEOL 201 - Physical Geology**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

A brief systematic description of the major rock-forming minerals and the three major rock groups. The events of erosion, transportation and deposition of chemically altered and physically fragmented rocks and the resulting sculpturing of the earth's surface are discussed.

**GEOL 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**GEOL 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**GEOL 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**Geographic Information Systems****GIS 103 - The Digital Earth**

(F)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Introduction to the digital representation of the features and attributes of our natural world. Concepts, vocabulary, and use of GIS and GPS, and how these systems help solve geospatial problems. Integration of GNSS data into GIS. Uses of data from LiDAR and UAS (drones) are discussed.

**GIS 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**GIS 134 - Geographic Information Systems**

(W)

Lecture Hours: 1

Lab Hours: 6

Credit Hours: 3

Coordinate systems. Creating, editing, and querying feature and attribute data.

Symbolizing, classifying, and labeling features. Tabular relationships.

Introduction to elements of map design, Shapefile-KML and CAD-GIS data conversion.

Use of raster data, analyzing raster surfaces. Use of UAS (drone) data.

Use of web-based GIS applications and services. Extensive use of ArcGIS™ software. Examples from a variety of disciplines.

Prerequisite: CE 203 or GIS 103

**GIS 205 - GIS Data Integration**

(S)

Lecture Hours: 1

Lab Hours: 3

Credit Hours: 2

Construction and use of a data dictionary. Principles of Differential Correction.

Importing feature and nonfeature data into a GIS. Data Conversion. Theory and operation of GPS. Use of GPS and other tools for field data collection.

Extensive use and creation of web-based GIS applications and services.

Prerequisite: GIS 134

**GIS 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**GIS 306 - Geospatial Raster Analysis**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Manipulation and storage of raster data. Measurement scales. Map algebra.

Georeferencing raster datasets. Least-cost path and corridor modeling techniques.

Distance, surface and density mapping techniques. Viewshed and hydrologic analyses. Processing of UAS (drone) data.

Prerequisite: GIS 134

**GIS 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**GIS 316 - Geospatial Vector Analysis I**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Coordinates, datums, projections.

Advanced editing and annotation techniques.

Use of subtypes and domains. Map and geodatabase topology.

Linear referencing and dynamic segmentation. Geocoding.

Working with legal descriptions.

Professional map creation skills. GIS project design fundamentals.

Creation and use of online GIS resources and applications.

Prerequisite: GIS 134

**GIS 332 - Customizing the GIS**

**Environment I**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Customizing geoprocessing workflows with Python. Working with lists, and dictionaries.

String manipulation. Branching.

Error handling. Working with geometries. Use of cursors to access and manipulate spatial and non-spatial data.

Tool creation.

Prerequisites: GIS 316 and MIS 118

**GIS 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**GIS 426 - Geospatial Vector Analysis II**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Advanced geospatial analysis. Spatial adjustment techniques. Extensive use of subtypes, domains, validation rules, and cardinalities.

Use and creation of directed and undirected networks for geospatial analysis. Routing. Conflation.

Quantitative assessment of geographic patterns and distributions. Geostatistics.

Prerequisite: GIS 316

**GIS 432 - Customizing the GIS**

**Environment II**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Creation and management of Add-Ins.

Hosting feature and geoprocessing services. Introduction to the server environment and Portal for ArcGIS.

Developing mobile GIS applications.

Prerequisite: GIS 332

**GIS 446 - GIS Database Development**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Advanced geodatabase design. Import and export of XML. Extensive use and creation of relationship classes.

Study, use, design, and creation of data models. Design and creation of user interfaces for data entry.

This course is a capstone experience for the GIS option.

Prerequisites: GIS 426, GIS 432, and MIS 442

**GIS 456 - GIS Web Services and Management**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Implementation of a GIS. Definition of information products. Discussion of the server-client relationship.

Server site configuration and administration. Sharing GIS content on the web.

Building web applications and services.

Prerequisites: GIS 446 and GIS 432

**GIS 468 - GIS Practicum**

Credit Hours: (Hours to be arranged each term.)

**Geomatics****GME 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**GME 161 - Plane Surveying I**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Fundamental concepts of plane surveying including theory of measurements, systematic and random errors.

Distance and angle measurement using total stations and differential leveling.

Calculation of bearings, azimuths, coordinates, area and traverse adjustments.

Introduction to horizontal and vertical curve computations.

Corequisite: MATH 111

**GME 162 - Plane Surveying II**

(S)

Lecture Hours: 2

Lab Hours: 6

Credit Hours: 4

Digital theodolites and data collectors, instrument testing and observational error analysis. Theory of leveling. Solar observation and computation. E.D.M. use and calibration. Field labs including solar observations, traversing, leveling and horizontal curve layout. Introduction to COGO software.

Prerequisites: GME 161 and MATH 112

**GME 163 - Route Surveying**

(F)

Lecture Hours: 2

Lab Hours: 6

Credit Hours: 4

Laboratory intensive project overview including horizontal and vertical control for preliminary location and construction surveys for a secondary road. Instruction in basic elements of horizontal and vertical route alignment and layout. Determination of earthwork quantities. CAD drafting of plan, profile and cross-sections.

Prerequisites: GME 162 and GME 175, both with grade "C" or better

**GME 175 - Computations and Platting**

(W)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Coordinate geometry concepts with emphasis on solutions to standard surveying computations. Introduction to calculator and Excel spreadsheet computations. Introduction to map composition and platting using industry standard software.

Prerequisite: GME 161

Corequisite: CE 203

**GME 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**GME 241 - Legal Aspects of Land Surveying I**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Statute law, common law, and legal principles relating to land boundaries. Each student will be required to use the county law library to research assigned cases.

Prerequisites: GME 161 and WRI 121, or instructor consent

**GME 242 - Land Descriptions and Cadastre**

(W)

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

Real property descriptions and land record systems. Emphasis on interpreting and writing land descriptions, and introduction to researching records in various Land Information Systems.

Prerequisites: GME 161 and GME 241, both with grade "C" or better

**GME 264 - Digital Design for Surveying**

(W)

Lecture Hours: 0

Lab Hours: 6

Credit Hours: 2

Use of Carlson software to solve and plot assignments covering traverse calculations, horizontal and vertical curve alignments, profiles and earthwork volumes. Hand calculations will be made to supplement the computer solutions.

Prerequisites: CE 203 and GME 163 with grade "C" or better

**GME 297 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**GME 299 - Independent Studies**

Credit Hours: (Hour to be arranged each term.)

**GME 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**GME 324 - Geomatics Computer Programming**

(F)

Lecture Hours: 1

Lab Hours: 6

Credit Hours: 3

Students develop Visual Basic programs and Excel spreadsheets to solve geomatics problems. Extensive use of Excel spreadsheets including developing custom functions and VBA extensions. Students are introduced to MS Access relational database, and develop a functioning geomatics database.

Prerequisites: GME 264 and MIS 115

**GME 343 - Boundary Surveys**

(F)

Lecture Hours: 2

Lab Hours: 6

Credit Hours: 4

Planning, organizing, calculating and applying field procedures for boundary and cadastral surveys. Writing deed descriptions; researching public record systems relative to property boundaries.

Prerequisites: GME 163 and GME 242, both with grade "C" or better

**GME 351 - Construction and Engineering Surveying**

(S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Organizing, planning and estimating costs for construction and engineering surveying projects. Field projects related to construction, layout of engineering works and site mapping.

Prerequisites: GME 163 and GME 264

**GME 355 - Digital Photogrammetry**

(F)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Introduction to Photogrammetry, topics include geometry of the vertical image, the stereo pair, and parallax computations. Aerotriangulation of image blocks, and project planning and mission design. Students use Softcopy workstations to compile topographic maps.

Prerequisites: GME 264 and MATH 252

**GME 372 - Subdivision Planning and Platting**

(S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Land use planning; governmental regulations as applied to subdivisions; subdivision planning, computations and preparation of subdivision plats.

Prerequisites: GME 242 and GME 264, both with grade "C" or better

**GME 381 - Advanced Cadastral Surveying I**

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

History of United States land surveying and pertinent boundary law. Introduction to records research and boundary law principles; analysis of legal descriptions in deeds and other documents that transfer land title. Course utilizes BLM CFedS materials.

Prerequisites: Instructor consent, ability to perform standard surveying computations, and an understanding of boundary law

**GME 395 - Cooperative Field Experience**

Lecture Hours: 0

Lab Hours: 40

Credit Hours: 4

An approved work program related to geomatics practice involving full-time meaningful activity. The employer, type of work and level of difficulty must be approved by the Geomatics Co-op Coordinator prior to the work period. Progress reports are prepared by the student during the work period and submitted for review. A comprehensive written report is required at the end of each co-op period. A co-op period may be three months for 2 credits or six months for 4 credits. A tuition fee is required for credits earned by co-op work experience. Prerequisites: Completed freshman year and two terms residence

**GME 396 - Cooperative Field Practice**

Lecture Hours: 0

Lab Hours: 40

Credit Hours: 2

Three month, two credit hour version of GME 395 and GME 495.

**GME 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**GME 415 - Advanced Road Design (W)**

Lecture Hours: 2

Lab Hours: 6

Credit Hours: 4

Complete road design project including "L" and "P" line locations; horizontal and vertical curve calculations with consideration of stopping and sight distances; earthwork and mass diagram calculations; drainage and road construction materials.

Prerequisite: GME 351

**GME 425 - Remote Sensing (F)**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Photogrammetry and remote sensing preparation for FS exam. UAS (drone) technology overview. UAS flights to obtain imagery and process using Pix4d software to create DSMs, orthomosaics, and other products. Overview of high-resolution satellite imagery applications and commercial aerial mapping imagery. Prerequisites: MATH 252 and PHY 222

**GME 434 - Advanced Geographic Information Systems (W)**

Lecture Hours: 2

Lab Hours: 6

Credit Hours: 4

Review and compare land tenure systems in the United States and Foreign countries. Introduction to principles of land administration. Use of geospatial data models for management of parcel data and use of ArcGIS software for creation of Land Information Systems designed to manage cadastral data. Prerequisites: GIS 134 and GIS 316  
Corequisite: GME 452

**GME 444 - Adjustment by Least Squares (S)**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Theory of the least squares method and error propagation; variances and covariances of observed, derived and adjusted quantities. Modeling of geomatics problems using different techniques of least squares. Linearization and iteration of nonlinear equations. Adjustment validation using hypothesis testing. Prerequisites: MATH 254 and MATH 361

**GME 451 - Geodesy (F)**

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Size and shape of the earth. Geometry of the reference ellipsoid. Spherical, ellipsoidal and local coordinate systems. Coordinate transformations in 2-D and 3-D. Datums and datum conversion. Reduction of field observations to the ellipsoid. The geoid, orthometric heights, and leveling. Prerequisite: MATH 254 or instructor consent

**GME 452 - Map Projections (W)**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Overview of map projections used in cartography, and conformal map projections used in the geomatics profession. Emphasis on state plane coordinate systems and local map projections. Extensive use of Excel for analysis and computations. Prerequisite: GME 451 with grade "C" or better

**GME 454 - GNSS Surveying (W)**

Lecture Hours: 2

Lab Hours: 6

Credit Hours: 4

Study of the theory and operation of the Global Positioning System and other Global Navigation Satellite Systems. Design of GPS networks in accordance with current standards and specifications. Laboratory exercises introduce the student to a variety of GNSS applications. Prerequisites: GME 444 and GME 451, both with grade "C" or better

**GME 455 - GNSS Surveying for GIS (W)**

Lecture Hours: 2

Lab Hours: 6

Credit Hours: 4

Study of the theory and operation of the Global Positioning System and other Global Navigation Satellite Systems. Design of GPS networks in accordance with current standards and specifications. Laboratory exercises introduce the student to a variety of GNSS applications. Prerequisite: GME 451 with grade "C" or better

**GME 466 - Legal Aspects of Surveying II**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Evidence, professional liability, written and unwritten transfers of land ownership and title interests. A term paper is required of each student.

Prerequisite: GME 343 with grade "C" or better

**GME 468 - Geomatics Practicum**

(S)

Lecture Hours: 1

Lab Hours: 3

Credit Hours: 2

Students design and complete a Geomatics project. Students demonstrate ability to work independently. Projects are under the supervision of faculty members and comply with any related state statutes and local ordinances. Surveying option students are required to have registered for, or taken, the NCEES FS examination to receive a passing course grade.

Prerequisites: GME 452, and GME 454 or GME 455

**GME 482 - Advanced Cadastral Surveying II**

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

Introduction to the complex process of evaluating field evidence and correlating with written records. Various scenarios discuss analysis aspects. Practical advice, legal concepts, and issues involved in evaluating corner evidence. Course utilizes BLM CFedS materials.

Prerequisite: GME 381 with grade "C" or better

**GME 483 - Advanced Cadastral Surveying III**

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

Introduction to water boundaries to create awareness of basic riparian issues.

Subdivision of sections addresses normal subdivision lotted closing sections, elongated and fractional sections, and the three-mile method of section subdivision. Course utilizes BLM CFedS materials.

Prerequisite: GME 482 with grade "C" or better

**GME 495 - Cooperative Field Experience**

Lecture Hours: 0

Lab Hours: 40

Credit Hours: 4

An approved work program related to geomatics practice involving full-time meaningful activity. The employer, type of work and level of difficulty must be approved by the Geomatics Co-op Coordinator prior to the work period. Progress reports are prepared by the student during the work period and submitted for review. A comprehensive written report is required at the end of each co-op period. A co-op period may be three months for 2 credits or six months for 4 credits. A tuition fee is required for credits earned by co-op work experience.

Prerequisites: Completed freshman year and two terms residence

**GME 496 - Cooperative Field Practice**

Lecture Hours: 0

Lab Hours: 40

Credit Hours: 2

Three month, two credit hour version of GME 395 and GME 495.

**GME 497 - CFedS**

(F,W,S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Provides academic credit for licensed professional land surveyors who successfully completed the rigorous BLM Certified Federal Surveyor (CFedS) examination.

Prerequisite: Successful completion of the CFedS examination

**GME 498 - Workshop**

Credit Hours: (Hours to be arranged each term.)

**GME 499 - Independent Study**

Credit Hours: (Hours to be arranged each term.)

**Health Education****HED 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**HED 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**HED 240 - Emergency Care and CPR (F,W,S)**

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

Comprehensive coverage of emergency care for a wide variety of injuries or illnesses. Course content includes artificial respiration and cardiopulmonary resuscitation, wounds, and bleeding; shock; burns; poisonings; bone, joint, and muscle injuries; cold- and heat-related injuries; alcohol and drug emergencies; and methods of transportation. Emphasis on victim examination, evaluation, and assessment tools and appropriate immediate and temporary care.

**HED 246 - Drugs and Alcohol Problems of Modern Society**

(S)

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

Physiological and psychological effects of drugs, from caffeine to heroin. A brief study of neurophysiology and pharmacology. Investigation of the major drug classifications. Other topics include alcohol advertising, codependency, drug-affected babies, treatment and recovery, and legalization issues.

**HED 250 - Contemporary Health Issues**

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

Topics related to the maintenance of a healthy lifestyle. Emphasis on lifestyle choices and behavior patterns that affect one's state of wellness. Topics include stress management; emotional, social, and spiritual well-being; nutrition, fitness and exercise; weight management; cardiovascular disease and cancer risk reduction; addictions; and other lifestyle related health behaviors.

**HED 260 - Diet and Exercise for Lifetime Fitness**

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

Practical concepts of nutrition and exercise, their role in disease risk, obesity, and weight control. Consumer concerns, advertising, fads, gimmicks. Fitness and dietary evaluations.

**HED 275 - Introduction to Sports Medicine**

(S)  
Lecture Hours: 2  
Lab Hours: 3  
Credit Hours: 3

An introduction to the principles and practice of sports medicine. Emphasis on the prevention and treatment of common sports injuries. Instruction includes understanding the basic mechanisms behind injury and practical experience in preventative measures and basic treatment.

**HED 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**HED 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**History****HIST 101 - History of Western Civilization (From the origins of human civilization to 1000 A.D.)**

(F) SS  
Lecture Hours: 3  
Lab Hours: 0  
Credit Hours: 3  
Development of Western civilization from early beginning to the present, with attention to political, economic, religious, social, and cultural factors. Courses need not be taken in sequence.

**HIST 102 - History of Western Civilization (From 1000 A.D. to 1789)**

(W) SS  
Lecture Hours: 3  
Lab Hours: 0  
Credit Hours: 3  
Development of Western civilization from early beginning to the present, with attention to political, economic, religious, social, and cultural factors. Courses need not be taken in sequence.

**HIST 103 - History of Western Civilization (From 1789 to the present)**

(S) SS  
Lecture Hours: 3  
Lab Hours: 0  
Credit Hours: 3  
Development of Western civilization from early beginning to the present, with attention to political, economic, religious, social, and cultural factors. Courses need not be taken in sequence.

**HIST 107 - Seminar**

SS  
Credit Hours: (Hours to be arranged each term.)

**HIST 201 - U.S. History (Pre-Columbian and colonial times to 1840)**

(F,W) SS  
Lecture Hours: 3  
Lab Hours: 0  
Credit Hours: 3  
The historical development of the United States, its economic, political, and social institutions from the colonial period to the present. Courses need not be taken in sequence.

**HIST 202 - U.S. History (1840, Westward expansion and the Civil War to 1899)**

(W) SS  
Lecture Hours: 3  
Lab Hours: 0  
Credit Hours: 3  
The historical development of the United States, its economic, political, and social institutions from the colonial period to the present. Courses need not be taken in sequence.

**HIST 203 - U.S. History (1900 to present)**

(S) SS  
Lecture Hours: 3  
Lab Hours: 0  
Credit Hours: 3  
The historical development of the United States, its economic, political, and social institutions from the colonial period to the present. Courses need not be taken in sequence.

**HIST 207 - Seminar**

SS  
Credit Hours: (Hours to be arranged each term.)

**HIST 224 - Technology and the Ancient World**

(F) SS  
Lecture Hours: 3  
Lab Hours: 0  
Credit Hours: 3  
The interaction of technology and world civilization from earliest times to 1500 A.D. Topics include the development of agriculture, urbanization, the place of technology in the Roman and Chinese empires, Medieval engineering, and the technological roots of globalization.

**HIST 225 - Technology and the Rise of the West**

(W) SS  
Lecture Hours: 3  
Lab Hours: 0  
Credit Hours: 3  
The economic and social roots of Western dominance of the world economy after 1500. Topics include the Trans-Atlantic Exchange, the Industrial Revolution, urbanization, globalization, and the technological roots of colonialism.

**HIST 226 - Technology and the Modern World**

(S) SS  
Lecture Hours: 3  
Lab Hours: 0  
Credit Hours: 3  
The interaction of technological change and world civilization in the 20th century. Topics include the role of corporations in technological change, the theory of Large Technological Systems (LTS), Cold War science and technology, and origins of the internet.

**HIST 245 - Hitler and the Holocaust**

(W) SS  
Lecture Hours: 3  
Lab Hours: 0  
Credit Hours: 3  
Introduction to the history of the Holocaust, with a focus on the role of Adolph Hitler. Topics include Hitler's life and political career, the social, technological and economic structure of the Holocaust, and Hitler and the Holocaust in popular culture.

**HIST 275 - Introduction to the History of Medicine**

(F) SS  
Lecture Hours: 3  
Lab Hours: 0  
Credit Hours: 3  
Introduction to the history of medicine, with a focus on American medicine in the 19th and 20th centuries. Topics include medical professionalization, the social, technological and economic structure of the medical industry, and medicine in popular culture.

**HIST 307 - Seminar**

SS  
Credit Hours: (Hours to be arranged each term.)

**HIST 335 - The Engineering Profession**

(F,W) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

The emergence and development of the engineering profession in Europe and North America. Topics include the changing nature of the profession's work and institutions, the role of engineering professional societies, the relationship between engineers, engineering technologists, and engineering technicians, and the place of engineers in society.

Prerequisite: WRI 123 or WRI 227

**HIST 356 - A History of Energy**

(F,W,S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Study of the emphasis societies place on the development, safeguarding and exploitation of energy resources. Development of energy resources since the Industrial Revolution; exploitation of energy resources; oil shocks of the 1970s, glut of the 1980s; the modern energy paradigm.

Prerequisite: WRI 123 or WRI 227

**HIST 357 - History of the Electric Grid**

(S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Study of the electric grid as a large technological system. Topics of study include the creation of the electric grid by Edison and others, rural electrification, the rise and fall of the utility consensus and the politics of deregulation.

Prerequisite: WRI 123 or WRI 227

**HIST 392 - Modern Asia**

(S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

China, Japan, and Korea from the early nineteenth century to the present. Emphasis on modern political movements and economic and cultural transformation.

Prerequisite: WRI 123 or WRI 227

**HIST 407 - Seminar**

SS

Credit Hours: (Hours to be arranged each term.)

**HIST 452 - Globalization and the Pacific Northwest**

(F,S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

This seminar addresses globalization in the PNW. Topics include colonialism, mercantilism, markets, imperialism, and cultural exchange. PNW industries involved in globalization such as timber, fishing, agriculture, tourism, and oil will be examined. Social movements and protests will also be considered.

Prerequisite: WRI 122

**HIST 468 - History of the Pacific Northwest**

(S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

This course will cover the history of the Pacific Northwest including Native American settlements, exploration and later American settlements. It will include the impacts of institutional growth, urbanization, and resource development. The impact of national events upon the region will be explored.

Prerequisite: WRI 122

**HIST 478 - History of Oregon**

SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

An overview of the history of Oregon. The primary focus is the pattern of European settlement of Oregon, the origins and development of state government and the impact of commercial and industrial development.

Prerequisite: WRI 123 or WRI 227

**Health Sciences****HSC 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

Prerequisite: Health Sciences major or instructor consent

**HSC 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**HSC 485 - Research and Project Proposal**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

General aspects of conducting research with emphasis on biomedical approaches, constructing and testing hypotheses, interpreting and validating data, assessment of selected research paper, development and submission of a research proposal.

Prerequisites: MATH 361, Health Sciences major, or instructor consent

**Humanities****HUM 105 - Texts, Images, Games**

H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

An introduction to literary analysis. Students will learn how to effectively and thoroughly analyze, discuss, and critique works of literature, visual art, films, graphic novels, and video games.

**HUM 107 - Seminar**

H

Credit Hours: (Hours to be arranged each term.)

**HUM 125 - Introduction to Technology, Society and Values**

(F,W,S) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

An introduction to the relationship of economic, political, and social contexts to technological development with a focus on human values.

**HUM 147 - Western Culture in the Classical Age**

(F) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Study of the ideas and values from the classical period which have profoundly influenced Western culture. Readings and discussion will focus on arts, literature, and philosophy.

**HUM 148 - Western Culture in the Medieval Age**

(W) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Study of the ideas and values from the early Medieval to the Renaissance period which have profoundly influenced Western culture. Readings and discussion will focus on arts, literature, and philosophy.

**HUM 149 - Western Culture in the Modern Age**

(S) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Study of the ideas and values from the Age of Enlightenment to today which have profoundly influenced Western Culture. Readings and discussion will focus on arts, literature, and philosophy.

**HUM 207 - Seminar**

H

Credit Hours: (Hours to be arranged each term.)

**HUM 235 - Introduction to Film**

(F,S) H

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introduction to film history and appreciation. Students will engage with film across periods, genres, and national traditions to develop their understanding and analysis of the art of cinema. Film making techniques and the evolution of film culture are addressed.

**HUM 307 - Seminar**

H

Credit Hours: (Hours to be arranged each term.)

**HUM 335 - Video Game Studies**

(S) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Students will learn about the field of game studies by analyzing video games and video game culture from a literary analysis perspective. We will read essays and criticism about video games, but also play games and discuss our experiences. Prerequisite: WRI 122

**HUM 345 - Digital Culture and Society**

(W) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

In this class, students will study and analyze internet culture through a humanistic lens. Topics discussed may include online identity construction, social media's effects on relationships, the digital divide, the internet's influence on politics, and online representation for marginalized groups.

Prerequisite: WRI 122

**HUM 407 - Seminar**

H

Credit Hours: (Hours to be arranged each term.)

**Journalism****JOUR 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**JOUR 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**JOUR 211 - Publications-Student Newspaper**

(F,W,S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Practical experience and training in the elementary principles of newspaper writing, makeup, and layout. Members of this class will publish the student newspaper.

Prerequisite: WRI 121

**JOUR 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**JOUR 311 - Advanced Publications - Student Newspaper**

(S)

Lecture Hours: 1

Lab Hours: 3

Credit Hours: 3

Provides advanced experience and training in principles of newspaper editing, reporting, writing, makeup, layout, and specialty areas. Class members serve as the editorial staff.

Prerequisite: JOUR 211

**JOUR 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**Library Science****LIS 305 - Research Strategies**

(W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Designed to guide students in senior projects, professional and graduate research. Understand information access, use, and synthesis, literature reviews, inquiry development, and research design. Recognize and practice ethical information use across professions. Articulate applications and limitations of researched topics.

Prerequisite: WRI 123 or WRI 227

**Literature****LIT 104 - Introduction to Literature**

(F) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Literature and the nature of literary experience through reading of prose and poetry drawn from American and other literatures. Works representing principal literary types are read in their entirety when possible, with emphasis on such elements as structure, style, characterization, imagery, and symbolism.

**LIT 105 - Introduction to Literature**

(W) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Literature and the nature of literary experience through reading of prose and poetry drawn from American and other literatures. Works representing principal literary types are read in their entirety when possible, with emphasis on such elements as structure, style, characterization, imagery, and symbolism.

**LIT 106 - Introduction to Literature**

(S) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Literature and the nature of literary experience through reading of prose and poetry drawn from American and other literatures. Works representing principal literary types are read in their entirety when possible, with emphasis on such elements as structure, style, characterization, imagery, and symbolism.

**LIT 107 - Seminar**

H

Credit Hours: (Hours to be arranged each term.)

**LIT 207 - Seminar**

H

Credit Hours: (Hours to be arranged each term.)

**LIT 225 - Contemporary Theater: Ashland Plays**

(S) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Contemporary live drama viewed at Ashland Shakespearean Festival Theater. Review and analysis of original script prior to play experience. Post review and analysis of play performance, content: plot, character, diction, melody, spectacle.

**LIT 235 - American Multicultural Literature**

(F) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

An introductory study of short stories, poetry, essays, and a novel that illustrates the diversity of North American culture.

**LIT 246 - Creative Writing**

(W) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Examines the elements, structures and traditions of fiction writing through readings, discussions, and creative writing exercises. For students interested in writing fiction.

Prerequisite: WRI 122

**LIT 253 - 19th Century American Literature**

(F) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Survey of American Literature from 1800-1900. Genres include short stories, novels, poetry, nonfiction narratives, and drama. Topics include Romanticism, Gothic literature, Transcendentalism, Colonialism, Emancipation, and Women's Rights.

Prerequisite: WRI 121

**LIT 254 - 20th Century American Literature**

(W) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Survey of American Literature from 1900-1970. Genres include short stories, novels, poetry, nonfiction narratives, and drama. Topics include Urban Gothic literature, Modernism, World Wars 1 and 2, and Environmentalism.

Prerequisite: WRI 121

**LIT 255 - Contemporary American Literature**

(S) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Survey of American Literature from 1970-present. Genres include short stories, novels, poetry, nonfiction narratives, graphic novels, and drama. Topics include Postmodernism, the Cold War, Cyberpunk Literature, Post-apocalyptic Literature, and Environmentalism.

Prerequisite: WRI 121

**LIT 266 - Native American Literature and Film**

(S) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Explores connections to the human condition found in literature and stories authored by Native Americans with focus on a variety of themes including assimilation, ethnicity, survival and stereotyping. Documentary films and commercial cinema support and lend context to the readings. Students are encouraged to define and/or redefine their worldviews.

**LIT 305 - Nature Writing and the Environment**

(W) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Students will study how our perception of the environment has changed over the last two hundred years of Western culture. We will analyze the works of well-known nature writers as well as other related texts from a literary studies perspective.

Prerequisite: WRI 122

**LIT 307 - Seminar**

H

Credit Hours: (Hours to be arranged each term.)

**LIT 315 - Science Fiction Literature and Film**

(S) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Study of science fiction literature and film as expressions of the relationship between technology and culture(s). Approach will primarily be from a literary analysis perspective, with elements of film studies included.

Prerequisite: WRI 122

**LIT 325 - The Metropolis**

(F) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Study of the history of the modern city in Western culture from a literary studies perspective. Students will analyze and discuss works of literature and film that deal with how our understanding of urban space has developed over time.

Prerequisite: WRI 122

**LIT 335 - Nonfiction Travel Writing**

(F) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

In this course, student will read a selection of nonfiction travel narratives. These works will be analyzed and discussed in part as models to help to students write, workshop, and revise their own travel nonfiction essays based on their own life experiences.

Prerequisite: WRI 122

**LIT 345 - Post-Apocalyptic Literature and Film**

(S) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Inquiry into the recent popularity of post-apocalyptic themed literature and films. Study of post-apocalyptic subgenres including natural disasters, rogue artificial intelligence, zombies, etc. and the historiocultural context from which they each have emerged.

Prerequisite: WRI 122

**LIT 367 - Art and Trash in Contemporary Fiction**

(F,W) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

In-depth study of contemporary fiction, finding meaning in literature responsive to the human condition and relevant to the reader. Includes works from authors such as Margaret Atwood, Tim O'Brien, Alice Munro and Anthony Doerr.  
Prerequisite: WRI 122

**LIT 373 - British Culture and Literature: Romanticism to the Present**

H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Explores features of culture and selected works and writers from the Nineteenth and Twentieth Centuries in Britain. Some film presentation included.

**LIT 381 - Contemporary World Literature**

(F,S) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

An in-depth study of selected writers and works organized thematically, geographically, and ethnically. The focus on contemporary works provides insight into current world cultures and explores globalization while encouraging students to critically examine their worldviews.  
Prerequisite: WRI 122

**LIT 407 - Seminar**

H

Credit Hours: (Hours to be arranged each term.)

**LIT 456 - Topics in Film**

(F,W,S) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Examines films as stories using modern literary criticism techniques. Offerings include close analysis of contemporary film, selected directors, selected genres and surveys of film history.  
Prerequisites: 3 credits of English or Humanities and WRI 121

**Mathematics****MATH 20 - Basic Mathematics**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Operations with whole numbers, fractions and decimals. Ratio, proportion, and percent, with applications. Calculations using length, area, and volume. Estimation and unit conversion. Credits earned apply for enrollment (eligibility), but not apply toward a degree. An additional fee is required above regular tuition.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

**MATH 70 - Elementary Algebra**

(F,W)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

For students whose preparation contains no algebra background or whose placement examination scores do not qualify for entry into Intermediate Algebra. The topics covered stress the fundamental properties of algebra, solving equations, and manipulating algebraic fractions. Credits earned apply for enrollment (eligibility) but do not apply toward a degree. An additional fee is required above regular tuition.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisite: MATH 20 with grade "C" or better, or equivalent

**MATH 97 - Algebra Review**

(Su)

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

Structured review for students whose Math Placement score may not reflect an accurate evaluation or students who want a refresher but who do not require a math placement. The course has individualized directed study using a comprehensive programmed instructional technology. Course is graded P/W.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

**MATH 100 - Intermediate Algebra**

(F,W,S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Fundamentals of algebra, linear and quadratic equations, systems of equations, inequalities, functions and graphs, radicals and exponents, and stated problems. (May not be used for graduation credit.)

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisite: MATH 70 with grade "C" or better, or equivalent

**MATH 101 - Accelerated Algebra**

(F,W)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

An accelerated algebra course with topics ranging from Elementary Algebra (MATH 70) to College Algebra (MATH 111). For entering students with good high school algebra backgrounds. All students will start in Elementary Algebra, and may receive credit for one of MATH 70, MATH 100, or MATH 111, depending on individual level of achievement. An additional self-support course fee is required.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

**MATH 105 - Collegiate Mathematics**

(S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

A variety of modern mathematical topics based on contemporary applications. Topics include combinatorics, probability, statistics, finance, matrices, and logarithmic and exponential functions.  
Prerequisite: Intermediate Algebra with grade "C" or better.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

**MATH 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

**MATH 111 - College Algebra**

(F,W,S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Study of functions including graphs, operations and inverses. Includes polynomial, rational, exponential, logarithmic functions and their applications, and systems of equations.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisite: MATH 100 with grade "C" or better, or equivalent

**MATH 111A - College Algebra**

(F,W)

Lecture Hours: 1

Lab Hours: 2

Credit Hours: 2

For students requiring MATH 111 but desiring to learn the material at a slower pace. MATH 111 content covered upon completion of MATH 111A and MATH 111B.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisite: MATH 100 with grade "C" or better, or equivalent

**MATH 111B - College Algebra**

(W,S)

Lecture Hours: 1

Lab Hours: 2

Credit Hours: 2

For students requiring MATH 111 but desiring to learn the material at a slower pace. MATH 111 content covered upon completion of MATH 111A and MATH 111B.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisite: MATH 111A with grade "C" or better

**MATH 112 - Trigonometry**

(F,W,S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

The trigonometric functions and their applications. Topics include graphs, identities, trigonometric equations, vectors, and complex numbers.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisite: MATH 111 with grade "C" or better, or equivalent

**MATH 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

**MATH 211 - Fundamentals of Elementary Mathematics I**

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

This is the first course in the mathematics sequence for prospective elementary teachers. Topics include problem solving strategies, set theory, numeration, computational algorithms for whole numbers and integers, estimation, relations; use is made of calculators and manipulatives.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisite: MATH 100 or equivalent with grade "C" or better

**MATH 212 - Fundamentals of Elementary Mathematics II**

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

This is the second course in the mathematics sequence for prospective elementary teachers. Topics include decimals, percents, ratios and proportions, real numbers, probability and statistics; use is made of calculators and manipulatives.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisite: MATH 211 with grade "C" or better

**MATH 213 - Fundamentals of Elementary Mathematics III**

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

This is the third course in the mathematics sequence for prospective elementary teachers and covers basic geometry. Topics include geometric shapes and their properties, measurement, congruence and similarity, and coordinate and transformational geometry; use is made of calculators and manipulatives.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisite: MATH 211 with grade "C" or better

**MATH 221 - Introduction to Computational Software**

(W,S)

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

Solve applied problems involving formulas, functions, summation and iteration using Excel and MATLAB. Use built-in functions and graphing capabilities of MATLAB and Excel. Do vector and matrix calculations and write function files using MATLAB. Write and execute macros in Excel.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisite: MATH 112

**MATH 243 - Introductory Statistics**

(F,W,S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Descriptive statistics, numerical and graphical presentation of data, estimation and margin of error, hypothesis testing, correlation; interpretation of statistical results. Cannot be taken for graduation credit by students who have taken MATH 361.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisite: MATH 100 or instructor consent

**MATH 251 - Differential Calculus**

(F,W,S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Theory, computational techniques and applications of the derivative.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisite: MATH 112 with grade "C" or better, or equivalent

**MATH 252 - Integral Calculus**

(F,W,S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Computational techniques for and applications of the definite and indefinite integrals.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisite: MATH 251 with grade "C" or better

**MATH 253 - Sequences and Series**  
(F,S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Indeterminate forms and improper integrals. Infinite sequences and series, convergence, power series. Taylor series and applications. This course replaces MATH 254.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisite: MATH 252 with grade "C" or better

**MATH 254 - Vector Calculus I**  
(F,W,S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Vectors, vector functions, and curves in two and three dimensions. Surfaces, partial derivatives, gradients, and directional derivatives. Multiple integrals using rectangular and other coordinate systems. Physical and geometric applications.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisite: MATH 252 with grade "C" or better

**MATH 261 - Introduction to Linear Algebra**  
(W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Matrices and matrix operations, systems of linear equations, vectors in a geometric setting, projections, dot products, cross products, inverse matrices, determinants, linear transformations, Eigenvalues, Eigenvectors. Use of MATLAB or equivalent CAS and/or a graphing calculator required.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Pre- or Corequisite: MATH 251 or instructor consent

**MATH 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

**MATH 310 - Mathematical Structures**  
(F)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Introduction to proof and mathematical abstraction. Topics include logical statements, sets, set operations, functions, and relations.

Prerequisite: MATH 252 with grade "C" or better

**MATH 311 - Introduction to Real Analysis**  
(W)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

A one term stand-alone course on topics in real analysis, covering properties of real numbers, completeness axiom, continuity, convergence of sequences and series of numbers, convergence of sequences and series of functions. Emphasis will be placed on proofs.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisites: MATH 310 with grade "C" or better

**MATH 315 - History of Mathematics**  
(S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

This course will explore major themes in mathematics and their development throughout history from cultures around the world. The course will address different perspectives on mathematics and how it influenced the growth of the field and the cultures it was developed in.

Prerequisites: MATH 252 with grade "C" or better, SPE 111, and WRI 122

**MATH 321 - Applied Differential Equations I**  
(F,W,S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

The first in a two term sequence on the solutions of ordinary differential equations. Introduction to differential equations, first and second order equations with applications.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisite: MATH 252 with grade "C" or better

**MATH 322 - Applied Differential Equations II**  
(S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

The second in a two term sequence on the solutions of ordinary differential equations. Introduction to systems of equations, the Laplace transform and series solutions.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisites: MATH 321 and MATH 341

**MATH 327 - Discrete Mathematics**  
(W,S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Introduction to proof and mathematical abstraction. Topics include sets, set operations, functions, relations, sequences, series, recurrence relations, mathematical induction, equivalence relations.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisites: MATH 111 and MATH 252, both with grade "C" or better, or Junior standing

**MATH 341 - Linear Algebra I**  
(F,W,S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

The study of vectors and matrices in Euclidean space, their geometric interpretations and application to systems of equations. Includes linear independence of vectors, basis and dimension, introduction to linear transformations, eigenvalues and eigenvectors, diagonalization, determinants.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisite: MATH 252 with grade "C" or better

**MATH 342 - Linear Algebra II**

(S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

A continuation of the topics of MATH 341 to the setting of abstract vector spaces. Includes the study of orthogonality, inner product spaces, eigenvalues and eigenvectors, matrix decompositions and a more advanced study of linear transformations.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisite: MATH 341

**MATH 346 - Number Theory**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

A proof-based course in the theory of the integers, including divisibility, primes, Euclid's Algorithm, Euler's Theorem and an introduction to algebraic structures.

The course also includes applications of number theory such as RSA encryption.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisite: MATH 327 with grade "C" or better

**MATH 347 - Fundamentals of Abstract Algebra**

(S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Introduction to group theory and algebraic structures with applications.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisites: MATH 254 and MATH 327, both with grade "C" or better

**MATH 354 - Vector Calculus II**

(W)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Review of vector functions, space curves, gradients, and directional derivatives.

Introduction to vector analysis: vector fields, divergence, curl, line integrals, surface integrals, conservative fields, and the theorems of Gauss, Green and Stokes with applications to force, work, mass, and charge.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisite: MATH 254 with grade "C" or better

**MATH 361 - Statistical Methods I**

(F,W,S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Descriptive statistics, experimental design, introduction to probability, common probability distributions, random variables, sampling distributions, hypothesis testing and confidence intervals for means using one and two samples, simple linear regression.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisite: MATH 111 or instructor consent

**MATH 362 - Statistical Methods II**

(W,S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Review of inferential statistics, analysis of variance one factor and two factor, simple and multiple regression, analysis of categorical data using tests and confidence intervals for proportions and chi-square tests, correlation, goodness of fit, non-parametric tests. Data sets used will come from various fields including: business, psychology, biology, environmental science, engineering, manufacturing and communication.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisite: MATH 361 or instructor consent

**MATH 371 - Finite Mathematics and Calculus I**

(F,W,S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Linear functions, matrices, linear programming, mathematics of finance, derivatives and their applications. The integral and its applications, and calculus of several variables. (MATH 371 cannot be used for graduation credit by students who have taken MATH 251.)

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisite: MATH 111 with grade "C" or better

**MATH 372 - Finite Mathematics and Calculus II**

(F,W,S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Linear functions, matrices, linear programming, mathematics of finance, derivatives and their applications. The integral and its applications, and calculus of several variables. (MATH 371 cannot be used for graduation credit by students who have taken MATH 251.)

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisite: MATH 371 with grade "C" or better

**MATH 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

**MATH 411 - Topics in Complex Analysis**

(W)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Complex numbers and functions, differentiation and integration, Cauchy's theorem and integral formula, Taylor and Laurent series, Residue theorem.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisite: MATH 254

**MATH 421 - Applied Partial Differential Equations I**

(F)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

The first course in a three term sequence in applied partial differential equations. Modelling physical systems using differential equations, classifying differential equations and introduction to the methods of solving partial differential equations (separation of variables, Fourier series, transform methods).

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisites: MATH 321 and MATH 254

**MATH 422 - Applied Partial Differential Equations II**

(W)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

The second course in a three term sequence in applied partial differential equations. Introduction to solution techniques using eigenvalues and Eigen functions. Presentation of Eigen functions which form orthogonal bases such as Bessel functions and Legendre polynomials.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisites: MATH 421 and MATH 341

Corequisite: MATH 354

**MATH 423 - Applied Partial Differential Equations III**

(S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

The third course in a three term sequence. Applications of linear and weakly nonlinear partial differential equations. Analytical solution techniques for parabolic, elliptic, and hyperbolic equations. Green's functions, integral methods, shocks, and the method of characteristics.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisite: MATH 422

**MATH 451 - Numerical Methods I**

(F,S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Computer applications of matrix methods, iterative solutions of equations, and systems of equations, polynomial interpolation and curve fitting, numerical differentiation and integration.

Prerequisites: MATH 252 and MATH 261 or MATH 341, and CST 116 or ENGR 266 or ENGR 267

**MATH 452 - Numerical Methods II (W)**

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Numerical solution of ordinary differential equations. Numerical solution of initial value problems using Runge-Kutta methods and linear multistep methods; introduction to boundary value problems. Analysis of stability, accuracy, and implementation of methods.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisites: MATH 451 and MATH 321

**MATH 453 - Numerical Methods III (S)**

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Numerical solution of partial differential equations. Numerical solution of boundary value problems and initial-boundary value problems using finite difference and finite element methods. Analysis of stability, accuracy, and implementation of methods.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisites: MATH 421 and MATH 452

**MATH 465 - Mathematical Statistics**

(W,S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Counting techniques, probability, discrete and continuous random variables and distribution functions, joint probability distributions; expected value, variance and covariance; decision making.

**Note:** Unless otherwise indicated with F, W, S courses will be offered as often as requested.

Prerequisite: MATH 254

**Mechanical Engineering****MECH 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**MECH 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**MECH 221 - Statics**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Fundamental principles of mechanics of rigid bodies and the application of these principles to engineering problems.

Prerequisite: PHY 221

Pre- or Corequisite: MATH 252

**MECH 222 - Strength of Materials I**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Internal stresses and deformations of structural members and machines when subjected to external forces.

Prerequisite: ENGR 211 or MECH 221

**MECH 223 - Strength of Materials II**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Internal stresses and deformations of structural members and machines when subjected to external forces. Analysis of stress in pressure vessels and column buckling.

Prerequisite: MECH 222

**MECH 260 - Engineering Materials I**

(F,W,S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Survey of materials with emphasis on metals and metal alloys used in industry; their physical and chemical properties as related to structure, corrosion, and engineering applications. Diffusion mechanisms and binary phase diagrams are also examined. Tensile, impact, and fatigue failure of metallic materials. Laboratory included.

Prerequisite: CHE 201 and CHE 204, or CHE 221, or instructor consent

**MECH 304 - Co-op Field Practice**

(Terms and hours to be arranged with approval of the curriculum coordinator.) An approved work program related to the student's field of specialization for a continuous three-month period. The employer and the type, level, and difficulty of the particular job must be approved prior to the employment period. A written comprehensive report must be submitted during the following term of residence.

**MECH 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**MECH 312 - Dynamics II**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Continuation of the study of kinematics and kinetics of particles and rigid bodies, with applications to mechanical systems of current interest to engineers.

Prerequisites: ENGR 212 and MATH 321

**MECH 313 - Thermodynamics II**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Application of laws and principles of thermodynamics to real thermodynamic cycles. Teaches analysis of performance and design of internal and external combustion engines, steam generators, heat pumps, compressors, and refrigeration machinery.

Prerequisite: ENGR 355

**MECH 315 - Machine Design I**

(F,W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Study of stress and fatigue analysis as applied to machine elements.

Prerequisites: ENGR 213 or MECH 223, and MECH 260

**MECH 316 - Machine Design II**

(W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Application of stress and fatigue analysis in the design and selection of machine elements.

Prerequisite: MECH 315 or instructor consent

**MECH 318 - Fluid Mechanics I**

(F,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Covers fluid properties, fluid statics, conservation laws of pipe flow, drag, lift fluid dynamics, measurement of flow, viscous flow, laminar, and turbulent flow, and forces due to fluid motion.

Prerequisites: ENGR 211 and MATH 252

**MECH 323 - Heat Transfer I**

(F,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

An introduction to the three modes of heat transfer, conduction, convection, and radiation. Teaches the analytical and empirical techniques used for solving problems in heat transfer, including those for which computer application is most suited.

Prerequisites: ENGR 318 or MECH 318, ENGR 355, and MATH 321

**MECH 326 - Electric Power Systems**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Study related to theory and application of industrial electric power systems. Topics covered include transformers, motors, generators, motor controls, and protective devices.

Prerequisites: MECH 363 and ENGR 236

**MECH 351 - Finite Element Analysis**

(F,S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

This course is an introduction to the use of finite element analysis (FEA) in the solution of mechanical engineering problems. Existing FEA computer codes are used.

Prerequisite: MET 375

Pre- or Corequisite: MECH 315

**MECH 360 - Engineering Materials II**

(F,W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

This course extends the MECH 260 course using a more theoretical approach. Subjects include metals, polymers, ceramics, and composites.

Prerequisites: CHE 201 or CHE 221, and MECH 260

**MECH 363 - Engineering Instrumentation**

(F,W)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Study of measurement techniques and equipment used in mechanical engineering. Instrumentation for measurements in mechanics, thermodynamics, fluid dynamics, and electrical systems are considered.

Methods of calibration, correction, and data reduction are presented.

Prerequisite: ENGR 236

Pre- or Corequisite: ENGR 213 or MECH 223

**MECH 375 - Solid Modeling**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Introduces solid modeling techniques as applied to mechanical design. Topics include extruded and swept shapes, Boolean operations, and other construction techniques.

Prerequisite: MET 242

**MECH 404 - Co-op Field Practice**

(Terms and hours to be arranged with approval of the curriculum coordinator.)

An approved work program related to the student's field of specialization for a continuous three-month period. The employer and the type, level, and difficulty of the particular job must be approved prior to the employment period. A written comprehensive report must be submitted during the following term of residence.

**MECH 405 - Reading and Conference**

Credit Hours: (Hours to be arranged each term.)

**MECH 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**MECH 414 - Introduction to Aerodynamics**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

An introductory course on the fundamentals of aerodynamics. Includes a review of the behavior of fluids in motion, definition of the important parameters in aerodynamic behavior, and study of flow about simple aerodynamic shapes.

Emphasis will be placed on low-speed aerodynamics.

Prerequisites: ENGR 355 and MECH 318

**MECH 415 - Design Project**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

This course involves using material from prior course work in individual student projects.

Prerequisites: MECH 315, MECH 318, and MET 242

Pre- or Corequisite: MECH 316

**MECH 417 - Fluid Mechanics II**

(F)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Fluid Kinematics, differential analysis, similitude and modeling, and compressible flow. Computational fluid dynamics is introduced. An alternative to MECH 418. MECH 417 covers less topics/theory but does include a laboratory session.

Prerequisites: ENGR 355, MATH 321, and MECH 318

**MECH 418 - Fluid Mechanics II**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

A continuation of the study of the principles and applications of fluids in engineering, including: fluid kinematics, dimensional analysis and modeling, differential analysis of fluid flow, Navier-Stokes equations, compressible flow, open-channel flow, and turbomachinery. An alternative to MECH 417. MECH 418 covers more topics/theory but does not include a laboratory session.

Prerequisites: ENGR 355, MATH 321, and MECH 318

**MECH 421 - Introduction to Wind Tunnels**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

An introductory course on the experimental techniques used in wind tunnel testing of aerodynamic shapes. Includes operating characteristics of wind tunnels, the characteristics of and use of models and model instrumentation, and the development of analytical techniques for reduction of wind tunnel data.

Prerequisites: MECH 318 and MECH 363

**MECH 426 - Fluid Power Systems**

(S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

A mechanical approach to industrial hydraulic applications with emphasis on selection and function of hardware and interfacing of hydraulic systems with mechanical, fluidic and electrical/electronic controls.

Prerequisite: MECH 318 or instructor consent

**MECH 427 - Experiments in Thermodynamics**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Application of laws and principles of thermodynamics to performance testing of heat engines. Teaches measurement of power, determination of efficiency, preparation of heat balances, analysis of combustion products, and preparation of engineering reports.

Prerequisites: MECH 313 and MECH 363

**MECH 433 - HVAC**

(F)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Heating, ventilating, and air conditioning. Application of laws and principles of thermodynamics to analysis, design, and control of mechanically-controlled environments for human comfort, animal health, and food preservation. Teaches computation of heating and cooling loads, humidity control, heating, and refrigeration.

Prerequisite: MECH 323

**MECH 436 - Classical Control Systems (S)**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

An introduction to control systems. Both classic control theory and programmable logic controllers are considered. Topics include block diagrams, mathematical models, transfer functions, Laplace transforms, frequency responses along with control components and PLC programming.

Prerequisite: MECH 480

**MECH 437 - Heat Transfer II**

(W)

Lecture Hours: 1

Lab Hours: 3

Credit Hours: 2

A study of experimental heat transfer. Methods and instrumentation used for investigating heat transfer systems will be considered. Laboratory investigations include studies of heat exchangers, forced and free convection experiments, and determination of radiation and convection coefficients.

Prerequisite: MECH 323 or instructor consent

**MECH 438 - Reciprocating and Turbine Engines**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to construction, operation, and theory of reciprocating and turbine engines. Students will learn engine design, history of development, theory and practice of operation.

Prerequisites: MECH 313, MECH 315, and MECH 318

**MECH 475 - Parametric Modeling (W)**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Introduces feature-based parametric solid modeling techniques as applied to Mechanical Design. Emphasizes the concepts and practices of parametric modeling from the user's perspective. Theoretical and development backgrounds are also covered.

Prerequisite: MET 375

**MECH 480 - Mechanical Vibrations (W)**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

An introduction to mechanical vibration. Topics include the equations of motion, resonant frequencies, mode shapes, damping and applications. The laboratory will introduce vibration instrumentation. Prerequisites: ENGR 212, ENGR 266, MATH 321, MATH 341, MECH 315, and MECH 363

**Mechanical Engineering Technology****MET 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**MET 108 - Geometric Dimensioning and Tolerancing**

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

The study and application of ANSI geometric dimensioning and tolerancing principles relative to the preparation of engineering drawings. Prerequisite: MET 241

**MET 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**MET 218 - Fluid Mechanics (W,S)**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Covers fluid properties, laws of fluid statics, and fluid dynamics, measurement of flow, viscous flow, laminar, and turbulent flow, flow in ducts, forces due to fluid motion, and fluid machinery. Prerequisites: MATH 112, and PHY 201 or PHY 221

**MET 232 - Thermodynamics (F)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

An introductory course in thermodynamics. Develops understanding of energy, heat, work, efficiency, the ideal gas law, the first and second laws of thermodynamics and the general energy equation. Prerequisites: MATH 252, and PHY 202 or PHY 222

**MET 241 - CAD for Mechanical Design I**

(F,W,S)

Lecture Hours: 1

Lab Hours: 3

Credit Hours: 2

Computer aided drafting (CAD) for mechanical design. The focus of this course is the construction of 2-D drawings using current industry software. Topics include construction principles, input schemes, command structures, and data management. Prerequisite: ENGR 111 or instructor consent

**MET 242 - CAD for Mechanical Design II**

(F,W,S)

Lecture Hours: 1

Lab Hours: 3

Credit Hours: 2

Computer aided drafting (CAD) for mechanical design. The focus of this course is the construction of drawing sets using current industry software. Topics include detail part drawings, assembly drawings, and an introduction to 3-D drafting. Prerequisite: MET 241

**MET 298 - Reading and Conference**

Credit Hours: (Hours to be arranged each term.)

**MET 299 - Laboratory Practice**

Credit Hours: (Hours to be arranged each term.)

**MET 304 - MET Co-op Field Practice**

Credit Hours: (Terms and hours to be arranged with approval of the curriculum coordinator.) An approved work program related to the student's field of specialization for a continuous three-month period. The employer and the type, level, and difficulty of the particular job must be approved prior to the employment period. A written comprehensive report must be submitted during the following term of residence.

**MET 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**MET 313 - Applied Thermodynamics (W,S)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Application of laws and principles of thermodynamics to real thermodynamic cycles. Teaches analysis of performance and design of internal and external combustion engines, steam generators, heat pumps, compressors, and refrigeration machinery. Prerequisite: ENGR 355

**MET 315 - Machine Design I (F,W)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Knowledge and skills developed in preceding courses are extended and applied to design and selection of machine elements and machines. Attention is given to functional requirements, methods of manufacture, choice of materials, and economic factors. Prerequisites: ENGR 213 or MECH 223, and MECH 260

**MET 316 - Machine Design II (W,S)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

A study of power transmission systems components, their selection, and application to power transmission systems. Special consideration is given to the dynamic characteristics of the systems. Prerequisite: MET 315

**MET 323 - Heat Transfer I (F,W,S)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

An introduction to the three modes of heat transfer, conduction, convection, and radiation. Teaches the analytical and empirical techniques used for solving problems in heat transfer, including those for which computer application is most suited. Prerequisites: ENGR 355 and MET 218

**MET 351 - Finite Element Analysis**  
(W,S)Lecture Hours: 2  
Lab Hours: 3

Credit Hours: 3

This course is an introduction to the use of finite element analysis (FEA) in the solution of mechanical engineering problems. Existing FEA computer codes are used.

Prerequisite: MET 375

Pre- or Corequisite: MET 315

**MET 360 - Engineering Materials II**  
(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

This course extends the MECH 260 - Engineering Materials I course using a more theoretical approach. Subjects include metals, polymers, ceramics, and composites.

Prerequisite: MECH 260

**MET 363 - Engineering Instrumentation**

(F)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Study of measurement techniques and equipment used in mechanical engineering. Instrumentation for measurements in mechanics, thermodynamics, fluid dynamics, and electrical systems considered. Methods of calibration, correction, and data reduction presented.

Prerequisite: ENGR 236

Pre- or Corequisite: ENGR 213

**MET 375 - Solid Modeling**  
(F,W,S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Introduces solid modeling techniques as applied to mechanical design. Topics include extruded and swept shapes, Boolean operations, and other construction techniques.

Prerequisite: MET 242

**MET 404 - MET Co-op Field Practice**

Credit Hours: (Terms and hours to be arranged with approval of the curriculum coordinator.)

An approved work program related to the student's field of specialization for a continuous three-month period. The employer and the type, level, and difficulty of the particular job must be approved prior to the employment period. A written comprehensive report must be submitted during the following term of residence.

**MET 405 - Reading and Conference**

Credit Hours: (Hours to be arranged each term.)

**MET 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**MET 414 - Applied Aerodynamics**  
(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

An introductory course on the fundamentals of aerodynamics. Includes a review of the behavior of fluids in motion, definition of the important parameters in aerodynamic behavior, and study of flow about simple aerodynamic shapes. Emphasis will be placed on low-speed aerodynamics.

Prerequisites: ENGR 355 or MET 232, and MET 218

**MET 415 - Design Project**

(F,S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

This course involves using material from prior coursework in individual student projects.

Prerequisites: MET 218 and MET 315

Pre- or Corequisite: MET 316

**MET 416 - Energy Systems**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Compares available energy resources by application of laws and principles of thermodynamics. Provides computational skills for assessment of a given resource with respect to a given application. Develops understanding of energy economics.

Prerequisites: ENGR 355 or MET 232

**MET 417 - Gas Laws**

(F)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Application of thermodynamics and fluid mechanics to the analysis of flow of both ideal and real gasses in pipes, nozzles, diffusers, compressors and turbines. The course also emphasizes the use of appropriate instrumentation.

Prerequisites: MET 218, MET 313, and MET 363

**MET 421 - Wind Tunnel Technology**  
(W)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

An introductory course on the experimental techniques used in wind tunnel testing of aerodynamic shapes. Includes operating characteristics of wind tunnels, the characteristics of and use of models and model instrumentation, and the development of analytical techniques for reduction of wind tunnel data.

Prerequisites: ENGR 355 or MET 232, MET 218, and MET 363

**MET 427 - Experiments in Thermodynamics**

(S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Application of laws and principles of thermodynamics to performance testing of heat engines. Teaches measurement of power, determination of efficiency, preparation of heat balances, analysis of combustion products, and preparation of engineering reports.

Prerequisites: MET 313 and MET 363

**MET 433 - HVAC**

(W)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Heating, ventilating, and air conditioning. Application of laws and principles of thermodynamics to analysis, design, and control of mechanically-controlled environments for human comfort, animal health, and food preservation. Teaches computation of heating and cooling loads, humidity control, heating, and refrigeration.

Prerequisites: MET 313 and MET 323

**MET 436 - Control Systems**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

An introduction to control systems. Both classic control theory and modern digital process control are considered. Topics include block diagrams, mathematical models, transfer functions, Laplace transforms, frequency response along with control components and digital controllers.

Prerequisites: ENGR 212, ENGR 236, ENGR 355 or MET 232, MET 218, and MET 363

**MET 437 - Heat Transfer II**

(F,W)

Lecture Hours: 1

Lab Hours: 3

Credit Hours: 2

A study of experimental heat transfer. Methods and instrumentation used for investigating heat transfer systems will be considered. Laboratory investigations include studies of heat exchangers, forced and free convection experiments, and determination of radiation and convection coefficients.

Prerequisite: MET 323

**MET 438 - Reciprocating and Turbine Engines**

(W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to construction, operation, and theory of reciprocating and turbine engines. Students will learn engine design, history of development, theory and practice of operation.

Prerequisites: MET 218, MET 313, and MET 315

**MET 462 - Vacuum Technology**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

An introductory course defining the role of high and ultra-high vacuum in the process of high vacuum technology. Material will include such topics as vacuum pumping, vacuum gauging, processing of materials in a vacuum, evaporative deposition, sputtering, thin films, mass spectrometry, and leak detection.

Prerequisite: MET 417

**MET 465 - Computational Strength of Materials**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Advanced topics in structural mechanics using calculus and finite element approaches. Topics include stresses and deflections of non-uniform 2-d beams; shafts and connecting rods; axisymmetric shells; circular and rectangular plates; inertial stresses from rotation and seismic effects. Applications are emphasized.

Prerequisites: ENGR 211 or MECH 222, ENGR 213, MATH 252, MECH 221, and MET 351

**MET 475 - Parametric Modeling**

(W)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Introduces feature-based parametric solid modeling techniques as applied to Mechanical Design. Emphasizes the concepts and practices of parametric modeling from the user's perspective. Theoretical and development backgrounds are also covered.

Prerequisite: MET 375

**MET 480 - Vibrations**

(F,W)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

An introduction to mechanical vibration. Topics include the equations of motion, resonant frequencies, mode shapes, damping and applications. The laboratory will introduce vibration instrumentation.

Prerequisites: ENGR 212, ENGR 266, MATH 321, MECH 315, and MECH 363

**Manufacturing Engineering Technology****MFG 101 - Introduction to Manufacturing**

(S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

An introduction to the manufacturing engineering technology discipline. Orientation to the use of personal computers. Instruction in problem solving and laboratory procedures emphasized. Laboratory provides demonstration and practice in a variety of manufacturing equipment and procedures.

**MFG 103 - Introductory Welding Processes**

(F,W,S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Applications of welding in modern industry. Topics include: Oxyacetylene welding and cutting, shielded metal arc welding, gas tungsten arc welding, gas metal arc welding, and robotic welding. Prerequisite: Enrolled in any MMET program or instructor consent

**MFG 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**MFG 112 - Introduction to Manufacturing Processes**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

A survey of common manufacturing processes, including a history of manufacturing technology. Manufacturing economic considerations. Influence of product design on process selection. Manufacturing taxonomy, surface finish, tolerances, and functional specifications.

**MFG 120 - Introductory Machining Processes**

(F,W,S)

Lecture Hours: 2

Lab Hours: 6

Credit Hours: 4

An introductory course in metal removal processes emphasizing drilling, milling, and lathe processes. Includes tool bit grinding. Emphasis on production speeds and feeds.

Prerequisites: ENGR 111 and MATH 100

**MFG 204 - Data Management**

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

Current topics in data acquisition and management.

**MFG 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**MFG 220 - Manufacturing Processes II (W)**

Lecture Hours: 2  
Lab Hours: 3

Credit Hours: 3

Advanced concepts in material removal. Turning, milling, shaping, and drilling. Cutting tools and cutting requirements. Prerequisites: MECH 260, MET 241, and MFG 120

**MFG 223 - Casting and Molding Processes (S)**

Lecture Hours: 3  
Lab Hours: 3

Credit Hours: 4

Casting and molding processes including: pattern making, casting and molding methods, mold and core making, pouring, cleanup, sand conditioning and testing, quality considerations and economic factors.

Prerequisites: ENGT 115 and MECH 260

**MFG 245 - Electronics Manufacturing (F)**

Lecture Hours: 3  
Lab Hours: 0

Credit Hours: 3

Processes and materials specific to the production of printed circuit board and integrated circuit components. Topics include surface mount technology, vacuum system theory, photolithography, etching and deposition processes, micro-bonding, and component packaging. Prerequisites: CHE 101 and MET 112

**MFG 275 - CAD for Manufacturing**

Lecture Hours: 2  
Lab Hours: 3

Credit Hours: 3

Computer aided drafting for manufacturing. Presents equipment and programs from the user's perspective. Topics include construction principles, input schemes, command structures, and data management.

Prerequisite: One computer language

**MFG 295 - Individual Studies**

Credit Hours: (Hours to be arranged each term.)

**MFG 298 - Reading and Conference**

Credit Hours: (Hours to be arranged each term.)

**MFG 299 - Laboratory Practice**

Credit Hours: (Hours to be arranged each term.)

**MFG 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**MFG 313 - Manufacturing Analysis and Planning (F)**

Lecture Hours: 3  
Lab Hours: 0

Credit Hours: 3

Analysis and planning of manufacturing methods, procedures and equipment. Includes designing for manufacturing efficiency, tolerance analysis, equipment and resource allocation and scheduling. Prerequisites: MET 242, MFG 112, and MFG 120

**MFG 314 - Geometric Dimensioning and Tolerancing (F,S)**

Lecture Hours: 2  
Lab Hours: 3

Credit Hours: 3

The study and application of ANSI and ISO geometric dimensioning and tolerancing principles and practices relative to product design and manufacturing operations.

Prerequisites: MATH 112 and MET 242

**MFG 317 - Machine Element Design (F)**

Lecture Hours: 3  
Lab Hours: 0

Credit Hours: 3

Stress calculations and design of machine elements for general applications. Theories of failure, fatigue considerations, and material selection of shafts and associated parts, gear and belt drives, bearings, power screws, threaded fasteners, riveting, welding, and springs. Prerequisites: ENGR 213 or MECH 222, and MET 241, or instructor consent

**MFG 325 - Principles of Metrology, Machining and Welding**

Lecture Hours: 3  
Lab Hours: 3

Credit Hours: 4

Measuring techniques using precision devices. Metal removal processes such as lathe, mill, and grinder. Correct use of tools and cutting parameters. Basic welding processes and theory.

**MFG 326 - Solid Mechanics**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Concentrated study of statics and strength of materials comprising the principles of equilibrium, strain-stress relationships, and analysis of internal stresses for different loading systems.

Prerequisite: MATH 112

**MFG 331 - Industrial Controls (S)**

Lecture Hours: 2  
Lab Hours: 3

Credit Hours: 3

Fundamentals of control of manufacturing processes. Applications of relay logic, input and output devices, and programmable logic controllers (PLC). Design of complete control circuits, selection of components, and cost estimation. PLC programming for discrete event control and for analog applications.

**MFG 333 - Statistical Methods for Quality Improvement (F,W,S)**

Lecture Hours: 3  
Lab Hours: 0

Credit Hours: 3

Strategies for continuous manufacturing process improvement. Graphical and numerical methods for data analysis. Methods for manufacturing process control and acceptance criteria.

Prerequisite: MATH 361

**MFG 334 - Manufacturing Group Project (W,S)**

Lecture Hours: 1  
Lab Hours: 6

Credit Hours: 3

Development of a product by a group of manufacturing students working together. This includes creating or modifying the design of the product, writing operation sheets, specifying materials, tools and equipment needed, design of special tooling, setup and operation of equipment and actual manufacturing of the project.

Prerequisite: MFG 342

**MFG 341 - Numerical Control Programming**

(F)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Introduction to manual numerical control programming. Includes interpreting part drawings, process planning, machining setup and sequence. Program debugging and introduction to tool path simulation and computer-aided programming tools. Prerequisites: MATH 112, MET 242, and MFG 120

**MFG 342 - Computer Aided Machining**

(W,S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Development of CNC machine tool manufacturing programs using computer-aided process planning and advanced CAD/CAM software. Emphasis on analysis and planning required for successful CNC production, development of CAD drawings and solid models for CAM program development, toolpath simulation, and manufacturing engineering issues.

Prerequisites: MET 375 and MFG 341

**MFG 343 - Manufacturing Tool Design**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Fundamentals of jig and fixture design. Locating and clamping methods for manufacturing production. Design of sheet-metal stamping, piercing, and forming tools. Study of the effect of manufacturing machines and production methods on tooling design.

Prerequisites: MET 315 or MECH 315, MFG 313, MFG 314, and MFG 341, or instructor consent

**MFG 344 - Design of Manufacturing Tooling**

(S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Using material from prior courses students work in individual and team design projects. Design and analyze a variety of manufacturing fixtures, jigs, molds, and stamping dies.

Prerequisite: MFG 343

**MFG 351 - Microelectronics Manufacturing Processes I**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

A three term sequence providing in-depth theory of the processes used in the manufacture of electronic components. Primary topics include integrated circuits, printed circuits, electronic assembly. Vacuum system theory, photolithography, process specific chemistry, etching and deposition processes, and surface mount technology.

Prerequisites: CHE 101 and PHY 202

**MFG 352 - Microelectronics Manufacturing Processes II**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

A three term sequence providing in-depth theory of the processes used in the manufacture of electronic components. Primary topics include integrated circuits, printed circuits, electronic assembly. Vacuum system theory, photolithography, process specific chemistry, etching and deposition processes, and surface mount technology.

Prerequisite: MFG 351

**MFG 353 - Microelectronics Manufacturing Processes III**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

A three term sequence providing in-depth theory of the processes used in the manufacture of electronic components. Primary topics include integrated circuits, printed circuits, electronic assembly. Vacuum system theory, photolithography, process specific chemistry, etching and deposition processes, and surface mount technology.

Prerequisite: MFG 352

**MFG 404 - Co-op Field Practice**

Credit Hours: (Terms and hours to be arranged with approval of the curriculum coordinator.)

An approved work program related to the student's field of specialization for a continuous three-month period. The employer and the type, level, and difficulty of the particular job must be approved prior to the employment period. A written comprehensive report must be submitted during the following term of residence.

**MFG 405 - Reading and Conference**

Credit Hours: (Hours to be arranged each term.)

**MFG 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**MFG 408 - Workshop**

Credit Hours: (Hours to be arranged each term.)

**MFG 415 - Finishing Methods**

(F)

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

Review of material finishing technologies with focus on functional requirements of final product, life-cycle environmental considerations, and manufacturing technologies for material finishing.

Prerequisite: MECH 260

**MFG 420 - Advanced Manufacturing Processes**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to less conventional and recently developed manufacturing processes and materials. Emphasis on understanding unique characteristics, advantages, limitations, and applications. Analysis required for selection of appropriate materials and processes. Examples of computer programs that aid the selection process.

Prerequisites: MATH 112, MET 242, MFG 120, and PHY 221, or instructor consent

**MFG 425 - Plastic Manufacturing Processes**

(S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Fundamentals of polymer science and plastic manufacturing methods. Introduction to the effect of chemistry and morphology of plastics on material selection, product design, and process design. Emphasis is on thermoplastic processes such as injection molding.

Prerequisites: MECH 260 and MET 375, or instructor consent

**MFG 445 - Plant Layout and Handling Systems**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

In-depth study of facilities planning for manufacturing engineers. Focus is on layout optimization algorithms and applications, work cell design, warehouse design, materials handling systems, process/product/material/labor cost estimates and evaluations, and agile manufacturing.

Prerequisites: MFG 112 and MFG 313

**MFG 447 - Lean Manufacturing**

(W,S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Introduction of principles, techniques and skills of lean manufacturing. Process optimization and quality improvement for manufacturing. Plant layout, design and job scheduling. JIT skills, such as Kaizen, Kanban, value added analysis and one piece flow to reduce inventory and waste.

Prerequisite: MFG 333

**MFG 453 - Automation and Robotics in Manufacturing**

(F,S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Study of the appropriate level of manufacturing automation based upon economics and productivity. Discussion of robotics and a study of automated manufacturing including automatic machine design and material handling.

Prerequisite: Senior standing in MET or MfgET or instructor consent

**MFG 454 - Thermal Systems for Manufacturing**

(F,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Fundamentals of thermal energy analysis, including introduction to thermodynamics and heat transfer. Emphasis is on solving manufacturing related problems in thermal process control and analysis.

Prerequisite: MATH 252

**MFG 456 - Materials Science**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Study of the relationship of a material's structure to its properties. Materials studied include nonferrous metals, polymers, ceramics, composites, and electronics materials.

Prerequisite: MFG 420

**MFG 465 - Advanced Welding Methods (F,S)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

High energy density, solid state, and plastics welding processes. Welding metallurgy supports, metal combination choices and solutions to typical welding problems. Codes, procedure qualification, welding design and nondestructive testing.

Prerequisites: MECH 260 and MFG 103

**MFG 503 - Thesis**

(F,W,S)

Credit Hours: (Variable credit 1-16)

Course may be repeated for credit.

**MFG 507 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**MFG 521 - The Manufacturing Management Team in the Global Enterprise (S)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Concepts and theories needed to understand the management of people, work groups, and organizations in a global environment. Exploration of cultural differences, organizations, communication and business relationships; strategic thinking in a global context, and international e-communications. Emphasis on contemporary case studies regarding the operational problems facing the international firm.

**MFG 522 - Manufacturing Business Philosophies**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Contemporary world class manufacturing concepts and philosophies including Just-in-Time (JIT) applications for manufacturing and inventory management; methods and practices of total quality control in manufacturing; and continuous improvement techniques in manufacturing. Focus on contemporary cases in global manufacturing.

**MFG 523 - Capitalization Principles for Manufacturing**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Theory and concepts of capitalization for manufacturing assets; land, buildings, and equipment. Historical cost for valuing an asset. Net income, real and tax depreciation, and timing the disposal or exchange of assets. Exploration of capitalization of cost, post-acquisition asset costs, interest capitalization and expense, asset impairments, and multinational capital budgeting and financial management.

**MFG 524 - Project and Budget Planning for Manufacturing**

(W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Exploration of the theories, tools, and techniques needed to effectively plan and manage manufacturing projects and budgets. Development of the characteristics of project plans including scope of work statements, work breakdown structure, project schedules, schedule and budget metrics, and project change cost analysis. Core topics include cost, time, and resource estimation, management and budgeting.

**MFG 525 - International Economics for Manufacturing**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Exploration of international economics. Impact on manufacturing industries. Focus on the foundations of international trade including classical and modern theories of production and industrial organization. Free trade policies; foreign competition; direct foreign investment, fiscal and monetary policy; tariffs, quotas, and subsidies. International monetary market on production, and anti-globalization politics. Concentration on contemporary cases in manufacturing. Prerequisite: ECO 201 and ECO 202 or equivalent (see instructor)

**MFG 531 - Engineering Mechanics (S)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Fundamentals of statics. Dry, viscous, and rolling friction. Kinematics of particles: rectilinear and curvilinear motion. Kinetics of particles: work and energy, impulse and momentum. Kinematics of rigid bodies: translation and rotation. Kinetics of rigid bodies: work and energy, impulse and momentum. Fundamentals of stress analysis.

**MFG 533 - Thermal Processes and Technology in Manufacturing**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Review of the laws of thermodynamics. Review of heat transfer including conduction, convection, and radiation. Vacuum technology. Autoclave processes. Cryogenics: materials, techniques, and safety. Plasma processes. The processing of non-metallics. The processing of insulation materials. Energy costs and conservation in manufacturing processes.

**MFG 534 - Design Technology for Manufacturability**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Cutting costs and improving productivity, managing the manufacturing supply chain. Reducing time to market. Establishing core competencies and maintaining vital corporate best practices. The role of standards and lean manufacturing in design.

**MFG 535 - Product Life Software (F)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Use of high-end enterprise-wide software products for integrating design, automating the workflow, and comprehensively controlling security. Revision management over all types of data. Creating document links. Leveraging subject matter experts across the extended enterprise.

**MFG 536 - Automated Technology for Tool Path Generation**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Reviewing and validating manufacturing processes for administrators, managers, and designers. Reviewing the creation of tool paths using standard 3D and 2D mechanical design tools and the generative 2.5-axis and 3, 4 and 5-axis surface machining NC software tools. Controller, machine, and software selection and integration.

**MFG 537 - Product Data Management and Configuration Control**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Capturing intellectual property at its source from CAD design, manufacturing and maintenance, driving the product information across the extended enterprise, and enabling its use in other branches and partners in the enterprise. Creating the integration of better and more efficient decisions and processes over the life cycle of the product.

**MFG 538 - Special Problems in Manufacturing Software**

(W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Independent study using advanced functionality in high-end manufacturing and enterprise software. Approval of faculty advisor required.

**MFG 562 - Advanced Materials Science and Technology**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Advanced engineering materials. Recent advances in development and applications of metals, polymers, ceramics, and composites. Emphasis on the relationship between structure and properties. Manufacturing processes explored. Application of established standards for materials properties determination.

**MFG 563 - Inventory Control and Production Planning**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction of concepts, principles, techniques, strategies and applications related to demand forecasting, production planning, performance measurements, quality control, inventory control and continuous improvement for manufacturing systems.

**MFG 564 - Quality Concepts and Philosophies**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Understanding quality, Models and Framework for TQM, Leadership & Commitment, Planning, Strategy & Goal deployment, Partnerships & Resources, Performance measurement, Self-assessment, Audits & Reviews, Benchmarking, Process Management, Continuous Improvement; Culture change through teamwork, Communication, Implementing TQM, and Case studies.

**MFG 595 - Selected Graduate Topics in Manufacturing**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Manufacturing related topics in engineering science and design. Manufacturing related topics in software and computer integration. Manufacturing related topics in materials and processing technology. Manufacturing related topics in business and management. Course may be repeated for credit.

**MFG 596 - Selected Topics in Engineering Science and Design Technology**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Manufacturing related topics in engineering science and design. Course may be repeated for credit.

**MFG 597 - Selected Topics in Manufacturing Software and Computer Integration**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Manufacturing related topics in software and computer integration. Course may be repeated for credit.

**MFG 598 - Selected Topics in Advanced Manufacturing Materials and Processes Technology**

(F,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Manufacturing related topics in materials and processing technology. Course may be repeated for credit.

**MFG 599 - Selected Topics in Business, Financial and Management Processes**

(F,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Manufacturing related topics in business and management. Course may be repeated for credit.

**Marriage and Family Therapy****MFT 500 - Child & Adolescent Development**

Explores biological, psychosocial, cultural, environmental and family factors affecting human growth and development from conception through adolescence.

**MFT 501 - Adult Development**

Explores biological, psychosocial, cultural, environmental and family factors affecting human growth and development from young adulthood through late adulthood.

**MFT 510 - Introduction to Marriage & Family Therapy**

Introduction to the foundations of family therapy, including the historical development of the field and the fundamental concepts associated with family therapy.

**MFT 511 - Family Therapy Theory & Practice I**

Study of the foundational principles of family systems theory and practice and begins a study of the classic models of family therapy.

**MFT 512 - Family Therapy Theory and Practice II**

Course continues the study of models of family therapy in MFT 511, with study of the role of language, meaning, and process in relationships.

**MFT 520 - Counseling: Theory & Skills**

Introduction to basic skills in attending behavior, clinical interviewing, treatment planning, clinical intervention, collateral consultation, referral and clinical documentation.

**MFT 521 - Child & Adolescent Therapy**

Study and practice of a variety of psychotherapeutic modalities for work with children and adolescents.

**MFT 522 - Couples Therapy**

Examination of psychotherapeutic theories and processes for the assessment and treatment of a wide range of relational issues.

**MFT 523 - Group Therapy**

Study of theoretical approaches in working with groups, and the practice of group therapy.

**MFT 524 - Play Therapy**

In process

**MFT 525 - Trauma & Healing**

In process

**MFT 530 - Adult Psychopathology & Diagnosis**

Study of assessment, diagnosis, prognosis, and treatment of personality and behavioral disorders in adulthood, including assessment and multi-axial diagnosis using the DSM.

**MFT 531 - Child & Adolescent Psychopathology**

Study of assessment, diagnosis, prognosis, and treatment of personality and behavioral disorders in childhood and adolescence, including assessment and multi-axial diagnosis using the DSM.

**MFT 532 - Psychopathology and the Family**

Study of family dysfunction through exploration of the influence of the family on the development, maintenance, and prevention of behavior, substance abuse and co-occurring disorders.

**MFT 533 - Violence & Abuse in Intimate Relationships**

Study of contemporary understanding, assessment and treatment when violence and abuse occurs in intimate relationships. Includes physical and emotional abuse, neglect, sexual molestation; the dynamics violence in families, and resulting evidence of trauma.

**MFT 534 - Psychological Assessment**

Course provides students with a broad understanding of the clinical uses of psychological tests, including an introduction to the major types of instruments and understanding test results. An overview of the variety of assessment and diagnostic tools used to assess for behavioral, psychological, and relationship problems is covered.

**MFT 540 - Research Methods**

Course provides a survey of key concepts in social science research including sampling, measurement, research ethics, and design. Additional topics include the evidence base for clinical research, the evaluation of interventions, and pseudoscientific concerns in clinical research. Emphasis is placed on the review, evaluation, and application of professional literature to clinical practice in marriage and family therapy.

**MFT 550 - Professional Studies: Ethics**

Study of legal, ethical, and moral issues, and professional codes of conduct directing the ethical practice of marriage and family therapy in the states of Oregon and California.

**MFT 560 - Developing Cultural Competencies**

Increases students' awareness of multiple cultural values, assumptions, and family dynamics, with particular attention to power and control as experienced by members of majority and minority groups. Multicultural competence as requirement of ethical practice of MFT.

**MFT 561 - Sexuality and Therapy**

Exploration of contemporary professional understandings of sexuality including the overview of models of sex therapy, treatment strategies utilized in treating sexual dysfunctions, and relational and familial dynamics influencing sexual abuse recovery.

**MFT 562 - Rural Mental Health Care**

Development of the knowledge and skills required to address mental health care needs unique to rural populations.

**MFT 563 - Psychopharmacology**

Study of biological and neurological bases of human behavior and use of psychotropic medications as an adjunctive therapy to psychotherapy.

**MFT 564 - Substance Abuse & Co-Occurring Disorders**

Introduction to substance abuse and co-occurring disorders including a careful examination of DSM diagnostic criteria. Assessment procedures and treatment issues are study with emphasis on contemporary evidence-based treatment.

**MFT 565 - Mental Health Care & Technology**

Examination of contemporary technological innovations and their practical and ethical use in mental health care, with particular attention to strengthening rural mental health care services.

**MFT 566 - Medical Family Therapy in Rural Areas**

Study of the knowledge and skills required to work in the rapidly developing multidisciplinary field of medical family therapy. Includes emphasis on addressing rural mental health care needs with integrated health care teams that address biomedical and psychosocial needs of the whole person and family system.

**MFT 598 - Practicum (S)**

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Supervised practical experience across one practicum experience utilizing role playing, co-therapy and videotaping.

Prerequisite: Approval of internship coordinator.

**MFT 599 - Internship**

(F,W,S)

Credit Hours: 8

Supervised practical experience across 3 terms for a total of 700 hours in preparation for supervised practice, 280 of direct client contact and the remaining hours in supervisory and training activities and administrative duties related to the profession. Prerequisite: Approval of internship coordinator.

**Management****MGT 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**MGT 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**MGT 212 - Fundamentals of Renewable Energy Management**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Explores primary energy sources available for power generation. Includes cost comparisons of traditional sources (gas, coal, nuclear, hydro) and renewable sources (solar, geo-thermal, wind, biofuels, wave and tidal). Evaluates and benchmarks benefits of traditional versus renewable energy sources, long-term vs. short-term feasibility and strategic decision-making in energy generation and utilization.

Prerequisites: ACC 201 and REE 201

**MGT 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**MGT 321 - Operations Management I (F,W)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Functions of the operations division within the organizational structure. Manufacturing and service organization trends. Capacity planning with forecasting and master scheduling. Introduction to Just-In-Time concepts.

Prerequisite: BUS 215 or BUS 304 or BUS 317

**MGT 322 - Operations Management II (W,S)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Supply chain management for service and manufacturing companies. Covers flows of goods and services through relationships with business customers, suppliers and partners. Students learn how to manage strategic, operational and tactical planning using best-known practices and efficient use of information systems. Evaluate and design effective supply chains.

Prerequisite: MGT 321

**MGT 323 - Operations Management III (F,W,S)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Effective budgeting methods for industrial environments. Budget planning, formation and cost controls. Flexible budgets and expense management.

Manufacturing/nonmanufacturing costs and cost/contribution analysis.

Prerequisite: ACC 203 with grade "C" or better

**MGT 335 - Project Management**

(F,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Advanced application of the Critical Path Method to organization and control of project implementation. Applications software will be used to create and evaluate project networks and to develop management reports.

Prerequisite: BUS 215 or BUS 317 or MET 112

**MGT 345 - Engineering Economy**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Capital expenditure, economic life and replacement analysis based on net present value, periodic costs, internal and incremental rates of return. Coverage of compound interest, value flows, economic equivalences, depreciation, taxes and inflation.

Prerequisite: MATH 105 or MATH 111

**MGT 391 - Co-op Field Practice**

Lecture Hours: 0

Lab Hours: 9

Credit Hours: 3

Credit will be given for an approved work program related to the student's field of specialization for a continuous 10-week period. The employer and the type, level and difficulty of the particular job must be approved by the Management Department prior to employment.

**MGT 392 - Co-op Field Practice**

Lecture Hours: 0

Lab Hours: 9

Credit Hours: 3

Credit will be given for an approved work program related to the student's field of specialization for a continuous 10-week period. The employer and the type, level and difficulty of the particular job must be approved by the Management Department prior to employment.

**MGT 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**MGT 421 - Quality Management**

(F,W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Qualitative and quantitative methods of quality assurance in manufacturing and service industries. Assessing quality systems using the ISO 9000 series of standards. Application of basic statistical techniques including control charts, sampling procedures, and graphical analysis to assess quality performance. Use of computing systems in establishing quality assurance.

Prerequisite: MATH 361

**MGT 422 - Materials Management**

(W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Approaches to materials management common to production and service industries. Demand forecasting, inventory management, scheduling, requirements planning and capacity planning using qualitative and quantitative methods. Application of computing systems in materials management processes.

Prerequisite: MGT 321

**MGT 423 - Logistics Management**

(F,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Approaches to warehousing practices and distribution of goods and services across the supply chain. Warehouse justification and decisions. Procurement, packaging, handling, transport and ownership arrangements. Relationship management, sustainability and risk assessment.

Prerequisite: MGT 322

**MGT 461 - Lean/Six Sigma Management I**

(F,W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Lean thinking as applied to production and service operations. Kaizen, kaikaku, pull production and systems, value stream mapping and analysis. Standardized work charts and combination tables to streamline work content and achieve flow. Identifying sources of muda and its elimination.

Prerequisite: BUS 215 or MGT 321

**MGT 462 - Lean/Six Sigma Management II**

(W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Overview course of Six Sigma management roles, responsibilities and terminology. Students will understand the tools and the phases of the DMAIC model and explore business cases to understand how Six Sigma techniques are applied to business.

Prerequisite: MATH 361

**MGT 463 - Lean/Six Sigma Management III**

(F,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Deployment and management of Lean Six Sigma within the enterprise. Planning and assessment of deployment sustainability, infrastructure, success factors and metrics that describe the value proposition associated with institutionalizing large strategic initiatives such as Lean Six Sigma.

Prerequisite: MGT 462

**Management Information Systems****MIS 101 - Word Processing Software Laboratory**

(F,W,S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Word processing lab using Microsoft Word software. Includes creating and editing documents, letters, Web pages, forms, labels, and newsletters, research papers, an index and table of contents.

**MIS 102 - Spreadsheet Lab**

(F,W,S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Spreadsheet lab using Microsoft Excel software. Includes creating worksheets, charts, formulas, functions, what-if analysis, sorting, multiple worksheets, workbooks, templates, pivot tables and importing of data.

**MIS 103 - Presentation Graphics Software Laboratory**

(F,S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Presentation graphics lab using Microsoft PowerPoint software. Creation of presentations for use on paper, overhead transparencies, on a projection device, and Internet virtual presentations. Includes use of text, graphics, charts, and multimedia applications to create professional-looking presentations.

**MIS 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**MIS 113 - Introduction to Database Systems**

(F,S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Introduces concepts of desktop computer based database systems. Topics include database management issues, database design, creating and maintaining a database, normalization, table structures, and creating user queries, reports, and forms. Basic database security is discussed.

**MIS 115 - Visual BASIC Programming**

(F,W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Computer concepts and problem solving methods in the Windows environment using Visual BASIC. Topics include algorithms, simple data types, condition and iterative structures, functions and procedures, and the program documentation.

Prerequisite: MATH 100 or instructor consent

**MIS 116 - C++ Programming I**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Computer concepts and problem solving methods using C++ programming language. Topics include: algorithms, simple data types, conditional and iterative structures, function definition, structured programming and documentation. Cannot be taken for graduation credit if student has completed CST 116.

Pre- or Corequisite: MATH 111

**MIS 118 - Introduction to Programming in C#**

(F,W,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

An introduction to basic computer programming concepts in the C# programming language. Topics include algorithms, simple data types, conditional and iterative structures, functions and procedures, and code documentation.

Prerequisite: MATH 111 or instructor consent

**MIS 126 - C++ Programming II**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Solving complex problems using advanced features of the C++ language. Topics include function usage, pointer data type, dynamic memory allocation, string manipulation, and structure and union data types. Emphasis is on structured program design techniques. Cannot be taken for graduation credit if student has completed CST 126.

Prerequisite: MIS 116 with grade "C" or better, or instructor consent

**MIS 130 - Computer Organization**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introduces number systems, Boolean algebra, digital logic, computer arithmetic, instruction sets, memory, system software, and network organization and architecture. Laboratory exercises on digital logic, computer architecture, machine language and assembly language programming.

Completion of a programming project.

Corequisite: MATH 100

**MIS 136 - Object-Oriented Programming with C++**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

A study of object oriented programming with C++. Beginning and intermediate concepts are covered including classes, objects, member functions, overloading, inheritance, polymorphism, templates, and virtual functions. This course prepares students with a strong C background for upper-division coursework using C++. Cannot be taken for graduation credit if student has completed CST 136.

Prerequisite: MIS 126 with grade "C" or better

**MIS 145 - Introduction to PC Hardware/Software**

(F,W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

An introduction to PC hardware and software that prepares students as an entry-level PC technician. The course covers topics including: PC system components, peripheral devices, data storage, networking, printing, mobile devices, operating system installation and management, file management, basic data security, and the troubleshooting process.

**MIS 206 - Introduction to Management Information Systems**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to key components in information systems. Identification of major hardware components and primary categories of software applications. Data resource management concepts; elements of how information systems work to support problem solving and business opportunities. Ethics of information systems usage.

**MIS 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**MIS 215 - Business Application Programming**

(W,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Object-oriented and/or procedural languages employed with an emphasis on structured design, user interface design and error processing. Utilizing advanced language elements and program structures to integrate software development with data management.

Prerequisites: MIS 115 and MIS 275 with grade "C" or better, or instructor consent

**MIS 218 - Database Programming**  
(W,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Object-oriented and/or procedural languages employed with an emphasis on structured design, user interface design and error processing. Utilizing advanced language elements and program structures to integrate software development with data management.

Prerequisites: MIS 275 and MIS 118 with a "C" or better

**MIS 225 - Digital Marketing**  
(F,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

The role of the Internet and related technologies in modern business and e-commerce. Hands on course for creating dynamic web pages using cloud-based development platforms. Emphasizes both paid and owned digital marketing, search engine optimization, website analytics, and design principles to create effective marketing strategies.

**MIS 240 - Intro to Linux OS**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introduces the fundamental concepts of Linux operating systems. Topics include components and functions of an operating system, installing and configuring Linux operating systems, file systems, permissions, process and thread management, commands, utilities, text editing, shell programming and text processing utilities.

Prerequisite: MIS 145 with grade "C" or better

**MIS 251 - Networking Fundamentals**  
(F,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introduction to networking concepts and technology, including network types, common network standards, network interface cards, wired and wireless network components, IP addressing and sunbathing, network protocols, basic network security, and troubleshooting common network issues.

Prerequisite: MIS 145 with grade "C" or better

**MIS 255 - Health Informatics Concepts and Practices**

(F,W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

The discipline of health informatics is introduced, including history, knowledge of health informatics, data management, vocabularies, standards and tools as applied in the support of health care delivery. The course provides foundation knowledge and understanding of the impact of information technology on the health care industry and vice versa. Particular attention is paid to the design, usage and acceptance of information technology applications. This course introduces students to the concepts and practices of health informatics.

**MIS 273 - Windows Server Fundamentals**

(F,W,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introduces the fundamental skills required to install and configure a Windows Server. Topics covered include: Hyper-V, Active Directory, DNS, DHCP, Group Policy, and File and Print Services.

Prerequisite: MIS 145 with a "C" or better

**MIS 275 - Introduction to Relational Databases**

(F,W,S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

The relational model, DBMS functions, administration, design methodology, modeling and normalization. Hands-on design, development and use of an enterprise database system using SQL Server. SQL fundamentals will be introduced, covering select statements, data manipulation, sub-queries, multi-table queries, functions and data types.

**MIS 280 - Web Development Fundamentals**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introduces Hypertext Markup Language (HTML5) and Cascading Style Sheets (CSS) as the principle coding formats used in creating web pages. Students will learn code syntax, commenting, writing, testing, and maintenance of HTML and CSS. Also introduces basic dynamic web page development using simple JavaScript. Students will be able to create a multi-page web site using these technologies.

Prerequisites: MATH 100 and MIS 145 with grade "C" or better

**MIS 285 - Scripting Fundamentals**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introduction to the fundamentals of automating tasks with Python and PowerShell scripting languages. Topics covered include basic data types, control structures, regular expressions, input/output, and textual analysis. Focus on creating simple programs and scripts to automate common system administration tasks on Linux and Windows systems.

Prerequisites: CST 116 or MIS 116 or MIS 118, MIS 240, MIS 273, and MIS 280, all with grade "C" or better

**MIS 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**MIS 311 - Introduction to Systems Analysis**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to state-of-the-art business information systems. Acquiring, processing and distributing information in a technological environment. The MIS organization: its place in business, key trends and implications. Introduction to computing hardware. Introduction to System Development Life Cycle.

Prerequisite: WRI 121

**MIS 312 - Systems Analysis I**

(F,W)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Planning and Analysis phases of Systems Development Life Cycle. Focus on software development life cycles; entity relationships, data flow diagrams, prototyping and other forms of data or system modeling. Designing, selecting and installing new systems for end users. Includes cost/benefit and value-added evaluations.

Prerequisites: MIS 275 and MIS 311

**MIS 315 - Computer Software Techniques**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Lectures are divided between data structures and operating systems. Data structures section involves data representation, B-trees, graphs, and files. Operating systems section involves process, memory, and file management as related to UNIX. Cannot be taken for graduation credit if student has completed CST 313.

Prerequisite: MIS 126 with grade "C" or better

**MIS 318 - Advanced Programming in C#**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introduction to advanced programming techniques using the C# programming language. Emphasis on the design and development of business applications.

Prerequisite: MIS 218 with grade "C" or better

**MIS 322 - Systems Analysis II**

(W,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Design, implementation and maintenance phases of Systems Development Life Cycle. Designing, selecting and installing new systems for end users. Includes cost/benefit and value-added evaluation. Define and perform data modeling, process modeling, network modeling and their importance.

Prerequisites: MIS 218, MIS 312, and MIS 341, all with grade "C" or better

**MIS 334 - Business Analytics**

(W)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Overview of business analytics, the value of data in decision making through analysis. Students will evaluate data quality, cleansing, statistical interpretation and data visualization. Develop measurement tools and metrics to address key business questions and evaluate implementation.

Prerequisites: MATH 361 with a "C" or better, and MIS 113 or MIS 275 with a "C" or better

**MIS 341 - Relational Database Design I**

(F,W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

A comprehensive study of SQL and TSQL using the SQL Server relational database management system. Hands-on training will include the use of TSQL, SQL Server Management Studio, database creation, CLR, data queries, view definitions and use, operators and functions, triggers, calculations, indexing, cursors and data manipulation.

Prerequisites: MIS 118 and MIS 275, both with grade "C" or better

**MIS 343 - Relational Database Design III**

(W)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Install, create and maintain an Oracle database. Oracle database architecture and component interactions. Implement, configure and monitor an operational database in an effective manner including performance monitoring, database security, user management and backup/recovery techniques.

Prerequisite: MIS 342

**MIS 344 - Business Intelligence**

(W,S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Develop analytic solutions to gain functional understanding of Business Intelligence to solve business problems. Covers the development of Crystal Reports and Dash-boarding tools to develop reporting and interface solutions for business.

Prerequisite: MIS 341 with grade "C" or better

**MIS 345 - Health Care Information Systems Management**

(F,W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Information systems within healthcare organizations are examined. Business, clinical, and healthcare delivery processes are identified as they relate to data acquisition and information systems. Key issues confronting design, organization and management of healthcare systems are identified, examined, and solutions are explored and developed.

Prerequisites: BUS 313 and BUS 317

**MIS 351 - Routing and Switching I**

(F,W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Covers intermediate-level network design and implementation topics utilizing Cisco networking technologies. Students will learn the fundamentals of IPv4 and IPv6 routing and Ethernet switching. Students will also learn to configure essential network services such as NAT, and DHCP, as well as basic network security services.

Prerequisite: MIS 251 with grade "C" or better

**MIS 357 - Information and Communication Systems in Health Care**

(W)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Addresses the role of computer-based information and communications systems in patient care and health care administration, including hands-on experience with the acquisition, storage and use of information in the electronic medical record and systems such as PACS, lab and pharmacy systems and computerized provider order entry (CPOE).

Prerequisite: MIS 255

**MIS 365 - Cloud Computing**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introduces the technologies and services that enable cloud computing, different types of cloud computing services (SaaS, PaaS, DaaS, and IaaS), deployment models (Public, Private, and Hybrid) and the security and legal issues associated with cloud computing.

Prerequisites: MIS 251 and MIS 273, both with grade "C" or better

**MIS 375 - Decision Support Systems**

(F,W,S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Use of personal computer application programs for analysis and reporting, problem solving and decision assistance.

Prerequisites: Junior standing, MATH 111, and MIS 102

**MIS 385 - NoSQL**

(S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Develop concepts and a fundamental skill set of NoSQL and document-oriented data models. Conducting cross comparison between relational and document-oriented data models. Students will gain a broader understanding of DBA techniques used in managing database systems through replication and sharing approaches.

Prerequisite: MIS 341 with grade "C" or better

**MIS 390 - Co-op Field Experience**

Credit Hours: (Hours to be arranged each term.)

An approved work program related to the student's field of specialization for a continuous three-month or six-month period. The employer type, level, and difficulty of the particular job must be approved by the student's advisor prior to the employment period. A written comprehensive report of activities must be submitted during the following term of residence.

Prerequisites: All MIS 100 and 200 level courses

**MIS 405 - Reading and Conference**

Credit Hours: (Hours to be arranged each term.)

**MIS 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**MIS 408 - Workshop**

Credit Hours: (Hours to be arranged each term.)

**MIS 414 - Information Systems Development**

(F,W,S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Review of systems analysis. Tools, techniques, and reference sources used to research, configure and justify the hardware, software, staff, and facilities required for a computer system.

Changeover, file conversion and testing. Post-installation audit, backup, security and privacy.

Prerequisites: MIS 312 and a programming language

**MIS 425 - Information Systems Security**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

An overview of security challenges and strategies of countermeasure in the information systems environment. Topics include definition of terms, concepts, elements, and goals incorporation industry standards and practices with a focus on availability, vulnerability, integrity, and confidentiality aspects of information systems.

Prerequisites: MIS 251 and MIS 273

**MIS 435 - IT Service Management**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduces the key concepts of IT Service Management (ITSM), using the Information Technology Infrastructure Library (ITIL) framework. Examines the core processes in delivering IT services to organizations of different sizes. Focus on the IT service lifecycle (service strategy, service design, service transition, service operation, and continual service improvement). Best practices for capacity planning, vendor, asset, configuration, change, release, incident and knowledge management are explored in detail.

Prerequisites: MGT 335 and MIS 311, both with grade "C" or better

**MIS 442 - Advanced Web Application Programming**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Construct graphical end-user interfaces for scalable, high-performance Internet applications. Building, testing, debugging and deploying interactive Internet applications that use an enterprise level Database Management System. Develops experience with the System Development Life Cycle (SDLC) for web/database integration for application development. Develop understanding and application of Software as a Service (SaaS). For graduate credit students will participate in a field placement project working with companies such as the BLM to create a working application demonstrating mastery of the subject material.

Prerequisites: MIS 218 and MIS 341, both with grade "C" or better

**MIS 445 - Legal, Ethical and Social Issues in Health Care Technology**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Legal, ethical, and social issues in health care, especially as they impact systems design, development, use, and management will be examined.

Prerequisite: BUS 313

**MIS 446 - Data Mining**

(W)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Defining the project cycle of data mining through data collection, analysis and assessment. Classification, Clustering, Association, Regression, Forecasting, Sequence Analysis and Deviation Analysis are applied to the project life cycle of data mining applications.

Prerequisites: MIS 334 and MIS 344, both with grade "C" or better

**MIS 451 - Routing and Switching II**  
(F,W,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Covers intermediate-level network design and implementation topics utilizing Cisco networking technologies. Students will learn about dynamic IPv4 and IPv6 routing protocols, including: OSPF, EIGRP, and BGP. More advanced network design topics are also covered including redundancy, scalability, performance and manageability. Prerequisite: MIS 351 with grade "C" or better

**MIS 490 - Co-op Field Experience**

Credit Hours: (Hours to be arranged each term.)

An approved work program related to the student's field of specialization for a continuous three-month or six-month period. The employer type, level, and difficulty of the particular job must be approved by the student's advisor prior to the employment period. A written comprehensive report of activities must be submitted during the following term of residence.

Prerequisites: All MIS 100 and 200 level courses

**MIS 495 - Senior Project Selection**

(S)

Lecture Hours: 1

Lab Hours: 0

Credit Hours: 1

Selection of the senior project capstone project concept that meets industry demands and stakeholders requirement.

Prerequisite: MIS 312 and MGT 335 with grade "C" or better or instructor consent

**MIS 496 - Senior Project Management**  
(F,S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Focuses on project management. Includes best-known industry practices, as well as planning, organizing and managing resources to bring about successful completion of specific project goals and objectives. Produces formal proposal for Senior Project.

Prerequisites: MIS 322 and MIS 495, both with grade "C" or better, or instructor consent

**MIS 497 - Senior Project II**  
(W)

Lecture Hours: 1

Lab Hours: 6

Credit Hours: 3

Senior project students will plan, develop and carry through to completion a management information systems project for a client they select. Formal proposal, progress reports and project demonstration/presentation. The instructor serves as the student's consultant. Prerequisite: MIS 496 with grade "C" or better

**MIS 498 - Senior Project III**  
(F,S)

Lecture Hours: 1

Lab Hours: 6

Credit Hours: 3

Senior students plan, develop and complete a project for a client or an independent research project. Periodic progress reports and presentations required. Instructor functions as a consultant. Deliver final project. Prerequisite: MIS 497 with grade "C" or better

**MIS 542 - Advanced Web Application Programming**  
(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Construct graphical end-user interfaces for scalable, high-performance Internet applications. Building, testing, debugging and deploying interactive Internet applications that use an enterprise level Database Management System. Develops experience with the System Development Life Cycle (SDLC) for web/database integration for application development. Develop understanding and application of Software as a Service (SaaS). For graduate credit students will participate in a field placement project working with companies such as the BLM to create a working application demonstrating mastery of the subject material.

Prerequisites: MIS 218 and MIS 341, both with grade "C" or better

**Medical Imaging Technology****MIT 103 - Introduction to Medical Imaging**  
(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Orientation to the art and science of medical imaging. History and development of radiologic science, diagnostic medical sonography, vascular technology, nuclear medicine technology, medical ethics, health care industry, related professional organizations, and regulatory agencies.

**MIT 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**MIT 205 - Medical Imaging Technology Practicum**

Lecture Hours: 1

Lab Hours: 0

Credit Hours: 1

This course is a remedial section designed for imaging learners who plan to retake a sophomore year programmatic course or are returning to a program after brief hiatus. Curriculum for this course is customized to each learner's needs. Prerequisite: Sophomore standing in a Medical Imaging program

**MIT 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**MIT 209 - PACS I: Intro to Picture Archiving Communications System**  
(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

An introduction to Picture Archiving Communications System (PACS). PACS Workflow within the department and interdepartmentally, PARCA and CIIP certification, procurement, and PACS system administration.

**MIT 219 - PACS II: PACS Communication and Administration**  
(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Study of policies and procedures for PACS. Observation of the healthcare organization and PACS role within the organization. Overview of PACS components, image acquisition, viewing of images, and image archiving.

**MIT 229 - PACS III: PACS Technical Requirements and Image Quality**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Overview of computer basics, technical requirements, and Operating System basics. An introduction to HIPAA and PACS image quality.

**MIT 231 - Sonographic Principles and Instrumentation I**

(F,W,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Properties of sound waves, propagation and interaction of ultrasound in tissue, basic ultrasound instrumentation, static, and real-time ultrasound imaging principles and artifacts are covered. Laboratory includes demonstration of wave characteristics and introduction to basic instrumentation of real-time ultrasound imaging. Satisfies Science elective.

Prerequisite: PHY 217 with grade "C" or better

**MIT 232 - Sonographic Principles and Instrumentation II**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Advanced physical principles. Hemodynamics, Doppler physics, color imaging, and artifacts associated with them are covered. Digital signal and image processing and bio effects are also discussed. Laboratory develops instrumentation skills. Satisfies Science elective.

Prerequisite: MIT 231 with grade "C" or better

**MIT 239 - PACS IV: PACS Implementation and System Management**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Overview of implementing PACS. Starting from procurement to the Return on Investment (ROI). This will include the proposal, approval process, integration, a post install. Class will include the study of DICOM and HL7.

**MIT 249 - PACS V: DICOM**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Study of DICOM standard and how it allows for modalities to communicate inside and outside of a facility.

**MIT 259 - PACS VI: PACS Security**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Overview of Information Technology, IHE, security, structured reporting and networking fundamentals.

**MIT 305 - Medical Imaging Technology Practicum**

Lecture Hours: 1

Lab Hours: 0

Credit Hours: 1

This course is a remedial section designed for imaging Juniors who plan to retake a programmatic course or are returning to a program after brief hiatus. Curriculum for this course is customized to each learner's needs.

Prerequisite: Junior standing in a Medical Imaging program

**MIT 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**MIT 341 - Magnetic Resonance Imaging**

(F,W,S,Su)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Physics and principles used in the production of magnetic resonance images and spectroscopy, including: safety issues, static and gradient magnetic fields, coils, resonance, frequencies, relaxation, and computer applications. Basic pulse sequences are examined in detail.

Prerequisites: BIO 335, and PHY 201 or PHY 217, all with grade "C" or better

**MIT 342 - Magnetic Resonance Imaging II**

(F,W,S,Su)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Advanced principles of magnetic resonance images. Topics include: Coil function, advanced pulse sequences, artifact reduction techniques, magnetic resonance angiography (MRA), functional magnetic resonance (fMRI) and MRI safety. Laboratory simulation of IV therapy, exam protocols, and adjustment of imaging parameters.

Prerequisite: MIT 341

**MIT 356 - Computed Tomography II**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

CT patient care, radiation dose reduction, and adverse effect of contrast media. Sectional anatomy and pathology of the abdomen, pelvis, chest, head, and spine. Laboratory simulation of imaging protocols and scan post processing. Preparation for ARRT CT registry examination.

Prerequisite: NMT 355 or RDSC 355

**MIT 365 - Magnetic Resonance Imaging Review**

(F,W,S,Su)

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

Review of MR principles of image production for practicing and training MR technologists who intend to sit for the American Registry of Radiologic Technologists MRI examination.

Prerequisite: MIT 341

Corequisites: MIT 342 with instructor consent

**MIT 405 - Medical Imaging Technology Practicum**

Lecture Hours: 1

Lab Hours: 0

Credit Hours: 1

This course is a remedial section designed for imaging Seniors. The requirements for this course are largely clinical, but may include some instructional review. Curriculum for this course is customized to each learner's needs.

Prerequisite: Senior standing in a Medical Imaging program or working toward an advanced level certification

**MIT 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**MIT 411 - Magnetic Resonance****Externship**

(F,W,S,Su)

Lecture Hours: 0

Lab Hours: 13

Credit Hours: 5

A one to three term practicum designed to develop clinical skills at the imaging centers where students are employed.

Students perform MRI examinations for competency, as well as completing the clinical requirements to sit for the post primary American Registry of Radiologic Technologists (ARRT) MRI examination. Prerequisite: MIT 341 with grade "C" or better

Corequisite: MIT 342 and MIT 365, or instructor consent

**Medical Laboratory Science****MLS 100 - Introduction to Medical Laboratory Science**

(S)

Lecture Hours: 1

Lab Hours: 3

Credit Hours: 2

Orientation to the theory and practice of all aspects of the Medical Laboratory Science profession. The history of Medical Laboratory Science, professional organizations and career opportunities are discussed.

**MLS 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**MLS 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**MLS 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**MLS 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**MLS 415 - Clinical Chemistry I**

(W)

Lecture Hours: 5

Lab Hours: 3

Credit Hours: 6

Fundamentals of chemical analysis of body fluids. Laboratory practice in chemical formats, data evaluation, laboratory utilization, and quality control theory. Laboratory exercises linked to lectures: amino acids, proteins, carbohydrates, lipids, blood gases, enzymes, trace elements, electrochemistry, osmometry, electrophoresis, and spectroscopy.

**MLS 416 - Clinical Chemistry II**

(S)

Lecture Hours: 5

Lab Hours: 3

Credit Hours: 6

Fundamentals of chemical analysis of body fluids. Laboratory practice in chemical formats, data evaluation, laboratory utilization, and quality control theory. Laboratory exercises linked to lectures: renal and liver function, porphyrins, hormones, pregnancy, fetal development, bone metabolism, nutrition, and geriatrics.

Prerequisite: MLS 415

**MLS 417 - Clinical Chemistry III**

(Su)

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

The theory, practical application and technical performance of chemical analysis. Emphasis on theory of therapeutic drug monitoring, toxicology, proteomics, individualized screening, and method validation.

Prerequisite: MLS 416

**MLS 420 - Clinical Immunology and Infectious Serology**

(F)

Lecture Hours: 4

Lab Hours: 3

Credit Hours: 5

Lecture/laboratory coverage of human immunity, including innate and adaptive immunity, immune system organs, tissues, and activation. Immunological methods used in the clinical lab to assess human immune response in health and in various disease states are studied.

Corequisite: MLS 432

**MLS 422 - Molecular Diagnostic Methods**

(Su)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Molecular techniques used in the clinical laboratory to diagnose disease. Topics covered include principles of molecular biology, nucleic acid isolation, purification, amplification, quantitation, discrimination, specimen collection/handling, ethical issues and molecular lab operations.

Prerequisites: MLS 415, MLS 416 and MLS 420

**MLS 424 - Hemostasis**

(Su)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Lecture and laboratory coverage of the mechanisms of hemostasis and basic pathophysiology of hemostatic disorders. Students perform laboratory procedures pertaining to hemostasis, interpret results and correlate with other laboratory data to identify disease states.

**MLS 432 - Foundations of Medical Laboratory Science I**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

The first of three courses covering essential professional practice issues related to the pre-analytical, analytical, and post-analytical components of laboratory services. Lecture and lab emphasis on application of theories and concepts underlying professional practice in the contemporary clinical laboratory.

Prerequisite: MATH 361 or instructor consent or admission to the MLS program

**MLS 442 - Hematology I**

(F)

Lecture Hours: 4

Lab Hours: 6

Credit Hours: 6

Lecture and lab coverage of normal development and function of blood cells. Students learn to evaluate normal and abnormal blood cell morphology through microscopic examination of blood smears. Students perform laboratory procedures pertaining to hematology.

**MLS 443 - Immunohematology I**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Lecture and lab coverage of immunohematology with practical application in the contemporary blood bank laboratory. Topics covered include blood groups biochemistry, genetics, and immunology, test methods and transfusion practices including donor selection, component preparation, quality management and compliance issues.

Prerequisites: MLS 420 and MLS 442

**MLS 444 - Microbiology I**

(W)

Lecture Hours: 4

Lab Hours: 6

Credit Hours: 6

Lecture/lab coverage of human bacterial pathogens seen in the clinical laboratory including gram positive and gram negative cocci, and gram positive and gram negative bacilli. Principles and methods of clinical microbiology laboratory diagnosis of bacterial diseases are studied.

**MLS 445 - Microbiology II**

(S)

Lecture Hours: 2

Lab Hours: 6

Credit Hours: 4

Lecture/lab coverage of diseases caused by, and clinical laboratory identification of, human microbial organisms including anaerobes, spirochetes, mycobacteria, chlamydia, and rickettsia. Interpretation of clinical specimens, identification of pathogens, and the recognition of normal flora is also studied.

Prerequisites: MLS 444, MLS 464, and MLS 474

**MLS 449 - Principles of Urinalysis**

(S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Lecture and laboratory coverage of renal function, urine formation, and methods used to analyze urine in the medical laboratory. Students perform physical, chemical, and microscopic analyses on clinical samples and correlate results with states of health and disease in man.

**MLS 452 - Hematology II**

(W)

Lecture Hours: 4

Lab Hours: 3

Credit Hours: 5

Comprehensive study of the pathophysiology of hematological disorders. Students perform microscopic examination of blood films, interpret results and correlate with other laboratory data to identify disease states.

Prerequisite: MLS 442

**MLS 453 - Immunohematology II**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Continued study of immunohematology emphasizing clinical decision-making and problem-solving related to blood banking and transfusion therapy practices.

Prerequisite: MLS 443

**MLS 457 - Research Seminar**

(S)

Lecture Hours: 1

Lab Hours: 0

Credit Hours: 1

Introduction to the process of formal inquiry. Development of skills needed to evaluate research. Develop structured questions to guide inquiry. Examine ethical issues, regulations, research design and the selection of research methods. Identify research career opportunities for medical laboratory scientists.

**MLS 462 - Foundations of Medical Laboratory Science II**

(W)

Lecture Hours: 1

Lab Hours: 3

Credit Hours: 2

The second of three courses covering essential professional practice issues related to the pre-analytical, analytical, and post-analytical components of laboratory services. Lecture and lab emphasis on application of theories and concepts underlying professional practice in the contemporary clinical laboratory.

Prerequisite: MLS 432

**MLS 463 - Foundations of Medical Laboratory Science III**

(F)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Third of three courses covering essential professional practice issues related to the pre-analytical, analytical, and post-analytical components of laboratory services. Emphasis on practical experience through the application of theories and concepts of professional development, administration and supervision at an approved off-campus clinical site.

Prerequisites: MLS 432, MLS 462

**MLS 464 - Medical Mycology and Virology**

(Su)

Lecture Hours: 1

Lab Hours: 3

Credit Hours: 2

Lecture and laboratory coverage of pathogenic fungal and viral organisms with emphasis on those seen in a clinical laboratory. Principles and methods of clinical laboratory diagnosis of infections and diseases caused by these organisms are studied.

**MLS 470 - Chemistry and Immunology Externship**

(F)

Lecture Hours: 0

Lab Hours: 12

Credit Hours: 4

Four weeks full-time practical experience at an approved off-campus clinical site emphasizing application of knowledge and skills to perform a wide variety of testing in a contemporary clinical chemistry/immunology laboratory and further develop discipline specific competency.

Prerequisite: Successful completion of all didactic, pre-clinical coursework in the MLS program

**MLS 471 - Hematology Externship**

(F)

Lecture Hours: 0

Lab Hours: 12

Credit Hours: 4

Four weeks full-time practical experience at an approved off-campus clinical site emphasizing application of knowledge and skills to perform a wide variety of testing in a contemporary clinical hematology laboratory and further develop discipline-specific competency. Prerequisite: Successful completion of all didactic, pre-clinical coursework in the MLS program

**MLS 472 - Microbiology Externship**

(F)

Lecture Hours: 0

Lab Hours: 12

Credit Hours: 4

Four weeks full-time practical experience at an approved off-campus clinical site emphasizing application of knowledge and skills to perform a wide variety of testing in a contemporary clinical Microbiology laboratory and further develop discipline-specific competency. Prerequisite: Successful completion of all didactic, pre-clinical coursework in the MLS program

**MLS 473 - Immunohematology Externship**

(F)

Lecture Hours: 0

Lab Hours: 9

Credit Hours: 3

Practical experience at an approved off campus clinical site emphasizing application of knowledge and skills to perform a wide variety of testing in a contemporary blood bank laboratory and further develop discipline specific competency. Prerequisite: Successful completion of all didactic, pre-clinical coursework in the MLS program

**MLS 474 - Medical Parasitology**

(W)

Lecture Hours: 1

Lab Hours: 3

Credit Hours: 2

Lecture and laboratory coverage of normal and pathogenic parasitic organisms of humans with emphasis on organisms seen in a clinical laboratory. Principles and methods of clinical laboratory diagnosis of infections and diseases caused by these organisms are studied.

Prerequisite: Admission to the MLS program

**Music****MUS 107 - Seminar**

H

Credit Hours: (Hours to be arranged each term.)

**MUS 195 - Band**

HP

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

(One hour each term.)

**MUS 197 - Chorus**

HP

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

(One hour each term.)

**MUS 207 - Seminar**

H

Credit Hours: (Hours to be arranged each term.)

**MUS 307 - Seminar**

H

Credit Hours: (Hours to be arranged each term.)

**MUS 407 - Seminar**

H

Credit Hours: (Hours to be arranged each term.)

**Nuclear Medicine Technology****NMT 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**NMT 205 - Nuclear Medicine Administration**

(W)

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

Orientation to the principles of management, marketing nuclear medicine services, and administrative procedures. Prerequisite: MIT 103 with grade "C" or better

**NMT 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**NMT 212 - Nuclear Medicine Physics/Radiation Biophysics**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Interactions of radiation with matter. Introduction to the cellular and systemic responses to radiation. Early and late somatic and genetic effects described. Critical organ dose calculations risks versus benefits. Overview of film processors, associated chemistry.

**NMT 215 - Radiochemistry and Radiopharmacy**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

The design and function of radionuclide generators, labeling procedures, sterility and pyrogenicity considerations, radionuclide and radiochemical quality control procedures.

Prerequisite: CHE 350 with grade "C" or better

**NMT 217 - Patient Care**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Basic concepts of patient care, including consideration of physical and psychological needs of the patient and family. Routine and emergency patient care procedures. Infection control procedures utilizing Universal Precautions. Role of the nuclear medicine technologist in patient education.

Prerequisite: MIT 103

**NMT 225 - Nuclear Physics/Instrumentation**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

An in-depth examination of the physics in nuclear medicine, principles of detection, considerations of counting and imaging, collimators, planar imaging and associated quality assurance and control. Use of all major instrumentation in Nuclear Medicine Departments.

Prerequisite: NMT 215 with grade "C" or better

**NMT 256 - Cardiovascular Imaging**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to Cardiovascular Imaging techniques in Nuclear Medicine including planar, SPECT, and PET imaging acquisition and processing protocols, radiopharmaceuticals, cardiac anatomy and physiology, exercise and pharmacological stress testing, and EKG principles.

Prerequisites: NMT 205, NMT 215, and NMT 217

**NMT 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**NMT 311 - Imaging Procedures I**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Proper patient care before, during and after the procedure, identification and administration of prescribed radiopharmaceuticals. The use of imaging devices and external detectors for body organ imaging.

Prerequisite: NMT 225 with grade "C" or better

**NMT 312 - Imaging Procedures II**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Proper patient care before, during and after the procedure, identification and administration of prescribed radiopharmaceuticals. The use of imaging devices and external detectors for body and organ imaging.

Prerequisite: NMT 225 with grade "C" or better

**NMT 313 - Therapeutic Procedures**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Common therapeutic applications of radionuclides, dose ranges for each application, and proper techniques for calculating quantities of administered radiopharmaceuticals. Includes patient care, follow-up procedures and disposal of excreta.

Prerequisite: NMT 312 with grade "C" or better

**NMT 315 - Breast Imaging**

Lecture Hours: 1

Lab Hours: 0

Credit Hours: 1

An in-depth analysis of breast anatomy and physiology, positioning, and interventional methods. Patient education and breast cancer statistics will also be discussed at great lengths.

Prerequisite: Junior standing in Nuclear Medicine

**NMT 325 - SPECT Imaging and Computer Applications**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Single photon emission computed tomography (SPECT) imaging and computer applications as applied to nuclear medicine imaging. Demonstration of computer techniques and ECG monitoring and interpretation. Theoretic basis of computer operations and medical applications in nuclear medicine. Lab experience with computerized systems, including hospital sites.

Prerequisites: BIO 335 and NMT 312, both with grade "C" or better

**NMT 355 - Computed Tomography**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

X-ray physics, scanner components and data acquisition of computed tomography. Image reconstruction, manipulation and artifacts. CT patient care and imaging procedures of the head, neck, spine, chest, abdomen, pelvis and musculoskeletal system. Laboratory simulator practice on image manipulation, scan post processing and reconstruction.

Prerequisite: NMT 311 with grade "C" or better

Corequisites: BIO 335 and NMT 367

**NMT 367 - PET Imaging**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to Positron Emission Tomography (PET) imaging techniques including acquisition protocols, processing protocols, quality control procedures, radiation protection, patient screening, radiopharmaceuticals, image fusion, and imaging procedures.

Prerequisite: NMT 225 with grade "C" or better

Corequisites: NMT 311 and NMT 346

**NMT 388 - Externship Preparation**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Review and summarize key concepts in Nuclear Medicine. Focus is on patient care and interpersonal scenarios the externship student will likely face while in the hospital environment. Review and discussion of the NMT Externship Handbook and Procedures Log.

Prerequisite: Third quarter Junior standing

**NMT 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**NMT 410 - Nuclear Medicine Technology Externship**

(F,W,S)

Lecture Hours: 0

Lab Hours: 40

Credit Hours: 15

All students must complete four consecutive terms (12 months) of clinical experience in nuclear medicine technology at an Oregon Tech approved site. Students will work under the direct supervision of a registered Nuclear Medicine Technologist.

Prerequisite: All NMT courses with grade "C" or better

**NMT 445 - Computed Tomography Clinical Experience**

(F,W,S)

Lecture Hours: 0

Lab Hours: 15

Credit Hours: 5

All students must complete three consecutive terms (9 months) of clinical experience in computed tomography at a hospital or clinic of their choosing. Students will work under the direct supervision of an ARRT (CT) board registered technologist.

Prerequisites: ARRT and/or NMTCB registry in Nuclear Medicine Technology. Successful completion and faculty approval of Computed Tomography and Cross Sectional anatomy course.

## Physical Education

### **PHED 100 - Belly Dance: Beginning**

(F,W,S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Experience and unique dance form. Students will learn basic hip, rib, and shoulder isolations and of course shimmies. All of this and more are done in combinations, and finally a choreographed dance.

### **PHED 101 - Belly Dance: Intermediate**

(W,S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

A continuation of the beginning class. More complex moves are introduced and more technical expertise is expected. Dancing with veils will be introduced. There will be more complex choreography and music. Dance experience is helpful.

### **PHED 102 - Zumba**

(F,W,S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Zumba is an exhilarating, effective, easy to follow, Latin inspired, calorie burning dance fitness party. Zumba classes feature exotic rhythms set to high energy Latin and international beats.

### **PHED 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

### **PHED 110 - Boot Camp/Kick Boxing**

(F,W)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

This is a high-low workout with an emphasis on kickboxing (both Taebo and Turbo kickboxing), also included is body pump workouts, core ball as well as Winsor Pilates stretching.

### **PHED 111 - Core Strength and Balance**

(W,S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

BOSU ball training to improve balance and core strength and alleviate back pain and instability. This class includes full body training, using floor work, cardio circuits, and isometric exercises.

### **PHED 112 - Intro to Cardio and Core**

(S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

A survey participation of cardiovascular group exercise using cardio kickboxing (including both Taebo and Turbo kickboxing), dance aerobics, and step aerobics.

### **PHED 113 - Super Circuit and Cardio Training**

(F,W,S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

This course is designed to use a combination of free weights and/or the universal machines, along with cardiovascular fitness to provide a comprehensive program to increase muscle strength and endurance.

### **PHED 120 - Pilates and Body Pump**

(W,S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Focus is the floor techniques developed by Joseph Pilates as well as ball Pilates/core strength training. Use of a core ball and body pump bar for anaerobic workout and tone.

### **PHED 121 - Total Fitness Conditioning I**

(F,W,S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Opportunity to do an independent study of a selected aspect of physical education. Class designed to develop and encourage healthy attitudes and habits with regard to cardiovascular efficiency, body composition, muscular strength and endurance, and flexibility.

### **PHED 122 - Total Fitness Conditioning II**

(F,W,S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Opportunity to do an independent study of a selected aspect of physical education. Class designed to develop and encourage healthy attitudes and habits with regard to body composition, muscular strength and endurance. Geared toward weight training workouts, and isometric exercises.

### **PHED 123 - Dancercise/Step Aerobics**

(S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

A combination of step aerobics and dance moves to provide a fat burning/cardiovascular workout.

### **PHED 124 - Weight Loss**

(W)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Introduction to weight loss and the wellness model. Develop a fitness program for basic nutrition and weight control. Lecture portion spent in the field and in the weight room/ cardio room learning techniques and skills related to weight control.

### **PHED 125 - Weight Management Fitness**

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Continuation of the Weight Loss class. Meant to reinforce commitment to fitness for participants. Includes 40-45 minutes cardio and 15 minutes of intense cardiovascular training and 20-30 minutes low cardiovascular training. No lecture on weight loss with this class.

### **PHED 126 - Body Pump and Core Ball Pilates**

(F)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

A strength and endurance training workout involving intermittent cycles of cardio and weight training. Workouts intended to increase a person's metabolic rate as well as anaerobic fitness level.

### **PHED 130 - Rowing**

(F,S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Learn the fundamentals of rowing in a multi-person racing shell with racing oars and sliding seats. Also covered will be rowing and race terminology, marine safety, and improving fitness. Good swimming skills required.

**PHED 131 - Scuba: Beginning**

(S)

Lecture Hours: 1

Lab Hours: 3

Credit Hours: 2

Entry-level course. 1 hour lecture and 2 pool sessions per week. Post-course students are eligible for NAUI certification dives. Consists of 5 dives over two day period off-campus. No additional charge.

Prerequisite: Must pass swim test

**PHED 132 - Scuba: Advanced**

(S)

Lecture Hours: 1

Lab Hours: 3

Credit Hours: 2

Learn diving in challenging environments. Six dives include night, navigation, and deep dives and three others (your choice). Dives on weekend's off-campus. Dive gear furnished. Included is certification to dive Oxygen enriched mixtures (Nitrox).

Prerequisite: PHED 131

**PHED 141 - Tai Chi for Circulation**

(F,S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Learn ancient Chinese techniques to reduce stress, improve balance, and facilitate health. Practice includes various forms utilizing acupressure points and energy meridians that additionally will help facilitate health of heart and lungs, normalize blood pressure, and control blood sugar.

**PHED 142 - Tai Chi for Internal Organs**

(S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Learn ancient Chinese techniques to reduce stress, improve balance, and facilitate health. In a relaxed atmosphere, practice of various forms will additionally utilize acupressure points and energy meridians to facilitate health of internal organs.

**PHED 143 - Tai Chi and Qigong: Health, Bones, Muscle**

(W)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Learn ancient Chinese techniques to reduce stress, improve balance, and facilitate health. In a relaxed atmosphere, practice of various forms that additionally will help maintain bone density, ward off arthritis, maximize joint flexibility, and strengthen muscles supporting joints.

**PHED 144 - Tai Chi and Qigong: Neck/Back Strength**

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Learn ancient Chinese techniques to reduce stress, improve balance, and facilitate health. In a relaxed atmosphere, practice of various forms that additionally will strengthen neck and back, and help to prevent injury or heal from previous injuries.

**PHED 145 - Relaxation and Flexibility**

(F)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Explore Tai Chi and Qigong methods for stress reduction and facilitation of balance and flexibility. Other stress reduction methods include autogenic training, progressive muscle relaxation, and self-hypnosis. Explore the impact of cardiorespiratory exercise and diet on stress management.

**PHED 146 - Yoga**

(F,W,S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Class is generally Hatha Yoga, along with basic Ashitanga, and Kundalini Yoga techniques. In yoga a participant can hope to improve their flexibility, strength and balance.

**PHED 150 - Aikido**

(F)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

A Japanese martial art reflecting the circular movements and energy transference found throughout the universe. Provides the necessary skills to train for practical and tough self-defense while building self-confidence, character, self-respect, and respect for others.

**PHED 151 - Karate**

(F,W)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Dive into the very heart and soul of Karate! Teachings in traditional forms, self-defense, and competitive style point sparring. Great for new and experienced students. Promotes physical activity, increased mobility, and awareness while learning a valuable life skill.

**PHED 160 - Cross Country Skiing: Beginning**

(W)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Explore clothing, equipment and learn to travel on cross country skis while avoiding winter hazards. Learn basic map and compass skills to avoid getting lost. Two field trips provide experience to use for a lifetime.

**PHED 161 - Snowshoeing: Beginning**

(W)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Explore clothing, equipment and learn to snowshoe while avoiding winter hazards. Learn basic map and compass skills to avoid getting lost. Two field trips provide an enjoyable and learning recreational experience to use for a lifetime.

**PHED 162 - Ice Skating**

(W)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Covers basic figure skating technique using U.S. Figure Skating adult teaching guidelines, levels 1 through 4. Skills include proper use of forward and backward edges, basic curves and turns, simple spins and integrated use of upper body and arm movements.

**PHED 163 - Wilderness Navigation**

(S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Learn to read a map and utilize a compass. Gain skill to find precise wilderness locations. Learn the dangers of wilderness travel, and deal with those situations. Two field trips polish skills using map and compass to navigate.

**PHED 170 - Golf**

(S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Lecture covers terminology, rules, etiquette, and course management. Practical class will cover putting, chipping, and driving.

**PHED 171 - Archery: Beginning**

(S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Students learn basics of shooting a bow & arrow. Safety, form, mechanics, and practical basic skills. Classes meet off-campus. No prior experience required.

**PHED 172 - Archery: Intermediate**

(S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Build upon basic skills learned in Beginning Archery. Advanced instruction in shooting, mechanics, and basic repairs offered. Classes meet off-campus.

Prerequisite: PHED 171

**PHED 174 - Recreational Basketball**

(F,W,S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Basketball game played in a recreational environment. Emphasis on free play and team skill development. Most suitable for players with basic basketball skills.

**PHED 175 - Rugby**

(F,W,S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Basic rugby skill, practice, and game play. Players of any skill level welcome. Participants should be able to engage in physical contact, strength development, endurance training, team practice, and game play.

**PHED 180 - Varsity Cross Country**

(F,W,S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Competitive Cross Country for multi-level distance runners. Trail running, conditioning, strength training, psychological peak performance, nutrition, race tactics, running physiology and injury prevention is included. Participation in intercollegiate competition is included. Varsity athletes only or coach's approval.

**PHED 181 - Varsity Soccer**

(F,W,S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Competitive Soccer at the intercollegiate level, including coaching strategies, offensive and defensive strategies, training, conditioning and team organization. Varsity athletes only or coach's approval.

**PHED 182 - Varsity Track/Field**

(F,W,S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Competitive Track and Field techniques are covered including training, conditioning and team organization. Competition at the intercollegiate level. Varsity athletes only or coach's approval.

**PHED 183 - Varsity Men's Baseball**

(F,W,S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Competitive Baseball on the intercollegiate level, including coaching strategies, offensive and defensive strategies, training, conditioning and team organization. Varsity athletes only or coach's approval.

**PHED 184 - Varsity Men's Basketball**

(F,W,S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Competitive Basketball, including coaching strategies, offensive and defensive strategies, training, conditioning and team organization, including intercollegiate competition. Varsity athletes only or coach's approval.

**PHED 185 - Varsity Women's Basketball**

(F,W,S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Competitive Basketball, including coaching strategies, offensive and defensive strategies, training, conditioning and team organization, including intercollegiate competition. Varsity athletes only or coach's approval.

**PHED 186 - Varsity Women's Softball**

(F,W,S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Competitive Softball including coaching strategies, offensive and defensive strategies, training, conditioning and team organization, including intercollegiate competition. Varsity athletes only or coach's approval.

**PHED 187 - Varsity Women's Volleyball**

(F,W,S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Competitive Volleyball at the intercollegiate level including advanced technique analysis, offensive and defensive strategies, training, conditioning, and team organization. Varsity athletes only or coach's approval.

**PHED 188 - Varsity Sport Strength/Conditioning**

(F,W,S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

This course provides instruction for sports specific conditioning for varsity athletes. This includes strength training, power training, speed and agility training, core training, dynamic flexibility, and specific energy system training. Varsity athletes only or instructor consent.

**PHED 189 - Varsity Golf**

(F,W,S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Competitive golf techniques are covered including training, conditioning, team organization and advanced technique analysis. Competition at the intercollegiate level. Varsity athletes only or coach's approval.

**PHED 190 - Physical Education**

(F,W,S)

Lecture Hours: 0

Lab Hours: 3

Credit Hours: 1

Service course. General participation in physical activities to promote sound health.

**PHED 201 - Sports Seminar - Officiating**

(S)

Lecture Hours: 1

Lab Hours: 3

Credit Hours: 2

This course includes rules, mechanics and officiating procedures in sports found in intercollegiate, interscholastic, and intramural programs. Practical experience in officiating will be provided.

**PHED 207 - Major Sports Seminar**

(F,W,S)

Lecture Hours: 1

Lab Hours: 2

Credit Hours: 2

Development of professional competencies in fundamentals of training methods and objectives of major sports.

**PHED 255 - Introduction to Coaching Theory**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

An introduction to the central principles of coaching. Exploration of coaching as a practice including theories of coaching, motivation, and organization.

**PHED 291 - Lifeguard Training**

(S)

Lecture Hours: 1

Lab Hours: 2

Credit Hours: 2

Basic skills of lifesaving in aquatic programs; American Red Cross Advanced Lifesaving Authorization.

**PHED 292 - Water Safety Instructor**

(S)

Lecture Hours: 1

Lab Hours: 2

Credit Hours: 2

Analysis, methods of instruction, and teaching of aquatic skills; American Red Cross Authorization in Water Safety Instruction.

**PHED 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**PHED 355 - Coaching in Application**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Application of the principles of coaching. Application of the theories of coaching across contexts and in various different sports.

Prerequisite: PHED 255

**PHED 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**PHED 455 - Coaching Practicum**

(S)

Lecture Hours: 0

Lab Hours: 6

Credit Hours: 3

Practical application of coaching theories and methods in context. 60 hours of directed coaching experience.

Prerequisite: PHED 355

**Philosophy****PHIL 105 - Introduction to Ethics**

(F) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Students will become familiar with Kant's moral theory and Utilitarianism and use them to examine the morality of abortion, factory farming, and famine relief, among others. Students will learn how to make rational moral judgments.

Prerequisite: WRI 122 or WRI 227

**PHIL 107 - Seminar**

H

Credit Hours: (Hours to be arranged each term.)

**PHIL 205 - Introduction to Logic**

(F,W,S) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

This course prepares students to critique and assess arguments according to the rules of logic. Students will learn formal and informal methods for assessing deductive, inductive, abductive arguments. Logic is useful for all majors because everything you learn at OIT is based on arguments.

**PHIL 207 - Seminar**

H

Credit Hours: (Hours to be arranged each term.)

**PHIL 215 - Ethical Theory**

(W) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Students will become familiar with some plausible moral theories: Kant's moral theory, Aristotle's moral theory, Utilitarianism, The Social Contract, Feminist Ethics and with some more controversial moral theories: Cultural Relativism, Divine Command Theory, Natural Law Theory, Emotivism.

Prerequisite: WRI 122 or WRI 227

**PHIL 305 - Medical Ethics**

(F) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Students will become familiar with Kant's moral theory and Utilitarianism and use them to examine the morality of abortion, paternalism, allocation of medical resources, and the right to die, among others. Students will learn how to make rational moral judgments.

Prerequisites: WRI 122 and Junior standing

**PHIL 307 - Seminar**

H

Credit Hours: (Hours to be arranged each term.)

**PHIL 315 - The Ethics of Emerging Technology**

(F) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

In this course we will become familiar with genetic engineering, geoengineering and cognitive enhancement and examine the moral status of each. This course will provide you with the critical thinking skills to make rational ethical decisions concerning emerging technologies.

Prerequisite: WRI 122 or WRI 227

**PHIL 325 - Environmental Ethics**

(S) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Students will become familiar with influential moral theories, including those of Kant and Aristotle and Utilitarianism. Possible topics include: What is nature? Do we have a moral obligation to restore ecosystems? If we have moral obligations to nature, on what grounds?

Prerequisite: WRI 122 or WRI 227

**PHIL 331 - Ethics in the Professions**  
(F,W,S) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Applied ethics course that focuses on examining ethical issues common to the professions, such as privacy, confidentiality, social responsibility and whistle-blowing. Emphasizes critical thinking and ethical decision-making skills.

Prerequisite: WRI 123 or WRI 227

**PHIL 335 - Philosophy of Science**  
(W) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

What is the difference between science and pseudoscience? What is a scientific explanation? What is a law of nature? Is science objective or value-laden? In this course, students will engage with these and other fundamental topics in philosophy of science.

Prerequisite: WRI 122 or WRI 227

**PHIL 342 - Business Ethics**  
(F,W,S) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Business ethics course that focuses on ethical issues commonly found in business, such as whistle-blowing, discrimination, finance and international manufacturing. Emphasizes critical thinking, critical reading and the importance of personal ethics.

Prerequisites: One previous Humanities course and WRI 122

**PHIL 405 - Advanced Logic**  
(W) H

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

This course will build off the foundation of PHIL 205. Students will deepen their understanding of sentential logic and will learn about predicate logic. We will also prove that both formal systems are sound and complete.

Prerequisite: PHIL 205

**PHIL 407 - Seminar**  
H

Credit Hours: (Hours to be arranged each term.)

**Physics****PHY 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**PHY 201 - General Physics**  
(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

An introduction to physics with study of Newtonian mechanics, including kinematics, dynamics, work, energy, power, and hydraulics. All general physics students must register for a laboratory section.

Prerequisite: MATH 112 with grade "C" or better

**PHY 202 - General Physics**  
(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Temperature systems, heat, kinetic theory of gasses, introductory thermodynamics, and the fundamentals of electricity and magnetism. All general physics students must register for a laboratory section.

Prerequisite: PHY 201

**PHY 203 - General Physics**  
(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Wave motion, sound, introduction to geometrical and physical optics, and topics from modern physics. All general physics students must register for a laboratory section.

Prerequisite: PHY 202

**PHY 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**PHY 215 - Topics in Astronomy**  
(F)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Astronomy including a survey of the solar system, constellations, star characteristics, star groupings, galactic and extragalactic objects, stellar evolution, and instrumentation with emphasis on topics of maximum interest to the students.

Prerequisite: MATH 111

**PHY 217 - Physics of Medical Imaging**

(F,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

An introduction to physics for MIT majors. Topics include: basic mechanics, basic electrostatics, fundamentals of electronics, magnetism, sources and types of radiation, and image formation.

Prerequisite: MATH 112 with grade "C" or better

**PHY 221 - General Physics with Calculus**

(F,W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Basic principles of physics with emphasis on applications of calculus. Newtonian mechanics, including kinematics, dynamics, work, energy, power, and hydraulics. All general physics students must register for a laboratory section.

Prerequisite: MATH 251 with grade "C" or better

Corequisite: MATH 252

**PHY 222 - General Physics with Calculus**

(W,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Temperature systems, heat, kinetic theory of gasses, thermodynamics and the fundamentals of electricity and magnetism. All general physics students must register for a laboratory section.

Prerequisites: MATH 252 and PHY 221

**PHY 223 - General Physics with Calculus**

(F,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Wave motion, sound, introduction to geometrical and physical optics, and selected topics from modern physics. All general physics students must register for a laboratory section.

Prerequisite: PHY 222

**PHY 305 - Nanoscience and Nanotechnology**

(F)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Survey of chemical and physical phenomena as applied to nanoscale materials, including metal and semiconductor nanoparticles and carbon nanostructures. Discussion of major synthesis and characterization techniques. Biological and engineering applications of nanoscale materials.

Prerequisites: PHY 222 or PHY 223, and CHE 202 or CHE 222

**PHY 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**PHY 311 - Introduction to Modern Physics**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

An introduction to physics of the 20th century, including selected topics from atomic and nuclear physics and quantum theory with applications in science and industry.

Prerequisite: PHY 203 or PHY 223

**PHY 312 - Introduction to Modern Physics**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

An introduction to physics of the 20th century, including selected topics from atomic and nuclear physics and quantum theory with applications in science and industry.

Prerequisite: PHY 203 or PHY 223

**PHY 313 - Introduction to Modern Physics**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

An introduction to physics of the 20th century, including selected topics from atomic and nuclear physics and quantum theory with applications in science and industry.

Prerequisite: PHY 203 or PHY 223

**PHY 330 - Electricity and Magnetism**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

A study of electromagnetic phenomena leading to and using Maxwell's equations. Topics will include static fields in vacuum and in dielectric media, electric and magnetic potentials, and the energy density of electromagnetic fields.

Prerequisites: MATH 254 and PHY 222

Corequisite: MATH 253

**PHY 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**PHY 410 - Mathematical Methods: Fourier Optics**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Linear systems, Fourier transforms, and their use in optics. Topics will include special functions, orthogonal expansions, Fourier series and transforms and spectra of functions, mathematical operators, convolution, autocorrelation, cross correlation, linear systems as filters, and signal processing.

Prerequisite: MATH 254

**PHY 448 - Geometric Optics**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Reflection and refraction at plane and curved surfaces; imaging properties of lenses; first order Gaussian optics and thin-lens system layout; matrix optics; ray-tracing software; spherical and chromatic aberrations.

Prerequisite: PHY 223

**PHY 449 - Radiometry & Optical Detection**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Fundamentals of radiometry and photometry; detection of light using thermal and photon (photoemissive, photoconductive, and photovoltaic) methods; noise processes; blackbodies; charge transfer devices; spectroradiometry.

Prerequisites: EE 223 and PHY 223

**PHY 450 - Physical Optics**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Spherical and planar waves; scalar diffraction theory; Fresnel and Fraunhofer diffraction and application to measurement; interference and interferometers; optical transfer functions; coherent optical systems and holography.

Prerequisite: PHY 223

**PHY 451 - Lasers**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Laser radiation properties, laser cavities, coherence, atomic spectra, pumping rate, power gain, threshold conditions, beam shape, mode structure; ion, molecular, solid-state, dye, semiconductor, and fiber lasers.

Prerequisite: EE 450 or PHY 450

**PHY 452 - Waveguides and Fiber Optics**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Light propagation in fibers and waveguides; termination, coupling, and splicing of fibers; fiber optic communication; optical time domain reflectometry, fiber amplifiers, and fiber sensors.

Prerequisite: EE 450 or PHY 450

**PHY 453 - Optical Metrology**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Modern optical metrology with emphasis on non-destructive testing; Fourier optics; Moiré and polarization methods; classic and holographic interferometry; speckle techniques; fringe analysis.

Prerequisite: EE 450 or PHY 450

**PHY 548 - Geometric Optics**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Reflection and refraction at plane and curved surfaces; imaging properties of lenses; first order Gaussian optics and thin-lens system layout; matrix optics; ray-tracing software; spherical and chromatic aberrations.

Prerequisite: PHY 223

**PHY 549 - Radiometry & Optical Detection**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Fundamentals of radiometry and photometry; detection of light using thermal and photon (photoemissive, photoconductive, and photovoltaic) methods; noise processes; blackbodies; charge transfer devices; spectroradiometry.

Prerequisite: PHY 223

**PHY 550 - Physical Optics**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Spherical and planar waves; scalar diffraction theory; Fresnel and Fraunhofer diffraction and application to measurement; interference and interferometers; optical transfer functions; coherent optical systems and holography.

Prerequisite: PHY 223

**PHY 551 - Lasers**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Laser radiation properties, laser cavities, coherence, atomic spectra, pumping rate, power gain, threshold conditions, beam shape, mode structure; ion, molecular, solid-state, dye, semiconductor, and fiber lasers.

Prerequisites: EE 450/PHY 450 or EE 550/PHY 550

**PHY 552 - Waveguides and Fiber Optics**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Light propagation in fibers and waveguides; termination, coupling, and splicing of fibers; fiber optic communication; optical time domain reflectometry, fiber amplifiers, and fiber sensors.

Prerequisites: EE 450/PHY 450 or EE 550/PHY 550

**PHY 553 - Optical Metrology**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Modern optical metrology with emphasis on non-destructive testing; Fourier optics; Moiré and polarization methods; classic and holographic interferometry; speckle techniques; fringe analysis.

Prerequisites: EE 450/PHY 450 or EE 550/PHY 550

**Political Science****PSCI 107 - Seminar**

SS

Credit Hours: (Hours to be arranged each term.)

**PSCI 201 - United States Government**

(W) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Basic concepts and principles of the American political system.

**PSCI 207 - Seminar**

SS

Credit Hours: (Hours to be arranged each term.)

**PSCI 250 - Introduction to World****Politics**

(F,S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to international relations and global issues. The rise and demise of the Cold War, international efforts towards arms control, and global environmental and economic problems.

Prerequisite: WRI 122

**PSCI 307 - Seminar**

SS

Credit Hours: (Hours to be arranged each term.)

**PSCI 407 - Seminar**

SS

Credit Hours: (Hours to be arranged each term.)

**PSCI 497 - United States Foreign Policy**

(S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

The American foreign policy process, recurring themes in U.S. foreign policy, and the content of U.S. policy in such areas as Europe, Latin America, and the Middle East.

Prerequisite: PSCI 250

**Polysomnographic Technology****PSG 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**PSG 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**PSG 211 - Fundamentals of PSG and Patient Care**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Basic concepts of patient care, including consideration of physical and psychological needs of the patient and family. Routine and emergency patient care procedures. Infection control procedures utilizing universal precautions. Role of the polysomnographic technologist in patient education. Ethical and legal issues.

**PSG 221 - Physiology of Sleep**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to sleep architecture and the function of changes in electroencephalograms, electrocardiograms, and electromyograms. Physiology of sleep-induced alterations in pharyngeal muscle tone, autonomic control and polysomnographic staging.

**PSG 231 - Sleep Disorders Pathology (W)**

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Normal and abnormal sleep disorders integrating the physiological functions of the nervous, respiratory, and cardiovascular systems. Emphasis on basic sleep sciences, physiology, diagnosis and treatment of sleep disorders.

Prerequisite: PSG 221

**PSG 246 - Sleep Disorders in Women (W)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

In-depth study of sleep disorders in women exploring: the menstrual cycle; circadian rhythms and shift working women; polycystic ovary syndrome; endometriosis, fibromyalgia; breast cancer and fatigue; pregnancy and sleep-disordered breathing; insomnia and other medically related sleep disturbances.

**PSG 264 - Pediatric/Neonatal Polysomnography (F,S)**

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Presentation of theory and its practical applications in pediatric and neonatal respiratory diseases and other sleep disorders. Includes pathophysiology, etiology, patient testing, scoring and treatment.

Prerequisite: PSG 221 or RPSGT licensed

**PSG 271A - Clinical Polysomnographic Technology Part A (F,S)**

Lecture Hours: 2

Lab Hours: 12

Credit Hours: 6

Medical terminology, instrumentation setup and calibration, 10/20 system, patient hookups, recording and monitoring techniques, documentation, event recognition, monitoring, therapeutic intervention, professional issues and patient-technologist interactions related to polysomnographic technology. Part-time students only, requires 18 nighttime clinical hours weekly.

Pre- or Corequisite: PSG 211

**PSG 271B - Clinical Polysomnographic Technology Part B (F,W,S)**

(F,W,S)

Lecture Hours: 2

Lab Hours: 12

Credit Hours: 6

Medical terminology, instrumentation setup and calibration, 10/20 system, patient hookups, recording and monitoring techniques, documentation, event recognition, monitoring, therapeutic intervention, professional issues and patient-technologist interactions related to polysomnographic technology. Part-time students only, requires 18 nighttime clinical hours weekly.

Prerequisite: PSG 271A

**PSG 271C - Clinical Polysomnographic Technology Part C (W,S)**

(W,S)

Lecture Hours: 2

Lab Hours: 12

Credit Hours: 6

Advanced aspects of polysomnographic technology including recognition of sleep disorders, recording and monitoring, therapeutic interventions, scoring, MSLT, RSW and neurophysiology interpretation of sleep. Part-time students only, requires 18 daytime clinical hours weekly.

Prerequisite: PSG 271B

**PSG 272 - Clinical Polysomnographic Technology I (F,W,S)**

(F,W,S)

Lecture Hours: 2

Lab Hours: 27

Credit Hours: 9

Medical terminology, instrumentation setup and calibration, 10/20 system, patient hookups, recording and monitoring techniques, documentation, event recognition, monitoring, therapeutic intervention, professional issues and patient-technologist interactions related to polysomnographic technology. Requires 27 clinical hours weekly at night in the lab.

Pre- or Corequisite: PSG 211

**PSG 273 - Clinical Polysomnographic Technology II (F,W,S)**

(F,W,S)

Lecture Hours: 2

Lab Hours: 27

Credit Hours: 9

Advanced aspects of polysomnographic technology including recognition of sleep disorders, recording and monitoring, therapeutic interventions, scoring, Multiple Sleep Latency Test. Repeated Test of Sustained Wakefulness and neurophysiology interpretation of sleep. Requires 27 clinical hours weekly during the day and night.

Prerequisite: PSG 272

**PSG 291 - Clinical Sleep Educator**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Examination of the sleep technologist's increasing involvement in the identification, treatment and long term monitoring of patients presenting with insomnia, sleep apnea, and poor sleep hygiene. Review of the Clinical Sleep Educator certificate offered by the BRPT.

Prerequisite: PSG 221

**Population Health Management****PHM 105 - Intro to Population Health Management (F)**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

This course introduces students to the field of population health management, including the various careers, initiatives, and skills related to population health practice.

**PHM 215 - Public Health Policy (F)**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

This course explores public health issues throughout the lifespan and corresponding health policy initiatives designed to reduce prevalence of the preventable diseases. Particular attention will be paid to the collective impact framework for health policy.

**PHM 321 - Community Program Planning**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

This course prepares student to identify, develop, and coordinate interventions in a community health setting to target chronic disease risk reduction. Students will gain an understanding of chronic disease epidemiology and best practices in public health programming and gain skills in program planning methods.

Prerequisites: SOC 225 and WRI 227

**PHM 345 - Community Health Grant Writing**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

This course prepares students to develop grant proposals to secure funding for health promotion initiatives in a community health setting. Students develop skills to assess the health of target populations, identify pressing health needs, select appropriate evidence-based programs that address these needs, and prepare information in a grant proposal format.

By the end of this course students will be able to:

1. Identify contemporary public health issues and explain the diverse approaches used to address them in a community health setting
2. Develop community health assessment skills and identify data collection strategies
3. Develop program planning and evaluation skills for specific community health needs
4. Identify funding resources for community-based health promotion programs
5. Develop grant writing skills

Prerequisites: SOC 225 and WRI 227

**PHM 420 - Population Health Management Externship**

Credit Hours: Varies (1-16)

This course prepares students for work in the field of Population Health Management. Students will gain professional experience and apply the knowledge and skills learned in Population Health Management courses to real-world population health issues.

**PHM 435 - Research Center (S)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

The research center course places students as professionals in training at the Population Health Management Research Center. The mission of the Oregon Tech Population Health Management Research Center is to provide students rigorous training in applied social science and community-based research through professional work experience in population health, supporting organizations that promote the education and overall well-being of the region.

**Professional Writing****PWR 101 - Introduction to Professional Writing**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to the skills and tools necessary for a career in writing. Collaborative writing, editing, common genres, giving and receiving professional feedback. Exploration of scientific and technical, digital, and organizational writing to prepare students to choose a major track.

Pre or Corequisite: WRI 121

**PWR 102 - Introduction to Web Authoring**

Lecture Hours: 2

Lab Hours: 1

Credit Hours: 3

Rhetorically-grounded introduction to web technologies and the history and current state of the internet. Introduction to HTML and CSS. Genres of web content. Managing content on a web server. Introduction to content-management systems. Students will build a personal web page.

Pre or Corequisite: WRI 121

**PWR 206 - Social Media**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Strategies for integrating social media and digital marketing as part of professional writing. Practical steps, techniques, and best practices geared toward integrating social media and digital programs into business, personal, and artistic communication.

Prerequisite: WRI 122

Corequisite: COM 237

**PWR 215 - Writing in the Public Interest**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Emphasizes professional writing needs of nonprofit and community stakeholders. Focuses on analyzing particular rhetorical situations and using appropriate rhetorical strategies to produce multiple issue-focused documents in various genres. Culminates in professional portfolio prospective client.

Pre or Corequisite: WRI 227

**PWR 220 - Writing for Interactive Media**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Explores writing and editing for visual, audio, and interactive media. Workshops focus on choosing appropriate format and delivery mechanisms for news, Web sites, gaming, etc. Topics include accessibility, copyright law, information ethics, linear and non-linear media, including game writing.

Prerequisite: WRI 122 with grade "C" or better

**PWR 306 - Writing for the Health Professions**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Emphasizes professional writing needs of health professionals. Focuses on analyzing particular rhetorical situation and using appropriate rhetorical strategies to produce multiple issue-focused documents in various genres. Culminates in simulated outreach project requiring translation of expert medical content for non-expert audiences.

Prerequisite: WRI 227

**PWR 310 - Professional Writing for International Audiences**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Emphasizes professional writing needs of international audiences. Focuses on analyzing and understanding particular international contexts, revising documents according to rhetorical needs, and implementing strategies for creating original documents to address international audiences. Culminates in case study portfolio of professional documents.

Pre or Corequisites: COM 216 and WRI 328

**PWR 315 - Advanced Web Authoring**

Lecture Hours: 2

Lab Hours: 1

Credit Hours: 3

Advanced use of HTML and CSS.

Introduction to database-driven content development including JavaScript, PHP, and MySQL. Choosing and implementing content management systems, content models, and deploying site architecture. Usability testing a website and performing user analytics.

Prerequisites: COM 237 and PWR 102

**PWR 320 - Structured Authoring**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Advanced practice in documentation writing, information architecture and modular writing. Students will learn industry-standard writing practices such as Markdown, XML, and DITA. Students will also gain proficiency in content management and writing for re-use.

Prerequisite: WRI 227

**PWR 330 - User Research**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Applied research methods for developing interfaces, documents, and applications. Planning, testing, and revising a user experience. User analytics, field methods, interviewing, focus groups, usability testing, and other workplace practices for inquiry into users and audiences.

Prerequisite: WRI 227

**PWR 355 - Project Management for Writers**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Focuses on project planning, management, and assessment for large-scale communication (print and electronic) projects. Introduces the theory and practice of audience-, organization-, and process-based approaches to content strategy.

Prerequisites: SPE 321 and WRI 227

**PWR 490 - Portfolio Development**

Credit Hours: Variable 2 or 3

Focuses on the development of a professional senior portfolio that provides evidence of all writing experience and skill level.

Prerequisite: Any upper division writing course

**PWR 499 - Internship in Professional Writing**

Credit Hours: Variable to total of 9 credits

Students work in applied setting in their emphasis and under the supervision of an on-site mentor. Regular contact with extern advisor required. Written externship reports required. Writing proficiency exam must be passed before starting internship. Senior standing required.

Prerequisites: PWR 355 and upper division course in emphasis area

**Psychology****PSY 107 - Seminar**

SS

Credit Hours: (Hours to be arranged each term.)

**PSY 110 - Human Services Careers**

(S) SS

Lecture Hours: 1

Lab Hours: 0

Credit Hours: 1

Presentation and discussion of career options of psychology majors.

**PSY 201 - Psychology**

(F,W,S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to the principles and applications of psychology. Topics include scientific methodology, learning, memory, cognition, and intelligence.

**PSY 202 - Psychology**

(F,W) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to the principles and applications of psychology. Topics include the brain and behavior, consciousness, sensation and perception, health psychology, motivation, and emotion.

**PSY 203 - Psychology**

(W,S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to the principles and applications of psychology. Topics include social psychology, personality, abnormal psychology, psychotherapy, and development.

**PSY 207 - Seminar**

SS

Credit Hours: (Hours to be arranged each term.)

**PSY 215 - Abnormal Psychology I**

(F) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Overview of biological, psychological, and social causes of abnormal behavior. Specific topics include models, classification and assessment of abnormal behavior, as well as anxiety, somatoform, dissociative, personality, impulse, alcohol and substance abuse disorders.

Prerequisite: PSY 203 or instructor consent

**PSY 216 - Abnormal Psychology II**

(W,S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Overview of legal and ethical issues related to abnormal psychology.

Techniques of group and individual therapy. Specific disorders include: sexual and gender identity, mood, schizophrenia, cognitive, and childhood and adolescence.

Prerequisite: PSY 215 or instructor consent

**PSY 220 - Community Psychology**

(F,S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Provides a comprehensive understanding of community mental health, social ecology, and program planning/evaluation at the community level. Focuses on understanding community-based research and practice. Critical thinking regarding community and environmental factors and application of theory to solve community problems.

Prerequisite: PSY 203

**PSY 225 - Applied Statistics for the Social Sciences**

(W) SS

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Provides an overview of basic statistical techniques in social sciences, including t-test, chi-square, ANOVA, correlation, and regression. Students will engage in hands-on experience analyzing, interpreting, and reporting data. Students will develop skills applying basic statistical tests to answer research questions.

Prerequisite: MATH 100 or instructor consent

**PSY 301 - Basic Counseling Techniques**

(F,S) SS

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Basic counseling and interpersonal skills, including reflective listening, expressing empathy, questioning, and confrontation are taught. Complex skills such as goal setting, documentation, suicide/ homicide crisis intervention, and handling client noncompliance. Laboratory employs CD-ROM and role-play formats.

Prerequisite: PSY 216

**PSY 307 - Seminar**

SS

Credit Hours: (Hours to be arranged each term.)

**PSY 308 - Psychology of Eating**

(F,S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Exploration of eating behavior.

Psychological, social, and physiological factors will be examined. Application of empirical data to real world experiences. Typical, healthy, and disordered eating behaviors will be considered.

**PSY 311 - Human Growth and Development I**

(F,W,S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

A biosocial study of human development from conception through middle childhood. Discusses the biological, psychological, and social processes affecting the developing child.

Applications to health care, family, community, and education are discussed. Prerequisite: PSY 201 or PSY 202 or PSY 203

**PSY 312 - Human Growth and Development II**

(W,S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

The psychological study of the continuing development of the human being from adolescence through old age and death. Discusses the biological, psychological, and social processes relevant to this developmental time span. Applications to health care, family, community and education are discussed.

Prerequisite: PSY 201 or PSY 202 or PSY 203

**PSY 313 - Psychological Research Methods I**

(F,S) SS

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Overview of the techniques of research in psychology. Emphasis is placed on techniques of quantitative research, including experimental, quasi-experimental, field, and survey research methods. Students are engaged in developing an APA research proposal based on current psychological literature. Prerequisites: PSY 203 and one of the following: MATH 243 or MATH 361 or PSY 225, all with grade "C" or better

**PSY 314 - Psychological Research Methods II**

(W) SS

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

An in-depth look at advanced research methodology, including complex research design. Students gain experience with research projects by collecting data, analyzing, writing an APA style manuscript, and presenting a conference-style poster.

Prerequisite: PSY 313

**PSY 317 - Field and Career Preparation**

(F,W,S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Exploration of careers related to the field of psychology. Processes and skills needed for career search and placement. Externship process and opportunities will be discussed.

**PSY 321 - Theories of Personality I**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

In-depth coverage of personality theorists/theories, such as Freud, Adler, Horney, Erikson, and the Five Factor Theory. Applications of various theoretical concepts to case studies and to people in their personal lives.

Prerequisite: PSY 201 or PSY 202 or PSY 203

**PSY 322 - Theories of Personality**

(W) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

In-depth coverage of personality theorists/theories such as Maslow, Skinner, Rogers, Bandura, Sociological, and Cultural. Applications of various theoretical concepts to case studies and to people in their personal lives.

Prerequisite: PSY 201 or PSY 202 or PSY 203

**PSY 330 - Social Psychology I**

(F,W) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Surveys behavior and experience in a social context. Topics include the self in the social world, attribution, social cognition, affiliation and romantic relationships. Theory, research and application discussed.

Prerequisite: PSY 201 or PSY 203

**PSY 331 - Social Psychology II**

(W,S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Surveys behavior and experience in a social context. Topics include social influence, attitudes and persuasion, aggression, group dynamics, altruism and stereotyping/prejudice/ discrimination. Theory, research and application discussed.

Prerequisite: PSY 201 or PSY 203

**PSY 334 - Behavior Modification I**

(F) SS

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Measurement of behavior and key concepts of operant learning are covered, e.g., reinforcement, extinction, punishment, stimulus control and shaping, among others. Laboratory exercises are interactive computer simulations of these concepts. First in five course sequence approved by The Behavior Analyst Certification Board, Inc.® as meeting the coursework requirements for eligibility to take the Board Certified Behavior Assistant Analyst Examination®.

Applicants will have to meet additional requirements to qualify.

Prerequisite: PSY 201 or PSY 202 or PSY 203

**PSY 335 - Behavior Modification II**

(W) SS

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Applied to the study of human behavior. Complex techniques and new learning concepts found in the "real world" are also covered. Treatment plans for actual human problem behaviors are created in the laboratory. Second in five course sequence approved by The Behavior Analyst Certification Board, Inc.® as meeting the coursework requirements for eligibility to take the Board Certified Behavior Assistant Analyst Examination®. Applicants will have to meet additional requirements to qualify.

Prerequisite: PSY 334

**PSY 336 - Health Psychology I**

(F) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

The application of psychological theories to the understanding of the relationship between health, the environment, and behavior. This course focuses on the mind-body connection, stress, realities of healthcare delivery, health behavior change models, and research methods in health psychology.

Prerequisite: PSY 202 or instructor consent

**PSY 337 - Health Psychology II**

(W) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

The application of psychological theories to understand relationships between health, the environment, and behavior.

Focuses on prevention of disease/negative health behaviors, and promotion of health and well-being. Topics include substance abuse, nutrition, exercise, chronic illness, sex, and the built environment.

Prerequisite: PSY 336

**PSY 339 - Biopsychology**

(F,W) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Anatomical and physiological basis of behavior patterns presented from genetic, developmental, evolutionary and functional evidence. Discussions of mind-body relationships, senses, sleep, motor activity, emotions, and reproduction.

Prerequisite: BIO 232 or PSY 202 or instructor consent

**PSY 341 - Psychoactive Drugs I: Psychiatric Drugs**

(W) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Students will investigate the physiological, behavioral, social, and societal aspects of psychiatric drugs, including anti-anxiety, anti-depressant, and anti-psychotic drugs.

Prerequisite: PSY 202

Pre- or Corequisite: PSY 216

**PSY 342 - Psychoactive Drugs II: Abused Drugs**

(S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Students will investigate the physiological, behavioral, social, and societal effects of abused drugs including alcohol, hallucinogens, marijuana, opiates, and stimulants.

Prerequisites: PSY 202 or PSY 341, and instructor consent

**PSY 345 - Educational Psychology I**

(W,S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to psychological concepts, theories, and methodologies as applied to education. Focus will be on the major psychological views of learning and how these can be applied to create effective strategies and environments for teaching and learning.

Prerequisite: PSY 201 or PSY 202 or PSY 203

**PSY 346 - Educational Psychology II**

(S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Exploration of psychological principles and theories of teaching and learning. Focus will be on learner motivation, differences, needs, culture, and diversity. How to shape supportive learning environments and form comprehensive teaching will be considered, as will assessment of learning.

Prerequisite: PSY 201 or PSY 202 or PSY 203

**PSY 347 - Organizational Behavior**

(F,W,S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Psychology applied to business organization and operations as they affect employees, customers, and the community with particular interest on group processes.

Prerequisite: Junior standing or instructor consent

**PSY 351 - Cognitive Restructuring I**

(W) SS

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Philosophy behind criminal thinking errors, which influence their thought patterns. Laboratory component includes participation in client groups and casework.

Prerequisite: PSY 301 or PSY 334

**PSY 355 - Evolutionary Psychology**

(S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Examination of biological determinants underlying human behavior. Discusses family relations, aggression, crime, mating and other social aspects with regard to adaptation and fitness.

Prerequisite: BIO 103 or BIO 213 or PSY 203 or instructor consent

**PSY 356 - Military Psychology**

(Su) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Examination of the mental health and environmental issues facing current and former service members and their families by exploring military culture, theory, assessment, and evidence based interventions.

Prerequisite: PSY 201 or PSY 202 or PSY 203

**PSY 358 - Psychology of Gender**

(S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Psychological examination of the functioning, specialization, self-concept, and roles of women and men. Issues that women and men face in the gendered world are critically analyzed scientifically and experientially.

Prerequisite: PSY 201 or PSY 202 or PSY 203

**PSY 360 - Organizational Psychology**

(F) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Psychology applied to human relations problems in the work world. Specific topics include job satisfaction, motivation, leadership, attitudes and effects of stress on employees and job performance.

Prerequisite: PSY 201

**PSY 361 - Industrial Psychology**

(W) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Application of psychological principles, theories and behavioral techniques applied to human relations, problems in industrial situations.

Prerequisite: PSY 201 or PSY 202 or PSY 203

**PSY 364 - Environmental Psychology**

(S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

An interdisciplinary look into the human environment interaction in regards to sustainability, conservation, and the natural and built environments. Students will apply psychological theory to understand the role of human behavior, attitudes, policy, and ethics in sustainability and conservation efforts.

Prerequisite: PSY 201

**PSY 371 - Human Sexuality I**

(W) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Social, cultural, psychological and physiological influences on human sexuality are examined. Topics include: theory and research, gender, anatomy and functioning, and human relationship components, including love and communication.

Prerequisite: PSY 201 or PSY 202 or PSY 203

**PSY 372 - Human Sexuality II**

(S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Social, cultural, psychological and physiological influences on human sexuality are examined. Topics include: sexual orientation, pregnancy, contraceptive practices, sexual dysfunctions, sexually transmitted infections, paraphilias, sexual assault, media images, and the sale of sex.

Prerequisite: PSY 201 or PSY 202 or PSY 203

**PSY 375 - Organizational Behavior Management**

(S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to research and practice in Organizational Behavior Management (OBM). Topics include performance management, behavioral systems analysis, process mapping, scientific research in organizational change, and career options for organizational consultants.

Prerequisite: PSY 201

**PSY 376 - Foundations of Sport Psychology**

(Su) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to the foundations of psychology in the sport and physical activity domain. Focus will be on current theories, empirical research, and practices in the field of sport and exercise psychology.

Prerequisite: PSY 201 or PSY 202 or PSY 203

**PSY 385 - Peer Mentorship**

Lecture Hours: 1

Lab Hours: 3

Credit Hours: 2

Applied learning experience working with college and college bound populations. Enrolled students are engaged as mentors for peers, utilizing skills and technology to guide successful academic and social college experiences. May be repeated for credit. Not open to first year freshmen or first term transfer students.

Prerequisites: 90 credit hours and at least one term at Oregon Tech

**PSY 401 - Advanced Counseling Techniques**

(W) SS

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Major schools of psychotherapy are discussed. Students practice related techniques in the laboratory following demonstration and instruction. Group therapy techniques are emphasized with associated laboratory work using interactive CDROM, group therapy videotapes, and a Web site corresponding to readings.

Prerequisite: PSY 301

**PSY 407 - Seminar**

SS

Credit Hours: (Hours to be arranged each term.)

**PSY 410 - Organizational Change and Development**

(F,W,S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Theories and processes necessary to understand and implement change within organizations. Focuses on impact of technological change in organizations and on skill development in planning, implementing and evaluating change.

**PSY 416 - Abnormal Behavior of Children and Adolescents**

(S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Highlights differences between children and adults in their expression of emotional and interpersonal problems. Language/learning disabilities, problems of attention deficit, school refusal and separation anxiety, depression, and eating. Description of symptoms and treatments are emphasized.

Prerequisites: PSY 215, PSY 216, PSY 311, and PSY 312

**PSY 420 - Applied Psychology Externship**

(F,W,S,Su) SS

Credit Hours: (4, 8, 12, or 16 credit hours)

Opportunities to work under supervision in applied settings related to students' career interests. Students apply the knowledge they acquired in their classes and gain experience working in the field.

Prerequisites: PSY 317 with grade "B" or better, approval of the externship coordinator, and completion of at least 120 hours of college credit

**PSY 421 - Senior Project I**

(F) SS

Lecture Hours: 1

Lab Hours: 6

Credit Hours: 3

First term of a three-term comprehensive project in applied psychology. Focus on refining a research project, literature review and formulation of research question.

Prerequisite: PSY 313

**PSY 422 - Senior Project II**

(W) SS

Lecture Hours: 1

Lab Hours: 6

Credit Hours: 3

Second term of a three-term comprehensive project in applied psychology. Focus on development of research methodology and pilot testing of project.

Prerequisite: PSY 421

**PSY 423 - Senior Project III**

(S) SS

Lecture Hours: 1

Lab Hours: 6

Credit Hours: 3

Third term of a three-term comprehensive project in applied psychology. Focus on data collection, writing of research report and oral presentation of project.

Prerequisite: PSY 422

**PSY 425 - Motivational Interviewing**

(F) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Motivational interviewing is a highly effective (evidence based) approach to enhance behavior change in psychotherapy, substance abuse counseling, dentistry, education, various medical professions and business. This course will overview the theory, process, skills and implementation of motivational interviewing.

Prerequisite: PSY 301 or instructor consent

**PSY 428 - Animal Behavior**

(S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

The biological foundations of animal behavior are presented from an ethological and comparative psychology perspective. Emphasizes the evolution, development, and physiological basis of behavior patterns and presents topics on learning, perception, orientation, communication, and social behavior. (Cannot be taken for graduation credit by students who have taken BIO 428.)

Prerequisite: BIO 213 or PSY 202

**PSY 431 - Family Therapy**

SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Basic differences between functional and dysfunctional families. Theoretical underpinnings of family therapy, an emphasis on particular theoretical models, different family populations including single parent families, blended families and culturally diverse families.

Prerequisite: PSY 301

**PSY 432 - Group Therapy**

SS

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Theory and application of group therapy techniques. Historical and current applications of group treatment, special populations and multicultural considerations.

Prerequisite: PSY 301

**PSY 434 - Advanced Behavior Modification I**

(W) SS

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Ethical principles and issues in Applied Behavior Analysis and behavioral assessment methods and techniques, including measuring behavior and analyzing data. Third in five course sequence approved by The Behavior Analyst Certification Board, Inc.® as meeting the coursework requirements for eligibility to take the Board Certified Behavior Assistant Analyst Examination®. Applicants will have to meet additional requirements to qualify.

Prerequisite: PSY 313

Pre- or Corequisite: PSY 335

**PSY 435 - Advanced Behavior Modification II**

(S) SS

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Application of principles and techniques of Applied Behavior Analysis to change behavior. Fourth in five course sequence approved by The Behavior Analyst Certification Board, Inc.® as meeting the coursework requirements for eligibility to take the Board Certified Behavior Assistant Analyst Examination®. Applicants will have to meet additional requirements to qualify.

Prerequisite: PSY 434

**PSY 441 - Youth Mentorship I**

(F) SS

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Applied learning experience working with youth. Enrolled students are engaged as mentors for youth, utilizing skills in guiding social, academic, emotional, and cognitive development. May be repeated for credit.

Prerequisite: Instructor consent

**PSY 442 - Youth Mentorship II**

(W) SS

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Applied learning experience working with youth; continuation from PSY 441.

Enrolled students are engaged as mentors for youth, utilizing skills in guiding social, academic, emotional, and cognitive development. May be repeated for credit.

Prerequisites: PSY 441 and instructor consent

**PSY 443 - Youth Mentorship III**

(S) SS

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Applied learning experience working with youth; continuation from PSY 442.

Enrolled students are engaged as mentors for youth, utilizing skills in guiding social, academic, emotional, and cognitive development. May be repeated for credit.

Prerequisites: PSY 442 and instructor consent

**PSY 445 - Oregon Tech Relationship Building Program**

(F,W,S) SS

Credit Hours: (variable 1-3)

This course will provide an orientation to and ongoing training for family mentors in the Oregon Tech Relationship Building Program. Program related projects will be assigned based on number of credits (1-3) selected. This course can be repeated for credit.

Prerequisite: PSY 301 or instructor consent

**PSY 446 - Psychological Trauma**

(F) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Explores and introduces student to psychologically traumatic experiences in terms of definition, impact and reactions, including assessment and treatment of trauma-related psychological problems. Special focus on post-traumatic stress disorder.

Prerequisite: PSY 301

**PSY 455 - Cognitive Psychology**

(F) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

The scientific study of mental process and how the mind works (or fails to work).

Topics include memory, knowing, decision-making, attention, morality, and theories of mind. Students will debate current topics in the field and learn practical applications for cognitive research.

Prerequisite: PSY 201

**PSY 456 - Performance Management**

(S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Application of principles and techniques of Applied Behavior Analysis to change behavior, focus on implementation, management, and supervision of behavior change programs and systems in business, industry, and human services. Fifth in five course sequence approved by The Behavior Analyst Certification Board, Inc.® as meeting the coursework requirements for eligibility to take the Board Certified Behavior Assistant Analyst Examination ®. Applicants will have to meet additional requirements to qualify.

Prerequisite: PSY 434

**PSY 475 - Capstone in Applied Psychology**

(F,W,S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Provides students the opportunity to synthesize material learned throughout the degree program, create innovative projects, and evaluate new ideas related to higher level topics in applied psychology. Topics vary by term. May be repeated for credit.

Prerequisite: Senior standing or instructor consent

**PSY 480 - Theories of Learning**

(S) SS

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

The basics of the major learning theories as they apply to operant and respondent conditioning, social learning, and memory.

Prerequisite: PSY 335

**PSY 485 - Education Assistantship**

(F,W,S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Hands on exploration of educational functions with a wide range of possible ages and abilities; will involve tutoring and mentoring with additional specific duties dependent on the goals of each student. May be repeated for credit.

Prerequisite: Instructor consent

**PSY 497 - Special Projects/Training**

(F,W,S) SS

Credit Hours: (Variable Credit 1 - 6)

Students may enroll for credit in special programs offered by external agencies, approved by the department, leading to the development of specialized skills.

Programs may include training to work with special populations. May be taken twice for credit.

Prerequisites: Senior standing in Applied Psychology and HSS department chair consent

**PSY 499 - Independent Study**

SS

Credit Hours: (Variable Credit 1-6)

Intensive self-study of a topic in psychology of the student's choosing. Study guided by any professor in the Applied Psychology program. May be repeated, with different topics, up to three times.

Prerequisites: Senior standing in Applied Psychology and HSS department chair consent

**PSY 500 - Life Span Development**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Study of principles of human development with emphasis on the contributions of biological, social, psychological, and multicultural influences as applied to an understanding of cognitive, emotional, social, and physical development across the lifespan.

**PSY 505 - Law, Ethics & Professional Development**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Examines all aspects of therapy that involve statutes, regulations, principles, values and ethics of Marriage and Family Therapists with a special emphasis of the legal and ethical considerations of marriage and family therapy.

**PSY 512 - Systems Theory**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

In-depth analysis of Systems Theory in family dynamics. Emphasis placed on structural, strategic, and solution focused applications to counseling.

**PSY 513 - Couples Theory**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Overview of the fundamental theoretical foundations of couple's therapy, including systemic, communication, interactional theories of behavior as it relates to couples.

Prerequisite: PSY 512

**PSY 521 - Individual Counseling Techniques**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Evidence-based counseling interventions including theory and application from the primary schools of psychotherapy including cognitive-behavioral, systems theory, and humanistic.

Prerequisite: PSY 505

**PSY 522 - Individual Counseling Techniques II**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Advanced evidence-based counseling interventions including application of interventions from the primary schools of psychotherapy including cognitive-behavioral, systems theory, and humanistic.

Prerequisite: PSY 521

**PSY 525 - Family Therapy I**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Examines theories and techniques of family therapy including various models of family therapy. This course will offer opportunities for practice of the techniques through role playing and review of therapy sessions.

Prerequisite: PSY 512

**PSY 526 - Couples Therapy**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Examines issues related to therapeutic theories and treatment strategies with couples, including marriage, partnership, divorce, parenting and remarriage.

Prerequisite: PSY 513

**PSY 530 - Research Methods**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Fundamentals of methods for conducting research including experimental designs and non-experimental designs. Includes program evaluation, clinical studies, ethics, and statistical analysis. Emphasis on ability to critically evaluate research studies and provide a foundation for conducting research.

Prerequisite: Undergraduate statistics class with grade "C" or better

**PSY 535 - Treating Diverse Populations**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Examines the cultural context of relationships, issues, trends in a diverse society, including culture, ethnicity, nationality, age, gender, sexual orientation, spirituality, religion, larger system and social context. Strengths and limitations of models of treatment as they relate to a different cultural, economic and ethnic groups.

Prerequisite: PSY 505

**PSY 565 - Group Counseling**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Theoretical understanding of group dynamics and group process. Evidenced based group interventions for psychoeducational and process groups.

Prerequisite: PSY 522

**PSY 566 - Child & Adolescent Therapy**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Specific emphasis on treatment of children and adolescents. Course materials will cover a variety of childhood disorders and evidence-based interventions including individual and family interventions.

Prerequisites: PSY 500 and PSY 521

**PSY 575 - Treatment of Substance Abuse**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Overview of assessment and treatment of substance disorders including cognitive behavioral, group and family interventions.

Prerequisite: PSY 521

**Respiratory Care Program****RCP 100 - Matriculation**

(F)

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

A study into the evidence-based and political pressures driving new developments in respiratory care. Considerations and planning for the students emerging role in health care. Online version tailored to degree completion students.

**RCP 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**RCP 120 - Interventions in Gas Exchange**

(F,W,S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

An introduction to the effects of ineffective breathing on carbon dioxide removal and oxygen delivery. Basic pulmonary mechanics are described. The vascular effects of hypoxemia are fully explored. Oxygen therapy and Continuous Positive Airway Pressure are introduced.

**RCP 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**RCP 223 - Emergent Chest Radiographic Interpretation**

(S)

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

The evaluation of the chest radiograph in the intensive care setting. Students learn to identify structures and fissures as well as the significance of silhouette sign, blunted costophrenic angles, air bronchograms and hyperlucency. The identification of pneumothorax, infiltrates, and the correct placement of tubes is required.

Prerequisite: RCP 236

**RCP 231 - Pulmonary Physiology**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Pulmonary physiology including mechanics of ventilation, gas diffusion, acid-base regulation, oxygenation, and the physiologic advantage of structure. Gas laws and surface tension as applied to the understanding of clinical problems.

Prerequisite: BIO 233

**RCP 235 - Arterial Blood Gases**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Chemistry and classification of acid-base balance including determination of compensation and pathophysiologic causes. Assessment of partial pressures of oxygen, saturation and total oxygen delivery.

Prerequisite: Admission to the Respiratory Care program or instructor consent

**RCP 236 - Cardiopulmonary Dynamics**

(W)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Exploration of pulmonary mechanics as measured by spirometry. Cardiovascular hemodynamics including cardiac electrophysiology, rhythm recognition and the measurement and interpretation of Systemic Vascular Resistance and Pulmonary Vascular Resistance, Central Venous Pressures, Pulmonary Artery and Pulmonary Capillary Wedge Pressures.

Prerequisite: Admission to the Respiratory Care program or instructor consent

**RCP 241 - Respiratory Gas Therapeutics**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Physical and chemical applications of medical gases and humidity therapy to patient care. The transportation, regulation and dissemination of compressed gases. Clinical decision making strategies for Oxygen titration.

Prerequisite: Admission to the Respiratory Care program

**RCP 252 - Cardiopulmonary Pharmacology**

(S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

A study of the administration, pharmacokinetics, administration and actions of medications. Emphasis is placed on bronchodilators, steroids, mucolytics and antileukotriene agents. Vasoactive, antiarrhythmics, diuretics, sedatives, antimicrobials and neuromuscular blocking agents are introduced.

Prerequisite: CHE 360

**RCP 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**RCP 326 - Disaster Preparedness**

(F,W,S)

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

Preparation for unusual biological disasters. Case-based study of Ebola, anthrax, SARS, influenza, bird flu, tuberculosis, emergency room violence and unrest, evacuation and loss of services caused by earthquakes, hurricanes, floods and fire.

Prerequisite: RCP 235

**RCP 335 - Exercise Physiology and Education**

(F)

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

Introduction to the physiology of exercise, exercise in disease and health and stress testing. Concepts of age appropriate pulmonary rehabilitation and asthma education are described.

Prerequisite: RCP 235

**RCP 336 - Hyperinflation Therapies**

(F,S)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Study and evidence-based application of PEEP, CPAP, bi-level ventilation, IPPB, and incentive spirometry. Flutter valve, PEP, high frequency chest wall oscillation and other methods of improving bronchial hygiene and lung volume. Acquisition and interpretation of the patient history, physical examination, auscultation, vital signs, laboratory data including arterial blood gases and dysrhythmia recognition. Collaborative activities include the acquisition, analysis and communication of findings.

Prerequisite: RCP 236 and RCP 241

**RCP 337 - Pulmonary Pathology**

(F)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Case-based approach to the understanding, evaluation and treatment of pulmonary disease. Recognition of obstructive and restrictive disease patterns as well as the classification of acid-base and oxygenation disorders. Classification, application and pharmacodynamics of common pulmonary medications are discussed.

Prerequisite: RCP 235

**RCP 345 - Cardiopulmonary Diagnosis and Monitoring**

(W)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Collaborative investigation, practice, calibration and interpretation of spirometry, body plethysmography, diffusion capacity, helium dilution, seven minute nitrogen washout, cardiopulmonary stress testing, 12 lead ECG acquisition, dysrhythmia recognition, arterial blood gas instrumentation.

Prerequisite: RCP 337

**RCP 350 - Introduction to Clinical**

(S)

Lecture Hours: 1

Lab Hours: 24

Credit Hours: 9

Orientation to clinical practice in hospitals. Requires successful criminal background check, drug screening, completion of training in computer charting and compliance with Health Insurance Portability and Accounting Act (HIPAA). Competence developed in the area of basic patient assessment, oxygen therapy, aerosol therapy and mechanical ventilation.

Prerequisite: RCP 241

**RCP 351 - Mechanical Ventilation I**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Study of an array of artificial airways. Includes laboratory practice in intubation, endotracheal suctioning and bag-mask-valve ventilation. Study and practice of mechanical ventilation circuits, classes of mechanical ventilators and modes.

Prerequisite: RCP 235

**RCP 352 - Mechanical Ventilation II**

(W,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Description and analysis of the adult patient mechanical ventilator system including the initiation, assessment, management and discontinuance.

Prerequisite: RCP 351

**RCP 353 - Mechanical Ventilation III**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Advanced topics in mechanical ventilation including transport, dual modes, neonatal and pediatric mechanical ventilation.

Prerequisite: RCP 352

**RCP 366 - Clinical Simulation**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

The practice and measurement of critical thinking in the context of computer branching logic simulations. Students use organized sequential topical examinations to review and measure retention of respiratory care content. Passage of secure national review examination required.

Prerequisite: RCP 337

**RCP 375 - Pediatric Care**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Fundamental care of pediatric patients with an emphasis in acute care medicine. A review of common diagnosis, conditions affecting respiratory status, and treatments seen in the pediatric population. Special procedures along with Trauma and Emergency room care will be reviewed.

**RCP 386 - Critical Care I**

(S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Analysis and application of critical care techniques with an emphasis in cardiovascular management and assessment. Cardiovascular catheters and hemodynamics, advanced rhythm recognition, and the essentials of advanced cardiac life support.

Prerequisite: RCP 337

**RCP 387 - Critical Care II**

(F,W)

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

Advanced techniques during intubation. Assessment of the difficult airway including Mallampatti classification and thyromental distance. Continued practice and an extension of hemodynamic, pharmacology and imaging knowledge. Students practice anticipating care based on nutritional status.

Prerequisite: RCP 241

**RCP 388 - Advanced Neonatal Respiratory Care**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Survey of perinatal physiology with an emphasis on mechanical ventilation, the application of oxygen, medications, positive pressure, resuscitative efforts and evaluations as applied to the neonatal and pediatric patients. Instruction in neonatal resuscitation meets the standards established by the American Academy of Pediatrics.

Prerequisite: RCP 241

**RCP 389 - International Neonatology**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Advanced topics in neonatal and pediatric respiratory care including transport, stabilization and care in resource limited international settings.

Prerequisite: RCP 241

**RCP 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**RCP 440 - Case Management I**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Current clinical cases used as the basis for scholarly research and discussion. Students design a research-based senior project in the field of respiratory care, including interviews, research, literature review and formal presentation.

Prerequisite: Completion of all academic coursework in the Respiratory Care Program prior to the Senior year

**RCP 441 - Case Management II**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Current clinical cases used as the basis for scholarly research and discussion.

Students continue work on senior project in the field of respiratory care, including interviews, research, literature review and formal presentation.

Prerequisite: RCP 440

**RCP 442 - Case Management III**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Current clinical cases used as the basis for scholarly research and discussion.

Students complete work on senior project in the fields of respiratory care, including formal presentation of the project.

Prerequisite: RCP 441

**RCP 450 - Clinical Care I**

(Su)

Lecture Hours: 1

Lab Hours: 24

Credit Hours: 9

Continued development of respiratory care skills, mechanical ventilation and neonatal intensive care, expanded functions and observations in specialty areas.

**RCP 451 - Clinical Care II**

(F,W)

Lecture Hours: 1

Lab Hours: 24

Credit Hours: 9

Continued development of respiratory care skills, mechanical ventilation and neonatal intensive care, expanded functions and observations in specialty areas.

Prerequisite: RCP 450

**RCP 452 - Clinical Care III**

(W)

Lecture Hours: 0

Lab Hours: 36

Credit Hours: 12

Continued development of respiratory care skills, mechanical ventilation and neonatal intensive care, expanded functions and observations in specialty areas.

Prerequisite: RCP 451

**RCP 460 - Advanced Life Support**

(S)

Lecture Hours: 0

Lab Hours: 6

Credit Hours: 2

Students become certified or re-certified in professional life support classes such as Basic Life Support, Advanced Cardiac Life Support, Neonatal Life Support, Pediatric Life Support. Clinical simulations and other credentialing exam preparation included.

Prerequisite: RCP 252

**RCP 486 - Extreme Physiology**

(F,W)

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

Physiologic adaptations to gas exchange and transport which occurs during the challenges of neonatal transition, exercise, high altitude and high-pressure environments.

Prerequisites: RRT credential and admission to the degree completion program

**RCP 487 - Expert Mechanical Ventilation**

(F,W,S)

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

Recognition of levels of quality in mechanical ventilation. Practicing clinicians balance experience with current evidence-based recommendations for mechanical ventilation in order to develop a hierarchy of quality care. Includes selection of new modes, patient-ventilator synchrony, the reduction of medical errors and ventilator associated pneumonia.

Prerequisites: RRT credential and admission to the degree completion program

**RCP 488 - Respiratory Care Innovations**

(F,S)

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

Exploration of new opportunities to improve access to respiratory care. Reduction of disease through the expansion of respiratory care. Student projects focused on networking among students and faculty and across institutional, professional and nonprofit lines to implement improvements in health and education.

Prerequisites: RRT credential and admission to the degree completion program

**RCP 561 - Individual Development Plan**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Collaboration, negotiation and the development of priorities for program planning. Systematic planning required for the development and documentation of four professional competencies.

Prerequisites: State license, current respiratory care employment and the National Board for Respiratory Care (RRT) credential

**RCP 565 - Clinical Preceptorship**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Clinical practice beyond that of an advanced graduate as described in the OIT approved IDP. Areas for development of advanced clinical practice include the intensive care units, pulmonary rehabilitation, research, home care, education and management. Course completion is required for the fulfillment of the IDP.

Prerequisite: RCP 561

**RCP 575 - Accreditation Practicum**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Respiratory Care leaders are proactive in the validation of their programs through accreditation. This practicum provides the emerging leader with a practical familiarity with program data collection and the assessment of that data in comparison to accreditation standards. Methods of improving the outcomes of individual programs are studied. Course completion requires fulfillment of IDP.

Prerequisite: RCP 561

**Radiologic Science****RDSC 105 - Radiation Protection and Radiographic Quality Control**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Principles of radiation protection and radiographic quality control for veterinary x-ray operators in accordance with Oregon Administrative Rules. Students majoring in Radiologic Science are not eligible.

**RDSC 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**RDSC 201 - Imaging Techniques I**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Demonstration and practice with the phenomena and causes of image formation and visualization. The context includes studies of effects of technique-factor changes, effects of the use of various accessories and effects of chemicals in film processing. Causes of radiographic artifacts are discussed and explored. Includes the study of interactions of radiation and matter. Prerequisite: MIT 103 with grade "C" or better

**RDSC 202 - Imaging Techniques II**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Radiographic principles and principles of radiographic quality. Study of theory and practice in methods of protection against ionizing radiation.

Prerequisite: RDSC 201 with grade "C" or better

**RDSC 205 - Patient Care**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Basic concepts of patient care, including consideration of physical and psychological needs of the patient and family. Routine and emergency patient care procedures. Infection control procedures utilizing Universal Precautions. Role of the radiographer in patient education.

Prerequisite: MIT 103

**RDSC 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**RDSC 210 - Radiographic Positioning I**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Demonstration and practice of the routine and special radiographic positions of bones of the upper and lower extremities excluding the shoulder and pelvic girdles. Prerequisites: RDSC 201 and RDSC 235, both with grade "C" or better

**RDSC 211 - Radiographic Positioning II**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Demonstration and practice of routine and special radiographic positions of the axial skeleton, shoulder, and pelvic girdles.

Prerequisites: RDSC 202, RDSC 210, and RDSC 235, all with grade "C" or better

**RDSC 233 - Contrast Media Procedures**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Routine radiographic examinations of the urinary system, gastrointestinal biliary system, respiratory system, and nervous system, using various contrast medias and filming techniques. All radiographically significant anatomy, physiology, pathology, terminology, and topography, including all contrast studies of these systems.

Prerequisites: RDSC 202, RDSC 210, RDSC 235, all with grade "C" or better

**RDSC 235 - Equipment Operation and Maintenance**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Basic components and operation of radiographic, fluoroscopic, and mobile units. Evaluation, calibration, and maintenance of radiographic equipment and accessories.

**RDSC 272 - Radiation Protection**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Basic properties, sources, units of measurement, dosimetry, and biological effects of radiation. Methods of personnel protection and minimizing patient exposure. NCRP recommendations for protective devices and personnel monitoring.

Prerequisites: RDSC 201 and RDSC 235, both with grade "C" or better

**RDSC 301 - Radiographic Positioning III**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Demonstration and practice of routine and special radiographic positions of the skull, facial bones, and paranasal sinuses.

Prerequisites: RDSC 211 and RDSC 233, both with grade "C" or better

**RDSC 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**RDSC 320 - Surgical, Trauma and Mobile Radiography**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Routine radiographic examinations of the reproductive, muscular, nervous, skeletal and circulatory systems. Also including emergency and surgical procedures, using various contrast media and filming techniques. The comprehensive study of all radiographically significant anatomy, physiology, pathology, terminology, and topography including all contrast studies of these systems. Control of microorganism by physical and chemical means is incorporated as necessary.

**RDSC 326 - Cardiovascular/Interventional Technology**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Demonstration and practice of special radiographic examinations of nervous and vascular systems including use of serial film changers and pressure injectors, and other necessary equipment. Also includes related nursing procedures.

Prerequisites: RDSC 211, RDSC 233, and RDSC 320, all with grade "C" or better

**RDSC 350 - Bones: The Interactive Anatomy and Position Course**

(F,W)

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

A sequential review of osteology and positioning designed for the medical imaging student who has completed the positioning sequence, or the graduate seeking continuing education credit.

Prerequisites: RDSC 210, RDSC 211, and RDSC 301, or Registered Radiologic Technologist

**RDSC 354 - Mammography**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

An in-depth analysis of mammographic positioning, exposure techniques, quality control, film critiquing, and radiation safety. Includes mock registry exam.

Prerequisite: RDSC 301

**RDSC 355 - Computed Tomography**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

X-ray physics, scanner components, and data acquisition of computed tomography. Image reconstruction, manipulation, and artifacts. CT patient care and imaging procedures of the head, neck, spine, chest, abdomen, pelvis, and musculoskeletal system. Laboratory simulation is included.

Prerequisite: BIO 335

**RDSC 366 - Radiographic Pathology (W)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

An overview of common pathological conditions encountered in the clinical setting, for RDSC students. Pathology is categorized by body systems. The students will learn the pathology as they relate to: signs and symptoms, etiology, imaging diagnosis and prognosis and treatment.

**RDSC 388 - Externship Preparation (S)**

Lecture Hours: 2

Lab Hours: 0

Credit Hours: 2

Presentation of key concepts related to Radiologic Science externship and required in-services. Focus is on patient care and interpersonal scenarios the externship student will likely face while in the clinical environment. Review and discussion of the RDSC Externship Handbook. This course is a mandatory course that must be completed prior to externship.

Prerequisite: RDSC 356

**RDSC 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**RDSC 410 - Radiologic Science Externship**

(F,W,S)

Lecture Hours: 0

Lab Hours: 40

Credit Hours: 15

Students must complete four terms (12 months) of clinical experience in both general radiography and special imaging modalities, to include computed tomography, magnetic resonance imaging, ultrasound, nuclear medicine and/or cardiovascular interventional technology at an affiliated clinical site. Students will complete all phases of general radiography and a maximum of 12 weeks in the special imaging modalities. Students under the direct supervision of qualified radiographers and radiologists. Prerequisite: All academic coursework in the Radiologic Science curriculum

**RDSC 411 - Special Radiologic Science Externship**

(F,W,S)

Lecture Hours: 0

Lab Hours: 40

Credit Hours: 15

This one-term (three-month) practicum is designed to develop the skills of the student in the special imaging modalities, i.e., computed tomography, magnetic resonance imaging, ultrasound, nuclear medicine and special radiographic procedures. The student is sent to an affiliated hospital that has the required special imaging equipment to give the hands-on experience to develop competency in each of three areas chosen by the student. The student will spend one month in each selected area.

Prerequisites: All academic coursework in the Medical Imaging program with grade "C" or better and be a Registered Technologist

**RDSC 411A - Special Radiologic Science Externship**

(F,W)

Lecture Hours: 0

Lab Hours: 18

Credit Hours: 7

This two-term practicum is designed to develop skills of the degree completion student in special imaging modalities of computed tomography, magnetic resonance imaging, cardiovascular/interventional technology, mammography, quality assurance, nuclear medicine technology, or sonography. The student selects a local hospital or medical center that has the necessary equipment. Upon approval of the facility, the student begins a supervised experience to develop competencies in each of three chosen areas.

Prerequisites: All academic coursework in the Medical Imaging program with grade "C" or better and an ARRT registered technologist in good standing

**RDSC 411B - Special Radiologic Science Externship**

(W)

Lecture Hours: 0

Lab Hours: 22

Credit Hours: 8

This two-term practicum is designed to develop skills of the degree completion student in special imaging modalities of computed tomography, magnetic resonance imaging,

cardiovascular/interventional technology, mammography, quality assurance, nuclear medicine technology, or sonography. The student selects a local hospital or medical center that has the necessary equipment. Upon approval of the facility, the student begins a supervised experience to develop competencies in each of three chosen areas.

Prerequisites: All academic coursework in the Medical Imaging program with grade "C" or better and an ARRT registered technologist in good standing

**RDSC 471 - Clinical Imaging Education I**

(S)

Lecture Hours: 1

Lab Hours: 0

Credit Hours: 1

Development and application of clinical education objectives relating to medical imaging technology. Instruments used to evaluate student clinical performance and competence.

Prerequisite: RT(R) (ARRT)

**Renewable Energy Engineering****REE 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**REE 201 - Introduction to Renewable Energy**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

An introduction to renewable energy. Topics include photovoltaics, solar thermal systems, green building, fuel-cells, hydrogen, wind power, waste heat, biofuels, wave power, tidal power and hydroelectric. Discussions of economic, environment, politics and social policy are integral components of the course.

Prerequisite: MATH 111

**REE 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**REE 243 - Electrical Power**

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Fundamentals of electrical power. Power systems components and equipment. Fundamental analysis and design of electrical power systems.

Prerequisites: EE 223, MATH 252, and PHY 222

**REE 253 - Electromechanical Energy Conversion**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Motoring and generating principles for direct current, synchronous, and induction Machines. Analysis and design of motor and generator power and control circuits.

Prerequisites: EE 223, MATH 252, and PHY 222

**REE 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**REE 331 - Fuel Cells**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Introduction to fuel cell technologies: PEM, PAFC, AFC, SOFC, MCFC and DMFC systems. Fuel cell components and systems; field flow plates, electrolytes, electrode materials, electrode catalysts, on-board reformers. Portable devices, utility-scale power production, transportation systems. Fuel types and fuel storage.

Prerequisites: CHE 260 with grade "C" or better and PHY 222

**REE 333 - Batteries**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

This course covers fundamentals of the most important battery types including alkaline, zinc-air, lead-acid, nickel-cadmium, nickel metal hydride, lithium ion and lithium polymer. Applications include stationary, transportation and portable batteries. The lab deals with battery system design, testing and prototype assembly.

Prerequisite: CHE 260 with grade "C" or better

**REE 335 - Hydrogen**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

This course will cover hydrogen production, storage, distribution and use. Specific energy scenarios such as renewable hydrogen cycles will be explored focusing on transportation applications. The concept of hydrogen economy will be discussed in the context of global energy crisis.

Prerequisite: CHE 260 with grade "C" or better

**REE 337 - Materials for RE Applications**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Electrical, mechanical, thermal, chemical, optical, and processing properties of materials in renewable energy systems; solid-state device characteristics and their material properties. Engineering applications.

Prerequisites: CHE 202 and CHE 205 or CHE 222, and PHY 223

**REE 344 - Nuclear Energy**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to nuclear energy. Atomic and nuclear physics; the interaction of radiation and matter. Nuclear reactor operation; reactor components, nuclear cycles, neutron diffusion and moderation. Reactor shielding. Fuel reprocessing and waste disposal. Reactor licensing and safety. Economics and environmental concerns.

Prerequisites: CHE 202 and CHE 205 or CHE 222, and PHY 223

**REE 345 - Wind Power**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to power production from wind resources. Historical uses of wind resources. The Earth's wind systems. Physics of wind power. Vertical and horizontal axis turbines. Aerodynamics of wind turbines. Large-scale turbine farms and siting. Commercial development, economics and environmental impacts. Prerequisites: MECH 326 or REE 253, and PHY 222

**REE 346 - Biofuels and Biomass**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Introduction to power production from biomass resources. Historical uses of biomass resources. Biomass as a solar energy store; forestry and agricultural sources, crop wastes. Recycled sources; municipal solid wastes, landfill gas.

Gaseous fuels; anaerobic digestion, gasification, liquid fuels, fermentation, hydrolysis, transesterification.

Prerequisites: CHE 202 and CHE 205, or CHE 222, and PHY 222

**REE 347 - Hydroelectric Power**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to hydro-resource power production. Hydro-power in history. Physics of hydrology. Power, head, flow-rate. Turbine hydrodynamics; Francis, Kaplan, Pelton, Turgo, cross-flow.

System components: generators, governors, penstocks, spillways, valves, gates, trash racks. Large-scale and micro hydroelectric systems. Pumped storage. Economic, environmental considerations.

Prerequisite: MECH 318

**REE 348 - Solar Thermal Energy Systems**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to solar thermal energy systems for residential, commercial and industrial applications. Solar radiation; topics in heat transfer; flat plate and concentrating collectors; non-imaging optics; applications including water heating, building heating, cooling, industrial process heat, distillation, solar thermal power systems.

Prerequisites: ENGR 355 and MECH 323

**REE 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**REE 412 - Photovoltaic Systems**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

The solar resource, sun charts, site assessments. Grid-connected and stand-alone systems. Module and array performance. PV system components including batteries, modules, charge controllers, maximum power point trackers, inverters. Economic considerations including investment tax credits, present-value analysis, IRR.

Advanced PV materials.

Prerequisite: EE 343 or REE 337

**REE 413 - Electric Power Conversion Systems**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Power electronics devices in energy applications. DC-DC MPPT and charge controllers. Advanced inverter controls and applications. FACTS and HVDC systems and equipment.

Prerequisites: EE 419 and REE 243

**REE 425 - Electricity Markets and Modeling**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to restructured electricity markets. Students gain knowledge of theory, structures, successes and failures of markets, market participant behavior, risk and uncertainty, and basic simulation and optimization modeling for market analyses.

Prerequisites: ECO 201 or ECO 202, and EE 221, all with grade "C" or better

**REE 427 - Greenhouse Gas Accounting/Footprints**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Course topics include US and international greenhouse gas (GHG) management policies. GHG assessment methods and tools, emissions trading programs, climate risk and risk management, data and information sources, measurement standards and protocols and related sustainability concepts and policies. Course also listed as ENV 427 (cannot be used for graduation credit by students who have taken ENV 427).

Prerequisites: Junior or Senior standing, MATH 361 or MATH 465 with grade "C" or better, and WRI 227 with grade "C" or better, or instructor consent

**REE 431 - Geothermal Heat Pump Design**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Theory/design of geothermal heat pump applications, emphasis ground heat exchanger simulation and design. Closed-loop, open loop, and hybrid geothermal heat pump systems will be examined.

Exposure to the development and use of geothermal design and simulation tools.

Prerequisite: MECH 323

**REE 439 - Building Energy Auditing and Management**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Evaluating building thermal/electric/process loads, including lighting, hot water, HVAC and central plant systems, industrial refrigeration and motors. Opportunities for managing energy use through controls and operations/ maintenance strategies. Roles of commissioning, energy auditing, renewables and economic analysis in reducing energy use.

Prerequisite: MECH 433

**REE 451 - Geothermal Energy and Direct Use Applications**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to basic geothermal energy sources and generation. Basic geothermal energy applications including direct use, heat pumps and power generation.

Geothermal reservoir, site analysis, exploration and drilling. Direct use application system design (HVAC) and equipment.

Prerequisite: ENGR 355

**REE 453 - Power System Analysis**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Faults: symmetric, un-symmetric.

Modeling system components using positive, negative, zero sequence networks. System admittance matrixes.

Load flow computational methods such as Gauss-Seidel, Newton-Raphson. Power system transients. Voltage, frequency stability. Power system stabilization.

Power system analysis using software, emphasizing renewable resources.

Prerequisites: ENGR 267 and REE 243

**REE 454 - Power System Protection and Control**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Protection systems overview; protective devices; coordination and sequencing of relays; grounding practices; impedance protection. Methods of power systems operation and control; load-frequency control, automatic generation control. Modeling power system protection and control using power system analysis software, emphasizing renewable resources.

Prerequisite: REE 453

**REE 455 - Energy-Efficient Building Design**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Principles of integrated, energy-efficient building design. Interpretation/application of codes, standards. Use of software tools for modeling, simulation of building energy systems. Daylighting, natural ventilation, architectural features of passive solar buildings. Inclusion of renewable resources and net-zero designs. Life-cycle economic analysis.

Prerequisite: MECH 323

**REE 463 - Energy Systems Instrumentation**

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Application of electrical and mechanical sensors, data acquisition and logic controllers as applied to energy systems.

Determination of physical parameters necessary for control and data-logging. Methods of calibration and correction.

Prerequisite: EE 321

**REE 465 - Renewable Energy Transportation Systems**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Renewable energy transportation systems including fuel cells, hybrid gasoline-electric engines, electric vehicles, bio-diesel, flex-fuel vehicles, high-efficiency diesel engines, gas turbine prime-mover systems. Topics include fuel-air mixing, fuel storage, fuel delivery, cooling, fuel leak detection, chemical safety, and electrical power control systems.

Prerequisites: MECH 326 or REE 253

**REE 469 - Grid Integration of Renewables**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Issues unique to connecting renewable energy generation to the grid, Microgrids, Stability, transient and harmonic effects. Interconnect agreements and requirements, Standards development. SCADA and smart grid concepts, System optimization.

Prerequisite: REE 454

**REE 471 - Geothermal Power Plant Design**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to geothermal reservoir pressure, temperature and flow models and analysis. Basic geothermal power plant equipment and design for dry steam, single/double flash and binary cycle power plants. Plant thermodynamic analysis/efficiency using Rankine/ Kalina cycles. Plant environmental, economic and social impacts.

Prerequisite: ENGR 355

**REE 511 - Research Methods & Innovation I**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Intellectual Property (IP) development, evaluation, and strategy, IP fundamentals, patent fundamentals, conducting patentability searches, evaluating the patentability potential of an invention, drafting invention disclosures for patent applications, assessing the value of a patent or patent portfolio, and IP licensing fundamentals.

**REE 512 - Research Methods & Innovation II**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Fundamental concepts of scientific research, an introduction to the concepts underlying peer-reviewed research, evaluating the relevance and impact of sources, conducting literature reviews, evaluating published findings, using research productivity tools, using statistical methods, designing research studies, and writing scholarly articles.

**REE 513 - Research Methods & Innovation III**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Strategy and innovation concepts with a focus on technology commercialization. Business strategy frameworks, financial analysis, strategic marketing, operations management, business models, project management, business law, and entrepreneurship.

**REE 515 - Energy Engineering I (F)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Three-term sequence in energy engineering. Review of mechanical and electrical engineering fundamentals, understanding of resources, energy conversion technology, integration with existing systems, regulatory contexts, business environment, and future trends of a variety of renewable and conventional means of energy production, storage, and distribution.

**REE 516 - Energy Engineering II (W)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Three-term sequence in energy engineering. Review of mechanical and electrical engineering fundamentals, understanding of resources, energy conversion technology, integration with existing systems, regulatory contexts, business environment, and future trends of a variety of renewable and conventional means of energy production, storage, and distribution.

**REE 517 - Energy Engineering III (S)**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Three-term sequence in energy engineering. Review of mechanical and electrical engineering fundamentals, understanding of resources, energy conversion technology, integration with existing systems, regulatory contexts, business environment, and future trends of a variety of renewable and conventional means of energy production, storage, and distribution.

**REE 521 - Production of Biomass & Biofuels**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

The use of recently living plant or animal materials as sources of fuels, chemicals or industrial products. Sourcing and production. Biomass chemistry; lignocellulosics, fats, oils, saccharides, polysaccharides, proteins, and extractables. Chemical modification of biomass to produce fuels, polymers, industrial chemicals.

**REE 523 - Hydrogen Production and Storage**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

An overview of primary technologies, economic aspects, and social policy issues related to development of hydrogen systems and hydrogen economy, including water electrolysis, reformer technologies, and hydrogen storage.

**REE 525 - Solid-State Physics of Photovoltaic Materials**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Principles of PV; electrons and holes in semiconductors; junction analysis. Survey of available semiconductors and materials choices for photovoltaic design. Principles of important photovoltaic devices. Monocrystalline, poly crystalline, and thin film solar cells. Strategies for high efficiency. Photovoltaic materials and phenomena.

**REE 527 - Wind Power Generators**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Wind energy as a power source. AC machines, particularly three-phase induction and synchronous generators for wind power generation. Equivalent circuit models. Wound rotor, permanent magnet, multi-pole, and switched-reluctance generators. Power and torque control.

**REE 529 - Power System Analysis**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Faults: symmetric, un-symmetric. Modeling system components using positive, negative, zero sequence networks. System admittance matrixes. Load flow computational methods such as Gauss-Seidel, Newton-Raphson. Power system stabilization. Power system analysis using software, emphasizing renewable resources. Requires background in power systems.

**REE 531 - Ground-Source Heat Pumps**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Heat pump design and operation. Heat pump cycles. Refrigerant selection. Ground loop design. Heat transfer issues pertaining to geothermal energy. System design and integration. Temperature and materials issues unique to geothermal heat pumps.

**REE 533 - Heating, Ventilation and Air Conditioning**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Heating, ventilating, and air conditioning. Application of laws and principles of thermodynamics to analysis, design, and control of mechanically-controlled environments for human comfort, animal health, and food preservation. Teaches computation of heating and cooling loads, humidity control, heating, and refrigeration.

**REE 535 - Fuel Cell Fundamentals**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Basic science and technology of fuel cells, electrode processes, electrolyte types, catalysts, and balance of plant components.

**REE 537 - Sustainability of Energy Systems**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Comprehensive examination and classification of the local, regional, and global environmental and social aspects of energy use including lifecycle assessments. Impacts of global and national politics on energy use decisions.

**REE 539 - Hydraulics & Fluid Mech. of Hydropower**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Open-channel hydraulics, including watershed hydrology, sediment transport and bed load movement, reservoirs, hydrostatics, dredging, spillways, stilling basins, and hydraulic jumps. Advanced fluid mechanics. Types of turbines. Modeling and unit optimization. Background in fluid mechanics required.

**REE 541 - Utilization Strategies of Bioenergy**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Strategies for sustainable energy production from biomass. Direct combustion. Fermentation processes. Anaerobic digestion systems. Thermochemical processes; gasification, liquefaction. Chemical synthesis pathways.

**REE 543 - Materials for Electrochemical Processes**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Materials used for batteries, fuel cells, electrolyzers, and supercapacitors; their classification, selection and properties, including nanocatalysts, polymer electrolytes, ceramic and plastic packaging materials, and metals.

**REE 545 - Applied Photovoltaics**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

The characteristics of sunlight. Solar cell behavior, properties, and design. Cell interconnection and module fabrication. Designing stand-alone and grid-connected photovoltaic systems. Special-purpose photovoltaic applications. Concentrator and hybrid solar thermal and photovoltaic systems. Advanced photovoltaic systems.

**REE 547 - Electric Power Conversion**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Electric power conversion for wind generators. Review of power switching devices. Rectifiers, DC-DC converters, inverters. Pulse width modulation. Converter topologies. Doubly-fed induction generators. Reactive power compensation.

**REE 549 - Power System Protection & Control**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Protection systems overview; protective devices; coordination and sequencing of relays; grounding practices; impedance protection. Methods of power systems operation and control; load-frequency control, automatic generation control. Modeling power systems protection and control using power system analysis software, emphasizing renewable resources.

Prerequisite: REE 529

**REE 551 - Advanced Geothermal Energy**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Classification of geothermal resources. Basics of geothermal wells and drilling. Resource capacity estimation and measurement. System design and integration. Applications such as aquaculture, greenhouses, and district heating.

**REE 553 - Energy Systems Management and Auditing**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Evaluating building thermal/electric/process loads, including lighting, hot water, HVAC and central plant systems, industrial refrigeration and motors. Opportunities for managing energy use through controls and operations/ maintenance strategies. Roles of commissioning, energy auditing, renewables and economic analysis in reducing energy use.

**REE 555 - Stationary Fuel Cells**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Advanced treatise of fuel cell systems for large, stationary applications with detailed examination of polymer electrolyte membrane, alkaline, phosphoric acid, molten carbonate, and solid-oxide systems, their design, performance, lifetime and reliability, modeling, and economics.

**REE 557 - Costing Renewable Energy**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Renewable energy in micro- and macroeconomic contexts. Review and discussion of current energy market structures, prices, effects of inflation and incentives, affordability, costs of supply reliability, investment criteria, and modeling market trends.

**REE 559 - Development of Hydropower Projects**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Mechanical and electrical equipment, including flow control elements, generators, transformers, protection and control equipment, and governors. Transient responses and stability. The engineering, procurement and construction process for hydropower projects. Commissioning and documentation.

**REE 561 - Process Design and Economic Evaluation for Biomass Energy Systems**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Process engineering methods, including development of process and instrumentation diagrams (P&ID); equipment selection and sizing; cost estimation, economic evaluation; and, fundamentals of chemical process safety.

**REE 563 - Batteries**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Comprehensive overview, integration characteristics, and performance comparison of battery systems for transportation and stationary applications, including lead-acid, nickel metal hydride, nickel cadmium, sodium-sulfur, lithium polymer, and lithium ion.

**REE 565 - Semiconductor Process Engineering**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Semiconductor process technology: crystal growth, silicon oxidation, photolithography, etching, diffusion, ion implantation, film deposition. Process integration, manufacturing, and metrology. Future trends and challenges.

**REE 567 - Wind Energy Systems Integration**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Wind system electric power integration, protection, and control. System components, including generators, transformers, and switching stations. Network stability. Energy sector regulation and markets. Forecasting and integration of wind power systems.

**REE 569 - Grid Integration of Renewables**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Issues unique to connecting renewable energy generation to the grid. Microgrids. Stability, transient, and harmonic effects. Interconnect agreements and requirements. SCADA and smart grid concepts. System optimization.  
Prerequisite: REE 549

**REE 571 - Geothermal Power Generation**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

High-enthalpy resources suitable for electric power generation. Energy transfer and conversion. Plant design and integration. Advanced design such as absorption power cycles.

**REE 573 - Energy-Efficient Building Design**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Principles of integrated, energy-efficient building design. Interpretation/application of codes, standards. Use of software tools for modeling, simulation of building energy systems. Daylighting, natural ventilation, architectural features of passive solar buildings. Inclusion of renewable resources and net-zero designs. Life-cycle economic analysis.

**REE 575 - Transportation Fuel Cells**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Detailed assessment of advances, prospects, and economics of polymer electrolyte membrane fuel cell, operational characteristics, durability, manufacturing, and fuel storage options in the automotive applications.

**REE 577 - Renewable Energy Integration**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Discussion based-class on the integration of renewable energy into the established electric grid, focusing on energy availability, reliability, options for integration, matching demand, and balancing economic options on global, regional, and local scales.

**REE 579 - Economic, Regulatory, and Environmental Aspects of Hydropower**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Duration curves and generation studies. FERC permitting and licensing, including compliance. Power sales contracts and bundled services. Environmental impact assessments. Project financing, management, and operations requirements. Optimization of integrated hydropower systems.

**REE 581 - Energy Storage Fundamentals**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

The survey course will examine energy storage fundamentals; applications and trends for pumped hydro, compressed air, flywheels, superconducting magnetic energy storage, gravitational mass, supercapacitors, batteries, fuel cells, and thermal systems.

**REE 582 - Introduction to Batteries**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

The course provides introduction to field of batteries and discusses electrochemical fundamentals and general properties of batteries such as energy density, specific power, charging and discharging, temperature effects, aging, and self-discharge.

**REE 583 - Introduction to Fuel Cells**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

This overview course will introduce students to fundamental fuel cell principles, history, classification, thermodynamics, efficiency and causes of voltage losses, reaction kinetics, electrode performance and catalyst design, and fuel cell components and their impact on performance.

**REE 591 - Hydrogen Production and Storage**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

The course will discuss the basics of hydrogen production and storage, the concept of hydrogen economy, conventional hydrogen generation, electrochemical and photochemical technologies, principles of hydrogen storage and novel storage materials.

**REE 592 - Advanced Batteries**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

This course will examine technology and trends in battery chemistry, manufacturing, pack assembly, characterization, safety, economics and applications for battery systems including lead acid, nickel-based, lithium ion, lithium polymer, metal air and flow batteries.

**REE 593 - Advanced Fuel Cells**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

This course provides an in-depth analysis of the current trends, fuel processing, novel materials, applications, safety, and characterization for polymer electrolyte membrane, alkaline, phosphoric acid, molten carbonate, solid oxide, and direct methanol fuel cells.

**System Engineering and Technology Management****SEM 421 - Systems Engineering**

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Foundations of systems engineering; structure of complex systems; system development processes and frameworks; systems engineering management; system needs analysis; system design & development; system engineering validation, reliability, availability, maintainability and deployment; human factors engineering.

Prerequisites: MATH 254 or MATH 341, and WRI 227

**SEM 422 - Advanced Systems Engineering**

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Advanced concepts in systems science and systems engineering; modeling and mathematical methods for systems engineering; system simulation tools; optimization and decision analysis; case studies involving practical systems, engineering integration of hardware, software, information, and human factor systems.

Prerequisites: MATH 243 or MATH 361 or MATH 465, and MGT 345 and WRI 227, or SEM 421

**SEM 425 - Advanced Engineering Management**

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Competitive strategy, innovation strategies, risk and return, creativity and product development, marketing and sales, intellectual property, high-tech organization, acquiring and organizing resources, operations management, acquisitions/global expansion, financial plans, sources of capital, deal presentations and negotiations, successfully leading high tech organizations.

Prerequisite: MGT 345 or SEM 421

**SEM 521 - Foundations of Systems Engineering**

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Structure of complex systems; system development processes and frameworks; systems engineering validation, reliability, availability, maintainability and deployment; human factors engineering.

Prerequisite: Graduate standing

**SEM 522 - Advanced Systems Engineering**

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Advanced concepts in systems science and systems engineering; modeling and mathematical methods for systems engineering; systems simulation tools; optimization and decision analysis; case studies involving practical systems engineering integration of hardware, software, information, and human factor systems.

Prerequisite: Graduate standing

**SEM 525 - Advanced Engineering Management**

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Competitive strategy, innovation strategies, risk and return, creativity and product development, marketing and sales, intellectual property, high-tech organization, acquiring and organizing resources, operations management, acquisitions/global expansion, financial plans, sources of capital, deal presentations and negotiations, successfully leading high tech organizations.

Prerequisite: Graduate standing

**SEM 526 - Case Studies in Systems Engineering**

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Much of modern civilization is defined by technical products and services. Case Studies in Systems Engineering examines challenges firms face in creating these highly complex products and services rapidly, accurately, and cost-effectively. Selected cases represent examples of failed, successful, and prototype systems that all defined the state of the art. Through analysis and group discussions, students will critically examine issues and approaches presented in numerous case studies. Students will link their own critical analysis to System Engineering best practices.

Prerequisite: SEM 521

**SEM 527 - Engineering Data Analytics**

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Engineering Data Analytics introduces students to the technologies and methodologies needed for data-driven decision-making during all stages of product development. Students will learn how to analyze, process, and establish correlations using data from various engineering processes during the design phase, prototyping phase, and production and operation phase. Students will examine large data-sets from smart homes, large-scale to IoT (Internet of Things) applications, and IC design and manufacturing. Correlations will be established using linear regression, Anova, and other data relationship techniques. Students will use advanced software tools such as Tibco Spotfire and R to analyze "Big Data", establish correlations, and determine if processes are capable and in control. An introduction to machine learning and real-time streaming analysis techniques will also be discussed.

Prerequisite: Graduate standing or MATH 465

**Sociology****SOC 107 - Seminar**

SS

Credit Hours: (Hours to be arranged each term.)

**SOC 201 - Classical Sociological Theory**

(W) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to the early development of sociological theory. Works by Marx, Weber, Durkheim, Parsons and Goffman will be discussed in terms of their contribution to the discipline of sociology.

**SOC 202 - Contemporary Sociological Theory**

(S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Theories on the social construction of self, social and population structures, gender inequality, global capitalism and deviance are explored in the context of contemporary social issues.

Prerequisite: SOC 201

**SOC 204 - Introduction to Sociology**

(F,W,S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Survey of human relationships and interaction of organized groups and institutions in modern society. Emphasis on attitudes, values, beliefs, customs and change within our complex social structure.

**SOC 205 - Current Health Issues**

(W) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

An introduction to the most pressing health issues in contemporary society, including aging, healthcare reform, cost of healthcare, and amenable mortality.

**SOC 206 - Social Problems**

(F) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

A sociological exploration of contemporary social problems, including crime, illness, poverty, unemployment, immigration, gender inequality, LGBT issues, and the environment.

**SOC 207 - Seminar**

SS

Credit Hours: (Hours to be arranged each term.)

**SOC 210 - Marriage and Family Living**

SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Personal problems of the married couple in everyday living with an emphasis on adult lifestyles, relationships, sexual roles and attitudes, family planning, family finances, and divorce and remarriage.

**SOC 225 - Medical Sociology**

(F,W,S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to medical sociology and social-epidemiological research, covering social causes and consequences of health and illness, the practitioner-patient relationship, health behavior, and health care organization.

**SOC 235 - Introduction to Sustainability**

(S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

An introduction to the history, theory and practice of sustainability. The focus is on human-environment interactions, highlighting how human agency can jeopardize our collective future, and how harm can be avoided through appropriate social, political, and legal action.

**SOC 301 - Social Science Research Methods**

(F) SS

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Introduction to theory and methods of research in the social sciences, and interpretation of social science research. Prerequisites: SOC 204 and SOC 225

**SOC 302 - Social Science Research Methods II**

(W) SS

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Continuation of SOC 301: data collection, analysis, and development of social science research papers. Prerequisite: SOC 301

**SOC 304 - Criminology**

(W,S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Analysis of criminal behavior from theft to homicide. Discussion of the definition of criminal behavior, varieties of crime and the criminal justice system. Prerequisite: SOC 204

**SOC 305 - Rural Health**

(F,W,S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Advanced introduction to rural population health and health care. Topics include rural population health and health behavior, economic and social/structural issues, and health care delivery and reform. Prerequisite: SOC 225

**SOC 307 - Seminar**

SS

Credit Hours: (Hours to be arranged each term.)

**SOC 315 - Juvenile Delinquency**

(F) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to trends and sociological theories of juvenile delinquency. Prerequisite: SOC 204

**SOC 325 - Global Population Health**

(F,W) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduces demographic methods and theories of population health, in addition to trends in fertility, mortality, morbidity, and aging both in the U.S. and internationally. Prerequisite: MATH 111 or SOC 204 or SOC 225

**SOC 335 - Health Inequality and Cultural Competency**

(F,W,S) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduction to health inequality based on systematic social research. Provision of basic training on cultural competency and underrepresented populations' engagement with the health care system. Prerequisite: SOC 225

**SOC 345 - Aging and Society**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Aging and Society examines the aging process from a sociological perspective. The course explores socialization and development in health, education, economics, and families. Students will critically examine how aging is shaped by society's influence on individuals, groups, and cohorts. Prerequisite: SOC 204 or SOC 225

**SOC 405 - Program Planning and Evaluation**

(W) SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

In this course, health behavior and behavior change theories are introduced, critiqued, and utilized to provide theory-based examples of population health interventions.

Prerequisites: SOC 204 and SOC 225

**SOC 407 - Seminar**

SS

Credit Hours: (Hours to be arranged each term.)

**SOC 421 - Research and Extern Training**

SS

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

The objective of this course is to provide training and preparation to engage with local partners through research and externships.

Prerequisite: Population Health

Management majors with Senior standing only

**Spanish****SPAN 101 - First Year Spanish**

(F)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

An introduction to elementary Spanish. A three-term sequence for beginners. Emphasis on vocabulary building, listening comprehension, phonetics, oral practice, and elements of grammar. Elementary readings and writings will be required.

Prerequisite: Taken in sequence or instructor consent

**SPAN 102 - First Year Spanish**

(W)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

An introduction to elementary Spanish. A three-term sequence for beginners. Emphasis on vocabulary building, listening comprehension, phonetics, oral practice, and elements of grammar. Elementary readings and writings will be required.

Prerequisite: Taken in sequence or instructor consent

**SPAN 103 - First Year Spanish**

(S)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

An introduction to elementary Spanish. A three-term sequence for beginners.

Emphasis on vocabulary building, listening comprehension, phonetics, oral practice, and elements of grammar. Elementary readings and writings will be required.

Prerequisite: Taken in sequence or instructor consent

**SPAN 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**SPAN 201 - Second Year Spanish**

(S) H

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Intensive introduction to the language.

Course aims at progressive development of fluency through extensive exposure to the language in real situations.

Comprehension-based approach.

Prerequisite: SPAN 103 or instructor consent; SPAN 201, SPAN 202, SPAN 203 taken in sequence or instructor consent

**SPAN 202 - Second Year Spanish**

(W) H

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Intensive introduction to the language.

Course aims at progressive development of fluency through extensive exposure to the language in real situations.

Comprehension-based approach.

Prerequisite: SPAN 201 or instructor consent; SPAN 201, SPAN 202, SPAN 203 taken in sequence or instructor consent

**SPAN 203 - Second Year Spanish**

(S) H

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Intensive introduction to the language.

Course aims at progressive development of fluency through extensive exposure to the language in real situations.

Comprehension-based approach.

Prerequisite: SPAN 202 or instructor consent; SPAN 201, SPAN 202, SPAN 203 taken in sequence or instructor consent

**SPAN 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**SPAN 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**SPAN 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**Speech****SPE 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**SPE 111 - Public Speaking**

(F,W,S) C

Lecture Hours: 2

Lab Hours: 2

Credit Hours: 3

Public speaking with emphasis on content, organization, and speaker adjustments to various situations; dynamics of the speaker/listener interaction; and appropriate language usage. Includes informative, demonstrative, and persuasive speeches.

**SPE 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**SPE 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**SPE 314 - Argumentation**

(S) C

Lecture Hours: 2

Lab Hours: 2

Credit Hours: 3

Examines argumentation as part of human interaction and inquiry. Explores arguing to gain adherence as a way of reasoning. Practice in public speaking, debate, ethics and critical thinking.

Prerequisite: SPE 111

**SPE 321 - Small Group and Team Communication**

(F,W,S) C

Lecture Hours: 2

Lab Hours: 2

Credit Hours: 3

Provides instruction and experience in decision making through group processes designed to develop competent team leaders and participants. Participation in and evaluation of a variety of group communication exercises.

Prerequisite: SPE 111

**SPE 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**Statistics****STAT 412 - Regression and Time Series**

(F)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Examines an introduction to regression analysis with a focus on multiple linear regression. Topics include statistical inference, goodness of fit, diagnostics, criteria for choosing covariates, categorical predictors, and an introduction to analysis of time series data.

Prerequisite: MATH 362

**STAT 413 - Categorical Data Analysis**

(F)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Introduces analysis techniques for categorical data. Measures of stochastic superiority, odds ratios, techniques for Likert data, Models for frequency arrays, goodness-of-fit tests, two-, three-, and higher- way tables, latent and logistic models will be presented.

Prerequisite: MATH 362

**STAT 414 - Statistical Methods in Epidemiology**

(W)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Examines the methods used in epidemiologic research, including the design of epidemiologic studies and the collection and analysis of epidemiological data.

Prerequisite: MATH 361

**STAT 415 - Design and Analysis of Experiments**

(F)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Examines the principles of experimental design; construction and analysis of completely randomized design, randomized block design and Latin square designs; covariates; factorial treatments, split plotting; random effects and variance components.

Prerequisite: MATH 362

**STAT 431 - Sampling Methods**

(F)

Lecture Hours: 4

Lab Hours: 0

Credit Hours: 4

Construction of sampling frames; estimation of means, total and proportions: sampling designs including simple random, stratified, cluster, systematic, multistage and double sampling; ratio and regression estimators; source of errors in surveys; capture and recapture methods.

Prerequisites: MATH 361 and MATH 362

**STAT 505 - Biostatistics I**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

This course focuses on the introduction of statistics and application of statistical methods to data most often seen by medical practitioners and researchers. This course provides an introduction to the collection and analysis of public health and health care data. Elements of statistical inference, probability distributions, sampling, confidence intervals, and estimation of means and rates are reviewed with emphasis on application and critical interpretation of the results.

**STAT 515 - Epidemiology I**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

This course will serve as an introduction to the basic principles of epidemiology and the measures used in epidemiology, epidemiologic study design and analysis, and other topics that are important to an introductory understanding of epidemiology.

**Vascular Technology****VAS 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**VAS 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**VAS 214 - Vascular Anatomy**

(F)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Detailed consideration of the gross and microscopic anatomy of arteries and veins throughout the human body. Laboratory includes cadaver dissection, anatomical models, and an introduction to instrumentation and basic ultrasound scanning techniques.

Prerequisite: MIT 103 with grade "C" or better

**VAS 225 - Patient Management Practices**

(F)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

Current issues in the practice of vascular technology with emphasis on basic concepts of patient care, infection control procedures, and the technologist's responsibility to the patient, the patient's family, and the vascular technology profession.

Prerequisite: MIT 103 with grade "C" or better

**VAS 245 - Peripheral Venous Disease**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Investigation to the pathophysiology of venous disease with emphasis on theoretical and practical considerations of diagnostic methods of venous testing. These include clinical assessment, plethysmography, and duplex imaging of lower extremity veins.

Prerequisite: VAS 246

**VAS 246 - Peripheral Arterial Disease**

(W)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Investigation of the pathophysiology of arterial occlusive disease with emphasis on the theoretical and practical considerations of diagnostic methods of arterial testing. These include clinical assessment, physiological evaluation and duplex imaging of lower extremity arteries.

Prerequisite: VAS 214

**VAS 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**VAS 335 - Radiographic Vascular Anatomy**

(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Survey of medical imaging modalities ancillary to vascular sonography including angiography, digital subtraction angiography, computerized tomography and magnetic resonance angiography. Student teams will prepare case studies comparing the efficacy of these imaging modalities.

Prerequisite: VAS 214 with grade "C" or better

**VAS 337 - Survey of Echocardiography**

(W)

Lecture Hours: 2

Lab Hours: 3

Credit Hours: 3

A survey of basic echocardiography with emphasis on normal cardiac anatomy and abnormal disease states. Standard sonographic imaging techniques of adult echocardiography, including instrumentation and protocols.

Prerequisites: BIO 220

**VAS 365 - Abdominal Vascular Disease**

(F,W,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Diagnostic methods of abdominal and visceral vascular disease testing. Includes aortoiliac, renal artery and kidney, mesenteric system, liver system, and transplantations. Laboratory emphasizes advanced instrumentation and scanning techniques, patient interviews, clinical signs and symptoms, physical assessment and findings.

Prerequisite: VAS 246

**VAS 366 - Special Circulatory Problems**

(F,W,S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Diagnostic methods of testing the efficacy of vascular surgical procedures and interventions. To include arterial bypass grafts, organ transplants and dialysis access grafts. Venous and arterial mapping, upper extremity venous and arterial disease testing, IVUS, pseudo aneurysm treatment and compartment syndrome will also be covered.

Prerequisite: VAS 365

**VAS 367 - Cerebrovascular Disease**

(S)

Lecture Hours: 3

Lab Hours: 3

Credit Hours: 4

Theoretical and practical considerations of diagnostic methods of testing arterial and venous diseases affecting the vasculature of the head and neck including the intracerebral vessels. Laboratory includes advanced instrumentation and scanning techniques, and instruction on patient interviewing, clinical signs and symptoms, physical assessment and findings.

Prerequisites: VAS 366 and VAS 375

**VAS 375 - Survey of Abdominal Sonography**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

A survey of basic abdominal sonography with emphasis on normal abdominal anatomy and abnormal disease states. Standard sonographic imaging techniques of general abdomen, instrumentation, and abdominal protocols.

Corequisite: VAS 365

**VAS 385 - Vascular Laboratory Management**

(F,W,S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Focus on human resource skills as necessary to manage a vascular laboratory. Includes the interview process, hiring and firing, as well as employee performance evaluation. Other topics will include reimbursement, licensure, accreditation and other management issues.

Corequisite: VAS 388

**VAS 388 - Externship Preparation**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Review and summarization of key concepts in Vascular Technology. Focus is on patient care and interpersonal scenarios the externship student will likely face while in the hospital environment or independent vascular lab. Review and discussion of the Vascular Technology Externship Handbook.

Prerequisites: VAS 366 and VAS 375, both with grade "C" or better

Corequisites: VAS 367 and VAS 385

**VAS 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**VAS 420 - Vascular Technology Externship**

(F,W,S)

Lecture Hours: 0

Lab Hours: 40

Credit Hours: 15

All B.S. students complete four terms (12 months) of clinical experience in Vascular Technology at an affiliated clinical site.

Students work under the direct supervision of Registered Vascular Technologists and provide monthly log sheets and evaluation forms. Students prepare clinical case studies each term.

Prerequisite: All academic coursework in the Vascular Technology curriculum

**VAS 420A - Special Vascular Technology Externship**

(F,S)

Lecture Hours: 0

Lab Hours: 22

Credit Hours: 8

This two term special externship is designed for the degree completion student. Students working in a clinical vascular setting will prepare clinical case studies as well as rotate through special imaging modalities.

Prerequisites: Be an ARDMS or CCI Registered Vascular Technologist in good standing, and have completed academic course work in the Medical Imaging curriculum with grade "C" or better

**VAS 420B - Special Vascular Technology Externship**

(F,W,S)

Lecture Hours: 0

Lab Hours: 18

Credit Hours: 7

This two-term special externship is designed for the degree completion student. Students working in a clinical vascular setting will prepare clinical case studies as well as rotate through special imaging modalities.

Prerequisites: Be an ARDMS or CCI Registered Vascular Technologist in good standing, and have completed academic course work in the Medical Imaging curriculum with grade "C" or better

**Writing****WRI 107 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**WRI 115 - Introduction to Writing**

(F,W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Focuses on sentence structure, paragraph coherence, and essays. Regular writing and feedback develop student competency in college level writing. May not be used to meet general education requirement or graduation credit.

Prerequisite: Writing ability as demonstrated by SAT/ACT score and/or writing sample

**WRI 121 - English Composition**

(F,W,S) C

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Introduces critical reasoning and analysis. Explores connections between thesis, structure, tone and purpose; includes writing process, rhetorical strategies applications. Focuses on academic reading, writing and research skills.

Prerequisite: Writing ability as demonstrated by SAT/ACT score and/or writing sample

**WRI 122 - Argumentative Writing**

(F,W,S) C

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Designed to develop skills in ethical argument, research, critical thinking. Multipage papers, including argumentative research paper, required. Focuses on writing process with attention to audience, effective style, and overall rhetorical effect.

Prerequisite: WRI 121 with grade "C" or better

**WRI 123 - Research Writing**

(S) C

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Focuses on the formal research paper, including research techniques and process of developing a longer document.

Prerequisite: WRI 122

Pre- or Corequisite: SPE 111

**WRI 207 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**WRI 214 - Business Correspondence**

(F) C

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Focuses on theories and strategies governing written correspondence. Designed to equip the student to perform effectively in a variety of business writing situations; major emphasis on practical applications.

Prerequisite: WRI 122 or equivalent

**WRI 216 - Public Relations Writing**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Students will be introduced to the basics of writing and designing public relations communication, including press releases, newsletters, brochures, and other written public relations communication tactics.

Prerequisite: WRI 122

**WRI 225 - Writing Nonfiction**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Study of strategies for nonfiction composition. Both creation of text and analysis of existing text to apply the principles of effective nonfiction prose. Practical steps, techniques, and best practices geared toward analyzing, creating, organizing, revising effective nonfiction prose for publication. Significant amount of time spent writing and editing.

Prerequisite: WRI 122 with grade "C" or better

**WRI 227 - Technical Report Writing**

(F,W,S) C

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Focuses on techniques of gathering, organizing, and presenting technical information and graphics. Requires technical reports derived from realistic situations in the student's major.

Prerequisite: WRI 122 with grade "C" or better

Pre- or Corequisite: SPE 111

**WRI 305 - Writing for the Marketplace**

(As required)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Designed to introduce the basics of professional writing - fiction, personal experience, and technical articles, etc. for publication, including marketing and manuscript preparation. Each student must submit at least one article or story (8 pages or more) for publication during the term.

**WRI 307 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**WRI 327 - Advanced Technical Writing**  
(F,W,S) C

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Processes involved in technical writing and methods of preparing technical data; offers a variety of writing problems to provide opportunities for the student to develop precision in statement and in graphic presentation.

Prerequisite: WRI 227

**WRI 328 - Style**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Focuses on developing strategies for diagnosing, analyzing, and revising clarity using the technical vocabulary of style. Approaches style as a rhetorical concern dependent on audience and other aspects of the situation. Applicable to both research and professional/technical writing.

Pre or Corequisite: WRI 227

**WRI 332 - Academic Writing in the Disciplines**

(F)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Focuses on research and analytical writing strategies for meeting the rhetorical demands of specialized subjects and diverse audiences in the students' disciplines. The course addresses topics and issues of interest in disciplinary areas of health sciences, engineering, and social sciences.

Prerequisites: WRI 121 or WRI 122, and WRI 227 or WRI 327

**WRI 345 - Science Writing**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Processes and strategies involved in communicating scientific information to professional and lay audiences, including: topic, hypothesis, and experimental method description; literature review strategies; writing and project management strategies; visual display of quantitative data.

Prerequisite: WRI 123 or WRI 227

**WRI 350 - Documentation Development**

(W) C

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Provides students with basic tools for preparing documentation. Focuses on usability of documentation and includes planning and scheduling, audience evaluation, use of appropriate examples and illustrations, style, editing technique, organization and research.

Prerequisite: WRI 227

**WRI 407 - Seminar**

Credit Hours: (Hours to be arranged each term.)

**WRI 410 - Proposal and Grant Writing**  
(S) C

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Provides theory and skills in proposal writing for seeking funding from public and private agencies and for preparing proposals in business and industrial settings. Focuses on the process of preparing proposals, including analyzing audiences, conducting research, organizing, writing, and editing.

Prerequisite: WRI 227

**WRI 415 - Technical Editing**  
(W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Focuses on the role of the technical editor in business and industry. Examines the publishing process, the dynamics of the editor/writer relationship, and mechanics and techniques of proofreading and copyediting. Provides considerable practice in copyediting and proofreading manuscripts.

Prerequisite: WRI 227 or appropriate work experience

**WRI 420 - Document Design**

(S)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Applies publishing and graphic arts principles to the preparation of professional publications and presentation materials. Includes typography, design principles, the use of graphical elements, and integration of text and graphics.

Prerequisites: SPE 111 and WRI 227

**WRI 425 - Advanced Composition**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Advanced writing in varied topics specific to disciplines and realistic assignments in professional writing. 30 to 40 pages of formal writing required with several long pieces designed for publication. Open to advanced students in a variety of majors.

Pre or Corequisites: COM 301 or COM 305, and WRI 328

**WRI 510 - Grant Proposal Writing**

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

This Provides theory and skills in proposal writing for seeking funding from public and private agencies and for preparing proposals in business and industrial settings. Focuses on the process of preparing proposals, including analyzing audiences, conducting research, organizing, writing, and editing.

**WRI 521 - Writing at the Graduate Level**

(F, W)

Lecture Hours: 3

Lab Hours: 0

Credit Hours: 3

Focuses on developing graduate-level writing and research skills with emphasis on field-appropriate academic style, conventions, and research literacy.

Culminates in synthesis of professional and academic sources into a substantive literature review.

# Offices and Services

## Administrative Offices

### Academic Agreements

DOW E213

(541) 885-1844

[academicagreements@oit.edu](mailto:academicagreements@oit.edu)

[www.oit.edu/academic-agreements](http://www.oit.edu/academic-agreements)

Oregon Tech's Office of Academic Agreements cultivates and maintains partnerships with area high schools, community colleges, and universities that result in increased access and smooth transitions for students. The office forges meaningful relationships with educational partners by connecting faculties, coordinating partnerships, participating in pathways and other local and statewide advisory boards and providing internal and external communication and promotion of partnerships. The office develops dual enrollment agreements with college and university partners, coordinates dual credit and other programs with high schools locally and statewide, manages and coordinates articulation agreements, and develops and manages other academic agreements.

Information about the work of the Academic Agreements Office, Dual Enrollment with colleges and universities, dual credit with high schools and specific articulation agreements can be found on the web page or by contacting the office.

### High School Programs for College Credit

(541) 885-1844 Klamath Falls

(503) 821-1297 Portland-Metro

[www.oit.edu/youth-programs](http://www.oit.edu/youth-programs)

### Advance Credit Program

The Advance Credit Program (ACP) is a partnership between Oregon Institute of Technology and the participating high school to offer qualified high school students the opportunity to receive college credit from Oregon Tech. Oregon Tech is partnered with more than 20 high schools and offers more than 15 introductory college courses. The Advance Credit Program consists of college courses taught in the high schools by college level qualified high school instructors. These courses are offered as part of the regular high school curriculum with the option of registering for college credit from Oregon Tech. ACP gives students the opportunity to try college level courses, gain valuable skills, and develop study habits for college.

### High School Transition Program

The High School Transition Program (HST) at Oregon Institute of Technology gives qualified high school students the opportunity to come to the Klamath Falls or Portland-Metro campus and take a college course for Oregon Tech credit. Students must be 14 years or older and are typically eligible to take 100- and 200-level courses. High school students must register through the Office of Academic Agreements.

The ACP and HST Programs allow Oregon Tech to reduce the normal tuition fee by a considerable amount. Cost to the participating high school student is \$25 per credit.

## Affirmative Action, Non-Discrimination and Equal Opportunity

Office of Human Resources, Snell 108

(541) 885-1108

The Civil Rights Officer is charged with oversight and enforcement of Oregon Tech's compliance with relevant federal, state and university civil rights statutes, regulations and policies. Complaints and grievances related to unlawful discrimination and harassment under federal and state Civil Rights Acts, the Rehabilitation Act, the Americans with Disabilities Act, and other federal or state anti-discrimination and employment laws are to be directed to the Officer for resolution. The Officer also coordinates Oregon Tech's Equal Opportunity programs and activities which seek to maintain a learning and working environment that fosters diversity, inclusion and personal success. Inquiries, requests for assistance, or grievances pertaining to Oregon Tech policies on discrimination, harassment, equal opportunity or access to programs and services should be directed to this office.

## Assessment

(541) 885-1990

[www.oit.edu/provost/learningoutcomes](http://www.oit.edu/provost/learningoutcomes)

Oregon Tech actively engages in assessment of both degree programs and broad institutional essential student learning outcomes (ESLOs). The Director of Academic Excellence and Executive Assistant, in conjunction with the Executive Committee of the Assessment Commission, leads the campus in these efforts. Assessment plans are developed for each undergraduate and graduate degree program focusing on program learning outcomes created by each academic department. The faculty for the program identify

strengths and weaknesses in student learning and recommend plans for improvement through a continuous program improvement process. Information on assessment of student learning outcomes is posted on the Oregon Tech website. Oregon Tech faculty members also assess the ESLOs, which are intended to reflect common themes from departmental and program learning outcome statements. Information on assessment of ESLOS is posted on the Oregon Tech website at [www.oit.edu/provost/eslo](http://www.oit.edu/provost/eslo).

## Campus Safety

Cornett 131A  
(541) 885-1111  
[www.oit.edu/safety](http://www.oit.edu/safety)

The Campus Safety department administers the university's security and parking programs. The department promotes security on the Oregon Tech campus through emergency and non-emergency response services, problem solving, and enforcement of appropriate laws, rules and regulations. The Campus Safety department also provides service functions such as crime prevention and crime reporting programs. Campus Safety patrol officers are available 24/7 for any concern, including disability issues that need immediate resolution or assistance. Our "Night Ride" assistance program is also available for any person that needs an escort from one area to another on campus 24/7.

## Geo-Heat Center

Boivin Hall, 102  
(541) 885-1750  
[geoheat@oit.edu](mailto:geoheat@oit.edu)  
<http://geoheat.oit.edu>

The Oregon Renewable Energy Center encompasses Oregon Tech's Geo-Heat Center. Established in 1975, Geo-Heat is active in research, technical assistance and information services in geothermal direct-use, small-scale power generation and ground-source heat pumps. Research activities have included hydrology and geochemistry studies, district heating, down hole heat exchangers, heat pumps, agri-business applications, low temperature Rankine cycle power generators and resource assessment.

As funding allows, the Center provides technical assistance for geothermal projects in the area of equipment and materials selection, feasibility studies, design, troubleshooting and economic evaluations. The Center also provides training sessions and information dissemination regarding the direct applications of geothermal energy, small-scale power generation and ground-source heat pumps.

The Center also publishes technical papers, software and monographs on geothermal energy. Most publications are available on the Center's website, and also through the National Geothermal Data System (NGDS). Archival publications are available through Oregon Tech's library system. The staff has made presentations worldwide and gives tours of local geothermal installations. They are active in professional organizations such as the Geothermal Resources Council, the International Geothermal Association, International Ground-Source Heat Pump Association, and ASHRAE. An extensive Web site on geothermal energy is available at: <http://geoheat.oit.edu>.

## Information Technology Services

(541) 885-1720  
(541) 885-1470 Helpdesk/Service  
(503) 821-1289 Portland-Metro Helpdesk

Information Technology Services provides computing and telecommunications resources for the Oregon Tech campuses. Primary service and support areas include e-mail and network storage for all students, faculty and staff; broadband network connectivity between all Oregon Tech buildings; and advanced technology services such as wired and wireless Internet connections, Internet 2 and interactive videoconferencing. In conjunction with Oregon Tech faculty, staff and students, ITS strives to offer the comprehensive and advanced technologies necessary to meet educational needs and to help facilitate instruction and research on the Oregon Tech campus.

Oregon Tech offers more than 500 computers available for student use on the Klamath Falls campus. The Portland-Metro campus is a laptop-required campus with resources like laptop specifications, financial aid, and helpful instructions found at <http://www.oit.edu/portland-metro/college-costs/bring-your-own-device>. ITS supports the computers and projectors in campus laboratories and classrooms to insure proper function and availability for faculty and students.

## Library Services

(541) 885-1772

[www.oit.edu/libraries](http://www.oit.edu/libraries)

The University Libraries consist of the main library on the Klamath Falls campus, the Shaw Historical library, and the Portland-Metro campus library. The online catalog provides access to the library collections, while web-based databases offer students access to extensive online information sources. All electronic resources are available on both campuses and via remote access in order to promote student learning regardless of location. Research services include print and electronic reserves, inter-library loans, individual research assistance, and chat reference. Campus librarians offer class-related instruction in the use of the library and information resources, workshops on various topics, classes in research methods, and tours.

### Klamath Falls Library

The Klamath Falls library, located on the first and second floors of the Learning Resources Center (LRC), contains print and electronic research materials, including government documents; access to thousands print and electronic journals; and unique digital and special collections. For librarian assistance, call (541) 885-1772 or email [libtech@oit.edu](mailto:libtech@oit.edu).

### Portland-Metro Library

The Portland-Metro library, located on the fourth floor of the Portland-Metro campus building, houses a print collection on-site focusing on local programs, and will request any other resources as needed. For assistance call (503) 821-1260 or email [libtech@oit.edu](mailto:libtech@oit.edu).

### Shaw Historical Library

The Shaw Historical Library, located on the second floor of the LRC, established in 1983 by Laurence and Dorothy Shaw, houses books, art, maps, manuscripts, photographs, and other materials on the history, cultures and natural history of the Land of the Lakes—South Central Oregon, Northern California, and Northwestern Nevada. The Journal of the Shaw Historical Library is available for purchase at the Oregon Tech bookstore. For more information call (541) 885-1686 or email [Shawlib@oit.edu](mailto:Shawlib@oit.edu).

## Marketing, Communications & Public Affairs

Snell Hall

(503) 821-1303

[marketing@oit.edu](mailto:marketing@oit.edu)

The Marketing, Communications and Public Affairs Department at Oregon Tech is responsible for developing and implementing integrated outreach strategies designed to advance the university's reputational capital and standing among a variety of constituents and audiences. This includes providing services to all segments of the university, from supporting academic departments in promoting their programs, to developing ad campaigns to recruit students, to creating communications strategies that undergird our mission.

The department is responsible for the university's brand position and identity. It works with academic programs and administrative departments throughout the university on marketing and advertising outreach efforts, and manages university-wide publications, video production, the university's website, and social media. The department also serves as the public affairs office for the university, managing media relations, supporting legislative affairs, and providing executive writing and editorial support.

## Oregon Renewable Energy Center

The Oregon Renewable Energy Center (OREC) was established by the Oregon State Legislature in 2001 to promote energy conservation and renewable energy use in Oregon and throughout the Northwest. This is accomplished through applied research, educational programs and workforce development, and technical assistance and information dissemination. The Center also encompasses Oregon Tech's Geo-Heat Center. OREC draws its strong technical expertise from the Oregon Tech faculty, whose engineers and computer scientists have been involved in applied research in renewable energy for decades.

### OREC:

- investigates renewable energy technologies and opportunities for using them
- assesses which technologies are appropriate for particular circumstances
- applies promising technologies with effective instrumentation and controls
- evaluates technologies using testing and economic analysis
- supports Curriculum Development and student learning experiences
- informs the public through classes, educational materials, and technical data

Current OREC applied research and applications engineering projects focus on:

- power conversion and storage – Testing renewable technologies such as solar, fuel cells, and geothermal heat pumps and developing control systems to smoothly integrate renewable technologies into existing facilities and electrical distribution networks
- alternative fuel sources – Investigating electric and biodiesel power options for cars and trucks
- green building technologies – Utilizing green building materials and techniques, and instrumentation, control and testing of buildings that use renewable energy instead of conventional power
- grid integration of renewable energy sources (smart grid with smart buildings)

## Registrar's Office

Snell, Lower Level

(541) 885-1300

[registrar@oit.edu](mailto:registrar@oit.edu)

[www.oit.edu/registrar](http://www.oit.edu/registrar)

Major functions of the Registrar's Office are the maintenance of student records, registration, Web services, grade processing, transfer credit evaluation and community college articulation, degree checking, graduation, scheduling, veterans' services, enrollment certification and the catalog.

### Academic Information

The class schedule, introductory pages to the Class Schedule and General Catalog contain information about academic regulations, registration instructions and college procedures and policies. Students should be familiar with this information. These documents can be found on the Oregon Tech Web site at [www.oit.edu/registrar](http://www.oit.edu/registrar).

### Student Records

The Registrar's Office maintains information regarding academic progress, including grade reports and permanent academic records (transcripts). Students and alumni may request transcripts at any time.

The Registrar's Office also collects and maintains accurate information about students, such as address, curriculum (major) and advisor's name. Much of this information is required for local and state enrollment reporting and for accurate mailing addresses. Changes to personal data such as address or name should be reported to the office promptly.

### Privacy Rights

Under the Family Educational Rights and Privacy Act of 1974, students are entitled to review records, files, documents and other materials that contain information maintained by the university. Students may challenge information considered inaccurate or misleading. A list of university records, the responsible custodians and the university policy on records are available in the Registrar's Office.

### Directory Information

The following information is considered Directory Information and may be made available to the public unless you restrict its release by written notice to the University Registrar by the last day to register or add courses for the current term.

Oregon Tech designates the following items as Directory Information: student name, current address, current telephone number, dates of attendance, classification (year in school), major field of study, most recent previous school attended, degrees and awards received (including dates), hometown, past and present participation in officially recognized activities and sports; and for members of athletic teams: age, height and weight.

### Registration

The Registrar's Office publishes the class schedule and registration instructions for each term on the Oregon Tech Web site at [www.oit.edu/registrar](http://www.oit.edu/registrar). It also maintains class rosters for instructors and processes grades. Personal information, class schedules and grades, as well as unofficial transcripts, are on Oregon Tech's Web for Student and also available in the office.

## Strategic Partnerships and Government Relations

Portland-Metro

(503) 821-1247

[www.oit.edu/strategic-partnerships](http://www.oit.edu/strategic-partnerships)

The Office of Strategic Partnerships (OSP) and Government Relations promotes and oversees industry and government relationships at the Oregon Institute of Technology. The staff is responsible for campus-wide promotion of the University's economic development mission by facilitating the external relationships that enable the University to contribute to the vitality of its campus regions and the state of Oregon.

The OSP has responsibility for:

1. building long-term partnerships with businesses and industry associations that are crucial to Oregon Tech's mission
2. providing support to secure external funding by leveraging private sector partnerships for grants and sponsored projects
3. proactively working with faculty to develop collaborations with industry that lead to sponsored projects, commercialization and entrepreneurial opportunities
4. building an alliance of local, state and national support for Oregon Tech's policy and funding priorities
5. representing the University on strategic partnerships, industry affairs, and legislative advisory councils

The OSP collaborates with the Office of Sponsored Projects & Grants Administration and the Office of Innovation and Technology Transfer to determine Oregon Tech's research priorities and align faculty research interests with industry, other universities, and economic development and research organizations. Operationally, the Office of Strategic Partnerships reports to the President to advance the University's strategic priorities.

## **Business and Industry Partnerships**

The Office of Strategic Partnerships assists Oregon Tech's faculty at all locations to connect to industry partners and advisors to ensure that Oregon Tech's courses integrate new technologies and are responsive to business needs for skilled professionals. Businesses throughout the Pacific Northwest, such as Intel, Pacific Power, Maxim, PCC Structurals, FLIR, Mentor Graphics, JELD-WEN, Kaiser, Providence and the Boeing Company, send their best and brightest to Oregon Tech for professional development so they can advance into engineering, technology, health care and management positions within their companies.

Oregon Tech's business partners participate on Industry Advisory Councils, support students through internships and sponsored student projects, teach as adjunct faculty, recruit graduates for jobs, donate labs and equipment, and sponsor applied research. Oregon Tech could not fully execute its mission without the engagement and support of industry partners.

Oregon Tech is a member or partner with the Smart Grid Oregon, Drive Oregon, Oregon Solar Energy Industry Association, Renewable Northwest Project, Oregon Manufacturing Innovation Center, Oregon BEST (Built Environment & Sustainable Technology), Manufacturing 21 Coalition, Pacific Northwest Defense Coalition, Gorge Technology Alliance, Technology Alliance of Oregon, Oregon Manufacturing Extension Partnership, Oregon Workforce Investment Board and several local workforce boards, Oregon Transportation Research and Education Consortium, Oregon Health care Workforce Institute, and the Greater Portland, Klamath Falls, Tualatin, and Wilsonville Chambers of Commerce.

Individual businesses or business associations that are interested in university-industry partnerships are encouraged to contact the Associate Vice President for Strategic Partnerships at (503) 821-1288.

## **Government Relations**

Oregon Tech's government relations activities support the university community's vision "Oregon Tech will be a nationally recognized public polytechnic university delivering in-demand, industry-focused degrees and graduates ready to meet workforce needs in Oregon and the Northwest."

Working with local, state and national elected and appointed leaders, Oregon Tech's government relations efforts are focused on enhancing student and graduate success, continuing excellence in applied degree programs, providing statewide educational opportunities, and increasing service to the community.

Oregon Tech provides information to local, state and national legislators and policy makers on:

- increasing access for rural and under-served students to science, technology, engineering and math (STEM) degree programs
- workforce development support for local industries, such as health care, energy, and manufacturing
- education policy and reform including Oregon Tech's initiatives to achieve the state's and nation's educational goals
- financial aid and student access initiatives, with a focus on rural students and first-generation college students
- re-authorization bills that impact Oregon Tech's portfolio of programs
- local, state, and federal competitive grants to enhance Oregon Tech's degree programs and net-zero campus initiatives

## **Title IX**

Title IX Office, Snell 108

(541) 885-1108

[titleix@oit.edu](mailto:titleix@oit.edu)

The Title IX Coordinator is charged with oversight and enforcement of Oregon Tech's compliance with Title IX of the Education Amendments. Complaints of gender-based or sex-based discrimination, sexual harassment, and sexual assault should be immediately reported to Oregon Tech's designated Title IX Coordinator.

## Youth and High School Programs

[www.oit.edu/youthprograms](http://www.oit.edu/youthprograms)

Oregon Tech's Youth Programs offers innovative and energizing pre-college educational outreach programs designed to encourage K-12 students to pursue educational and career goals in science, technology, engineering and mathematics (STEM). The goals of our programs are to:

1. increase understanding and interest in STEM careers among participants
2. build confidence in their technical abilities
3. introduce them to role models and mentors

### Youth Camps

#### GEAR UP

A series of special programs, created in partnership with Oregon GEAR UP, to ensure that Oregon's low-income middle school and high school students are prepared for, pursue and succeed in post-secondary education.

#### I'm Going To College

In partnership with NELA, this day program brings sixth-grade students to campus to expose them to college. The students attend classes, tour Oregon Tech, and have lunch. A follow-up meeting with parents will be hosted by students' elementary schools.

#### MATHCOUNTS

An annual competition in February that challenges students' math skills, develops their self-confidence and rewards them for their achievements. Open to sixth-, seventh- and eighth-grade students in the Klamath Basin, this program gives students the opportunity to participate in individual and team competitions. The top students advance to the state and national levels.

## Auxiliary Services

### Athletics, Recreation and Fitness

(541) 885-1634

[www.oit.edu/athletics](http://www.oit.edu/athletics)

The mission of the Oregon Tech Athletic Department and the Tech Fit Center is to facilitate growth and development of students. The department provides a broad-based athletic program that creates educational opportunities through the medium of competition at the collegiate level as well as the opportunity to benefit personal health and fitness to the campus community through the Tech Fit facilities and educational classes. Oregon Tech's Athletics, Recreation and Fitness Education Center has many facilities, fitness and education opportunities. An expansion off the front of the center provides students with a larger cardiovascular workout area. A free-weight room stocked with all the needed equipment is located downstairs on the east side. An eight-lane, 400-meter, all weather surface track and a lighted basketball court offers more outdoor recreation. Also, watch for a lawn volleyball net as it tends to move around campus. Oregon Tech competitive athletics teams include men's and women's basketball, cross country, soccer, golf and track and field; women's volleyball, women's softball and men's baseball. Tech also supports men's and women's Rugby programs as extramural sports.

The Tech Fit Center, Athletics, Intramural Sports and Extramural Sports are funded by sales revenue (tickets, concessions, camps etc.), Incidental Fees, Oregon State Lottery funds, State General Appropriations and contributions from the community through the Oregon Tech Foundation.

The Tech Fit Center and athletics are financed by revenues generated from the programs' operation as well as from Incidental Fees, Oregon State Lottery funds, State General Appropriations and contributions from the community through the Oregon Tech Foundation or Oregon Tech Athletic Association.

### Competitive Athletic Teams

The Oregon Tech Athletic department is dedicated to preparing our student-athletes for professional and personal success in the real world by learning the values of integrity and excellence on the court, field and in the classroom. To that end, we are committed to field teams with the talent and ability to compete at the top of the Cascade Collegiate Conference, as well as regionally and nationally in the NAIA while representing Oregon Tech with dignity and class. To date, Oregon Tech has brought home four NAIA National Championships in team sports – men's basketball in 2004, 2008 and 2012 and softball in 2011. The privilege of participation in intercollegiate athletics and dedication to team goals provides a classroom where students may experience the development of skills, sportsmanship, loyalty, self-discipline and responsibility while learning the values of winning, losing and competing. The Oregon Tech athletic program contributes to campus life by providing a focal point for social interaction, leadership development, involvement in peer support groups and entertainment.

### Intramural Sports

The Oregon Tech intramural program offers a variety of individual and team events in three divisions: men, women and co-ed. We hope that our program and its diversity will invite each of you to participate in at least one event during the academic year. Call (541) 885-1722 for information about intramural sports programs or see the website for rosters and information.

### Tech Fit

The Tech Fit Center is free to all Oregon Tech students enrolled in eight or more credits per term. Students taking less than eight credits or community members may sign up in either credit or non-credit classes for a minimal charge. For more information call (541) 885-1634.

## Bookstore, Tech Nest

College Union, 1st Floor

(541) 885-1050

[bookstore@oit.edu](mailto:bookstore@oit.edu)

The Tech Nest Bookstore is a full-service campus bookstore that offers a variety of textbook and course material options (purchasing new or used, rental, and digital). In addition to these textbook options, they also offer a price match program, matching prices with online retailers: Amazon, and Barnes & Noble (see store for full details). They also carry a wide variety of supply and accessory items: school, office and dorm supplies, scientific calculators, writing instruments, emblematic clothing and gifts, computer supplies, useful reference books, among others.

Online ordering is available through the bookstore website at [www.bkstr.com/oregonitstore/home/en](http://www.bkstr.com/oregonitstore/home/en). The website allows students to order from the items in-store and a wide variety of other items for campus life which are available only online. Students can also set up a revolving charge account at the bookstore, allowing students to make purchases using their student ID (see store or Cashier's Office for full details).

The Tech Nest also has a book buy-back program that allows students to sell back books at the end of the term. Unlike other programs, students can sell back books every day as opposed to one time each term. The Tech Nest also sells mailing supplies such as stamps and packing materials, and packages can be shipped via Federal Express from the store.

## Campus Dining

College Union, 2<sup>nd</sup> Floor  
(541) 885-1076  
[www.oit.edu/dining](http://www.oit.edu/dining)

Dining services, provided by Sodexo Inc., offer a dining program complete with services in several locations across campus, and menu selections that include just about every item you can imagine.

The Marketplace features a wide variety of fresh food designed to satisfy everyone's appetite with food choices to rival restaurant favorites. The Bistro is a quick-serve coffee/espresso and light meals venue located on the first floor of the College Union. Duffie's, located in the Purvine building, and Hooties located in the DOW building offer a variety of fresh items to get you going in the morning or for a quick pick-me-up between classes. The Night Owl, the residence hall snack bar, is open only at night and offers a selection of beverages and snacks to satisfy that late night hunger.

## Document Resource Center

College Union, 1st Floor  
(541) 885-1059  
[servicecenter@oit.edu](mailto:servicecenter@oit.edu)

The DRC is a one-stop shop for printing and bulk mailing needs. Services are available to faculty, staff and students. Black and white, color, digital printing as well as laminating, comb binding and gluing are available at low costs. Electronic job submission provides the campus with access to services and completed jobs can be delivered to campus mail boxes within 24 hours. Mail services include bulk mailing; mail merge; folding and inserting; and postcard mailings. Special requests will be addressed on an individual basis. Hours of operation are 7 a.m. to 5 p.m. Monday through Friday.

## Housing and Residence Life

Housing Office Residence Hall, A151  
(541) 885-1094  
[housing@oit.edu](mailto:housing@oit.edu)  
[www.oit.edu/housing](http://www.oit.edu/housing)

Housing and Residence Life encourages self-responsibility, a necessary ingredient for the accomplishment of academic, social, and personal objectives. Every attempt is made to provide an environment to accomplish this aim. Studies indicate much of the knowledge required for success in life is gained outside the classroom. Oregon Tech's Housing and Residence Life program provides a vital aspect of a student's educational experience. Emphasis is on providing accommodations that are attractive, safe, reasonably priced, and that offer stimulating programs that satisfy individual needs for privacy, community life, diversity in living arrangements, and educational growth. In the Housing Office, students can make arrangements for a room, receive assistance with personal matters, consult with staff, make suggestions for improvements, discuss financial issues, and receive assistance for a variety of housing related concerns and interests.

Residence facilities at Oregon Tech are operated on a self-supported financial basis. The community houses up to 675 students. Living on campus relieves the student of many time-consuming and expensive tasks, including driving to and from campus and preparing meals. With this extra time and financial savings, students are able to devote more energy to their studies, participate in non-academic learning experiences, and enjoy recreational and stress-relieving pursuits, making new and often lifelong friends.

Information about on-campus housing is sent to all students admitted to Oregon Tech. Students living on campus must sign up for the meal plan. Apply now to live on campus with us. Visit our webpage at [www.oit.edu/housing](http://www.oit.edu/housing), click on Apply Now, and follow the 5 steps to apply for on campus housing!

Completed applications for on-campus housing received in the Housing Office by May 1st are guaranteed a spot on campus for the upcoming academic year.

## Room-and-Board Rates

Room-and-board rates at Oregon Tech are announced publicly after university approval. Current rate information and any other information concerning Housing can be obtained from the Housing and Residence Life Office, Oregon Tech, 3201 Campus Dr., Klamath Falls, OR 97601-8801, or online.

## Student Services

### Campus Life

College Union 107

(541) 885-1829

[www.oit.edu/campuslife](http://www.oit.edu/campuslife)

Campus Life is where students connect! We support the meaningful growth and development of Oregon Tech students throughout the life of their university experience. Through active partnership with our students, opportunities are created for hands-on learning, self-discovery, leadership, teamwork, diversity, community service, and social justice in an environment that is rewarding, energetic, and fun.

#### **Campus Life oversees the following resources and areas:**

##### **Community Service**

Campus Life has information available to connect students to ongoing service projects with local agencies in Klamath Falls. The department also coordinates monthly projects that take place on campus and in our local community. In addition, we sponsor annual spring break and summer break service trips and take a group of students to serve outside of our local area.

##### **Empower Mentors**

Empower Mentors are trained upperclassmen students who mentor and provide programming for first-time freshman who come from underrepresented communities and identities. The mentors provide students an opportunity to build strong relationships across cultural/community lines and explore issues of race, identity, social justice and culture. They are paired with these students during NSO and facilitate events for Multicultural Life throughout the year.

##### **Family Weekend**

Family Weekend gives families the opportunity to experience their student's university life and a snapshot of our community. Past activities and events have included in-depth campus tours, a student talent show, sporting events, a community service project, a 5K run, and a bonfire.

##### **Leadership Development**

Through the Leadership Academy, Campus Life provides an opportunity for students to integrate a variety of experiences across campus into their leadership development. The program includes opportunities for student development in the areas of communication; teamwork & service; diverse perspectives; wellness; professional development; and campus life. The workshops are free and open to all students.

##### **Multicultural Life**

Multicultural Life is committed to ensuring that Oregon Tech is a community where everyone is valued and respected, and diverse backgrounds and beliefs are honored. It is responsible for the development, coordination, and administration of programs and initiatives which promote an inclusive multicultural student community. The office supports multicultural clubs and programs on campus and provides advising to students from underrepresented communities.

##### **New Student Orientation**

New Student Orientation (NSO) is held each year on the week preceding the start of fall term classes. It is designed to help new students acclimate to Oregon Tech, meet their fellow students, and feel ready for the start of a successful year. Students who come to orientation receive Oregon Tech gear, free meals, and the chance to win great prizes while learning all about being an Oregon Tech Owl!

##### **Registered Student Organizations (RSOs)**

Student clubs and organizations add another important dimension to life on campus. Almost half of the approximately 60 clubs are related to various academic disciplines and provide opportunities for students to meet, study, and take part in professional development opportunities such as conferences and competitions related to their majors. Clubs and organizations also work together to support service learning by participating in a variety of community service projects at home and abroad. Clubs are also linked to special interests, sports, recreation, and cultural, spiritual, and social activities.

In addition, there are nine student programs, which are larger student organizations that exist to provide resources to a specific constituency of students. Student Programs have office space on campus, paid student leader positions, and a budget allocation each year.

## **ASOIT (Student Government)**

[www.oit.edu/asoit](http://www.oit.edu/asoit)

The purpose of ASOIT is to supplement the social, cultural, physical, and educational interests of its members, and to represent the individual and collective interests of the students of Oregon Tech. The membership consists of all admitted students at Oregon Institute of Technology holding a current, valid student ID card.

## **Campus Activities Board**

[www.oit.edu/cab](http://www.oit.edu/cab)

The purpose of the Campus Activities Board (CAB) is to provide a wide array of activities, opportunities, and entertainment for all students, taking into consideration their expressed wishes, interests, and needs. A broad array of events has been offered to students including bands, comedians, student talent shows, lectures, discount bowling and movie nights, and homecoming week.

## **Diversity Center**

[www.oit.edu/dc](http://www.oit.edu/dc)

The DC staff are committed to fostering a safe and welcoming campus for all students, faculty, and staff by increasing understanding, sensitivity and awareness to diversity. The Diversity Center supports these efforts by coordinating programs such as cultural hours, special events, discussions, films and other educational programs. With the firm support of the administration, faculty and the tireless energy of Oregon Tech students, the Diversity Center is a valuable resource on campus:

- to promote the free exchange of ideas in a safe and oppression free environment
- to provide programs that encourage diversity awareness and appreciation for human dignity
- to listen attentively to the voices of the Oregon Tech community
- to address all relevant issues with patience and impartiality

## **Outdoor Program (OP)**

[www.oit.edu/op](http://www.oit.edu/op)

The Oregon Tech Outdoor Program (OP) is a student-funded and student-led organization that allows students to enjoy fun activities and the beautiful scenery that surrounds them for an extremely low and reasonable price! Past trips have included: camping, rafting, skiing, mountain biking, and skydiving. In addition to sponsoring trips, the OP also offers low-cost rental equipment for a variety of outdoor activities.

## **Residence Hall Association (RHA)**

[www.oit.edu/rha](http://www.oit.edu/rha)

Each student living on campus is a member of the Residence Hall Association (RHA). This organization works with the Residence Life staff to promote, organize, coordinate and implement programming during the academic year. RHA sponsors everything from "Spring Fling" to movie nights. The RHA is funded in part through incidental fees and belongs to the residents.

## **Student Veterans Program (SVP)**

[www.oit.edu/svp](http://www.oit.edu/svp)

The members of the SVP are dedicated to satisfying the needs of any veteran of the Oregon Tech and KCC community during and after their time as a student, staff, or faculty. With the direction of the elected officers of SVP, the support of KCC Veterans Club, and the assistance of the Campus Veterans Service Officer (CVSO), the SVP shall reach out to the greater Oregon Tech and Klamath community and seek ways of building friendships and partnerships that are based on the same honor, duty, loyalty, and selfless service instilled in all veterans.

## **Women's Resource Center**

[www.oit.edu/wrc](http://www.oit.edu/wrc)

The Women's Resource Center is dedicated to helping women on campus connect, learn, and grow while raising awareness to important issues and amazing achievements for women around the world. Through education, support, outreach and community the WRC is committed to work actively against oppression, hate, sexism, and inequality at Oregon Tech and beyond.

## **Student Media**

### **The EDGE - Student Newspaper**

The Edge is student led and student read. Oregon Tech's student newspaper, The Edge, is a weekly publication written by students from all majors and produced by a student staff. It is published during fall, winter, and spring terms, with a satirical edition, The Ledge, published once per term.

## KTEC Campus Radio Station

[www.oit.edu/ktec](http://www.oit.edu/ktec)

89.5 FM

KTEC hit the milestone of their 65th year of operation in the spring of 2017 and is the oldest FM station in Southern Oregon. KTEC is operated by student staff and volunteers, and is programmed to serve the interests of the Oregon Tech student body and the Klamath Falls community.

## Oregon Technical Broadcasting (OTB)

[www.oit.edu/otb](http://www.oit.edu/otb)

OTB is the student-run video production program at Oregon Tech. OTB films campus events, creates a YouTube vlog series, and provides video services to campus organizations upon request.

Career Services

**Klamath Falls:** Learning Resource Center, 219

(541) 885-1020

[career@oit.edu](mailto:career@oit.edu)

**Portland-Metro:** Student Services

(503) 821-1155

[www.oit.edu/career](http://www.oit.edu/career)

<https://oit.joinhandshake.com/login>

[career@oit.edu](mailto:career@oit.edu)

Career Services helps students and alumni to develop and achieve their career goals. Services include: individual career advising; workshops and classroom presentations on resume-writing, job interviewing, job search and applying to graduate school; on-campus employer recruitment, career fairs, career resource materials, and a website with information on a wide range of career topics. Career Services also maintains the Handshake website, a centralized job board where employers connect with students for on-campus jobs, part-time off campus jobs, internships, and career positions.

## College Union

Information Desk

(541) 885-1030

[www.oit.edu/visitors-info/college-union](http://www.oit.edu/visitors-info/college-union)

The College Union is the center of student activity on campus. Located within the Union are the student government offices, Campus Life, the Diversity Center, Student Services staff, Campus Dining operations, *The Edge* student newspaper, the Tech Nest bookstore, the Outdoor Program, the Women's Resource Center, the Oregon Tech Veterans Lounge, and the main campus auditorium. In addition, there are comfortable study and lounge areas and meeting rooms for both student and community use. Coffee house functions, lectures, special classes, shows, dances, and movies are among the typical events scheduled in this facility.

For information about using space in the College Union or to make a reservation, contact the CU Information Desk located on the lower level, south of the main entrance.

## Disability Services

**Klamath Falls:** LRC 229C, (541) 851-5179

**Portland-Metro:** Room 432, (503) 821-1305

[access@oit.edu](mailto:access@oit.edu)

The Office of Disability Services coordinates academic, housing and program services accommodations for students with documented physical, learning, sensory, psychiatric and other disabilities. Students with disabilities who anticipate needing services on campus should contact this office well in advance of attendance at Oregon Tech to arrange for timely services.

## Integrated Student Health Center (ISHC)

Phone (541) 885-1800

Fax (541) 885-1866

[health@oit.edu](mailto:health@oit.edu)

The Integrated Student Health Center (ISHC), located at the main campus in Klamath Falls, provides general medical care for illnesses and accidents, medical referral, counseling and wellness programs. Students taking six or more on-campus credit pay the annual Student Health fee, which covers most services offered by the clinic (including counseling, medical appointments, and a variety of other services). Students with less than six credit hours can utilize ISHC services by paying the student health fee. Students at the Portland-Metro campus also pay a Student Health fee, which funds a full-time counselor on-site.

## Health Requirements to Register

Newly admitted students must complete the following health requirements prior to the beginning of their 2<sup>nd</sup> term (note: International students must complete a similar process prior to coming to campus; work with your Admissions Counselor to provide required information). Failure to complete these requirements will result in a "health hold" on the student's account, affecting a student's ability to conduct Business Office transactions and to register for additional courses. Once students have registered for their first term, they will be able to access the Student Health Portal, located in MyOIT, under the "Student Resources" tab. After confirming their date of birth, students will need to do the following:

- access the required forms by clicking on "Forms"
- complete the "Health History Form" and "High Risk Tuberculosis Screening Questionnaire" by clicking on the hyperlinks
- acknowledge "Privacy Practices" and "Consent for Treatment" by clicking on their links
- click on the "Immunizations Page in EMF Forms" hyperlink, and provide the dates that you received 2 doses of the Measles or MMR vaccine. Two doses... (see below)
- two doses of measles/mumps/rubella vaccine (MMR) are required for all full-time college students born on or after Jan. 1, 1957. The first dose must be given after the first birthday. The second dose must be after 1989.\*

*\* This requirement is supported by: Oregon Administrative Rule 333-050-0130 and the American College Health Association Guidelines: Recommendations for Institutional Pre-matriculation Immunizations, April 2014.*

## Medical Clinic Services

Oregon Tech's ISHC health care providers are committed to providing high quality, personalized care. The medical clinic is staffed by a physician, advanced practice nurse, registered nurse, psychiatric nurse and a practitioner. Diagnosis and treatment of acute and chronic illnesses, birth control and emergency contraception, routine laboratory procedures, immunizations, wart removal, gynecological exams, minor surgery and care of minor injuries are some of the services provided. Major emergencies are referred to Sky Lakes Medical Center adjacent to the Klamath Falls campus. Referrals are made to specialists as needed. Visits are free with low costs for medications, laboratory work, immunizations, and some treatments.

## Counseling Services

Counselors are available to discuss personal, academic and career concerns. Crisis services are available and referrals are made to community resources if needed. Sessions are confidential and are provided free of charge to students enrolled for six or more on-campus credits. Students enrolled for five or fewer credits can receive one free assessment session, and then may access additional services by paying the Student Health fee. Testing is also available for Learning Disabilities and Attention Deficit Hyperactivity Disorder for additional fees.

Personal counseling focuses on concerns such as self-esteem, relationship issues, academic performance, family difficulties and troubled sleep. Some specific issues dealt with are: depression; anxiety, substance abuse, suicide, conflicts with parents, spouses or children; loneliness; dating problems; study skills; coping with past or present abusive situations; and grief. A psychiatric nurse practitioner is available for psychotropic medical management.

## Wellness Programs

A Health Educator is on staff to assist students in staying healthy and fit while attending Oregon Tech. Free individual appointments are available for personalized health and fitness programs, BMI testing, nutrition education and smoking cessation. Awareness events and health promotion programs are also provided on a regular basis campus-wide. Please call the ISHC to make an appointment or learn more about various campus-wide wellness activities.

## Student Health Advisory Committee (SHAC)

SHAC serves as an advisory committee to the ISHC. Students provide input on programs and services provided, generate new ideas and participate in wellness and promotion events. All students are welcome to apply to join this committee. SHAC meets on a monthly basis during the academic school year. Call or visit the ISHC to apply.

## Fees/Charges

As indicated previously, students taking six or more on-campus credit hours pay an annual Student Health fee. This fee entitles students to services offered by the medical clinic, counseling and wellness programs. Other students can use the center if they pay the health fee. Office visits are free for illness and injury, evaluation, treatment, questions and other reasons. However, additional charges may be necessary for medications, treatments, supplies, immunizations and laboratory tests. Costs for these services and supplies are kept well below the market price for student affordability. No cash is necessary at the time of visit. All medical expenses rendered outside the ISHC from private physicians, laboratories, or hospitals are the student's financial responsibility.

## Student Affairs

College Union, 2nd Floor

(541) 885-1011

[www.oit.edu/student-affairs](http://www.oit.edu/student-affairs)

The Student Affairs Office is the office location for the Vice President for Student Affairs and the Dean of Students, and the Executive Assistant. The division of Student Affairs provides direct service to students in the following offices: Campus Life, Campus Safety, College Union, Housing & Residence Life, the Integrated Student Health Center, and the Student Success Center, which is composed of Career Services, Disability Services, Testing and Peer Consulting Services, and TOP (a Trio program).

The Vice President for Student Affairs and her staff maintain close relationships with all Oregon Tech students, including the Klamath Falls campus, Portland-Metro campus, Online, Salem, Seattle and student organizations. Student Affairs staff are available for consultation and collaboration on all matters pertaining to student well-being and success.

## Student Success Center (SSC)

Learning Resources Center, Room 229

(541) 851-5179

[ssc@oit.edu](mailto:ssc@oit.edu)

[www.oit.edu/ssc](http://www.oit.edu/ssc)

The Student Success Center (SSC) is a multi-purpose department designed to enrich learning, teaching, and student success at Oregon Tech. The SSC consists of Testing, Peer Consulting (Tutoring), TOP, Career Services, and Disability Services. The SSC helps students succeed by providing effective academic assistance, support, and resources through promotion of student learning, personal growth, and programs designed to enhance achievement, retention, persistence, graduation, and post-graduate success. The SSC provides peer tutoring for matriculated Oregon Tech students, academic success (ACAD) classes, accommodations for students with disabilities, test proctoring, as well as many other services to support students, staff, and faculty in an effort to facilitate student success at Oregon Tech. In addition, the SSC assists with faculty orientation, support, and development efforts, Advisor Training for new faculty. The SSC also functions as the University Testing Center by offering testing, distance testing, placement testing, test proctoring, and other standardized testing programs.

The SSC is an integral part of Oregon Tech's student success initiatives and strives to provide effective programs and services to create a welcoming, supportive, and successful campus.

## Tech Opportunities Program - TRIO

Learning Resource Center, Room 228

(541) 885-1125

[TOP@oit.edu](mailto:TOP@oit.edu)

[www.oit.edu/TOP](http://www.oit.edu/TOP)

The Tech Opportunities Program (TOP) is a federally funded (Student Support Services TRIO) academic support program designed to assist highly motivated students who are also low income, first generation or students with disabilities. TOP staff work closely with participating students to comprehensively assess academic and financial needs and to develop personalized plans for college success. Participants may be eligible for a variety of academic support services, including group and/or individual tutoring and related support; mentoring; networking with other students; college-success workshops and classes; additional academic advising; and limited financial assistance.

## Testing Services

**Klamath Falls:** LRC 230, (541) 885-1791

[testing@oit.edu](mailto:testing@oit.edu)

**Portland-Metro:** Room 429, (503) 821-1263

[Jenni.Betschart@oit.edu](mailto:Jenni.Betschart@oit.edu)

Testing Services provides a secure, quiet test center for all testing needs at Oregon Tech with trained professional test proctors. Testing Services can also provide the assistance of a scribe or reader if the test-taker requires them.

## Peer Consulting Services

**Klamath Falls:** LRC 233, (541) 851-5226

[peerconsulting@oit.edu](mailto:peerconsulting@oit.edu)

**Portland-Metro:** Room 429, (503) 821-1263

[w.peerconsulting@oit.edu](mailto:w.peerconsulting@oit.edu)

Peer Consulting is a completely free academic support service available to all students of Oregon Tech. Our goal is to provide assistance in all areas, majors, and courses offered at Oregon Tech. Peer Consultants are Oregon Tech students who have taken the same classes you have and have earned a B or better in their areas of expertise. Peer Consultants can help clarify ideas, concepts, theories, and skills your professors are teaching in class.

## University Development

Hoss Business Center

(541) 885-1130

The University Development Department is charged with providing financial support of Oregon Tech's mission by connecting donors, alumni, and friends with philanthropic opportunities at the university in partnership with the Oregon Tech Foundation. University Development works to build positive relationships with students, faculty, staff, alumni and friends of the university to enhance and create opportunities that foster a tradition of philanthropic support. University Development engages in initiatives and activities that embody institutional values and position Oregon Institute of Technology among the nation's leading technological and health professions universities. Fundraising, alumni relations, community outreach and other activities serve to promote the distinctive role and numerous educational, research and public service contributions of Oregon Tech throughout our communities, the nation, and internationally.

## The Oregon Tech Alumni Association

(503) 821-1145

[alumni@oit.edu](mailto:alumni@oit.edu)

<https://alumni.oit.edu>

The Alumni Relations office promotes interactions and loyalty of alumni and currently enrolled students toward Oregon Institute of Technology. Services and activities include regional social events, student activities, reunions and continuing education programs. Alumni have the opportunity to keep in touch with other alumni through the university's alumni Web page and other means of communications regarding their academic major and Oregon Tech.

The Oregon Tech Alumni Association, established in 1949, is guided by the Alumni Advisory Board and exists to support and promote Oregon Tech as a premier learning institution and to provide a structure for alumni affiliation. Membership is free and automatic to anyone who has completed at least 90 credits at Oregon Tech. Areas of special interest for the Alumni Association include assisting the university with new student recruitment activities, career networking, social and educational activities and the financial support of Oregon Tech. The Alumni Association is an affiliated organization of the Oregon Tech Foundation.

## The Oregon Tech Foundation

(541) 885-1130

The Oregon Tech Foundation was established to support the educational, cultural, charitable, and service activities of Oregon Institute of Technology through philanthropic support. Established as a 501(c)(3) tax-exempt organization, the Foundation is a separate legal entity from the University and is the designated charitable arm of the University.

The Foundation is governed by a Board of Directors that represents a broad range of community leaders, alumni and private benefactors. The Foundation board of directors is tasked with management and growth of the assets of the Foundation and for participating in fundraising efforts of Oregon Tech.

The Foundation has enriched the University and student life by combining their efforts with the Oregon Tech administration and community leaders to accomplish some of the most notable projects on campus:

- Martha Anne Dow Center for Health Professions
- Jesse A. Crabtree Civil Engineering Learning Plaza
- Danny Miles Court floor and scoreboard replacement
- Shaw Historical Library
- John F. Moehl football stadium

Enabling Oregon Tech to build a great university and maintain an unparalleled level of excellence for students, the Foundation annually provides approximately \$1 million to Oregon Tech. The Foundation provides student support through numerous scholarships, innovation through student projects, hands-on experiences with equipment in modern classrooms, labs, and buildings, and providing a professional network through alumni relations.

The Foundation works closely with its affiliated organizations, including the Oregon Tech Alumni Association and the Shaw Historical Library.

## Directories

### Governance of Oregon Institute of Technology

Prior to 2015, the Oregon Institute of Technology was governed by the Oregon State Board of Higher Education, the governing board for the seven public universities in Oregon. In April 2014, the State Board of Higher Education authorized the Oregon Institute of Technology to establish a Board of Trustees, appointed by the Governor and approved by the Senate.

Effective July 1, 2015, the University became an "independent public body" governed by the Board of Trustees with every authority necessary or appropriate for the operation of a major public university. The Oregon Tech Board of Trustees approves the University's mission, programs, budgets, and strategies; and works with the Higher Education Coordinating Commission (HECC) to provide final approval for the University's mission and any new academic programs.

### Oregon Tech Board of Trustees

Members and term expiration dates:

Dr. Jeremy Brown, 2018

Jessica Gomez, 2018

Dr. Lisa Graham, Chair, 2018

Kathleen Hill, 2018

Vincent Jones, 2018

Jill Mason, 2019

Kelley Minty Morris, 2018

Celia Núñez, 2018

William "Liam" Perry, 2018

Dr. Dan Peterson, 2018

Dr. Steve Sliwa, Vice-Chair, 2018

Paul Stewart, 2018

Fred Ziari, 2018

Oregon Tech President, ex-officio

## Administrative Offices

**President**, Nagi G. Naganathan,  
Ph.D., ASME Fellow

**Provost and Vice President for  
Academic Affairs**, Gary Kuleck,  
Ph.D.

**Vice President for Finance and  
Administration**, Brian Fox

**Vice President for Strategic  
Enrollment Management, Dean  
of Online Learning**, Erika Veth

**Vice President for Student Affairs  
and Dean of Students**, Erin Foley,  
Ph.D.

**Vice President for Portland-  
Metro**, Vacant

**Associate Provost and Vice  
President for Research**, Vacant

**Associate Vice President and Chief  
Information Officer**, Jim Jones,  
Ph.D.

**Associate Vice President for  
Communication and Public Affairs**,  
Di Saunders

**Associate Vice President for Human  
Resources and Affirmative Action**,  
Suzette Yaezenko

**Associate Vice President for  
Government Relations and Strategic  
Partnerships**, Kate Sinner

**Associate Vice President for  
University Development**, Tracy  
Ricketts  
**Dean, College of Engineering,  
Technology and  
Management**, Hallie Neupert, Interim

**Dean, College of Health, Arts and  
Sciences**, LeAnn Maupin

**Associate Dean, College of  
Engineering, Technology and  
Management**, Brian Moravec

**Academic Agreements**, Marla Edge,  
Director

**Academic Excellence**, Seth Anthony,  
Interim Director

**Admissions**, Erik Johnson, Director

**Assessment**, Seth Anthony, Interim  
Director

**Athletics**, John Van Dyke, Director

**Board Secretary & Community  
Relations Director**, Oregon Tech  
Board of Trustees, Sandra Fox

**Business Affairs**, Vacant, Director

**Campus Life**, Holly Anderson and  
Josie Hudspeth, Associate Directors

**Campus Security**, Ed Daniels,  
Director

**College Union**, Shellie Wilson,  
Manager

**Facilities Management and  
Planning Services**, Thom Darrah,  
Director

**Financial Aid**, Tracey Lehman,  
Director

**Housing and Residence Life**, Mandi  
Clark, Director

**Institutional Research**, Farooq  
Sultan, Director

**Integrated Student Health Center**,  
Gaylyn Maurer, Administrative  
Director

**Library Services**, Dawn Lowe-  
Wincentzen, Interim Director

**Online Learning**, Carrie Dickson,  
Director

**Oregon Renewable Energy Center**,  
Mason Terry, Director

**Procurement, Contracts and Risk  
Management**, Vivian Chen, Contracts  
Officer & Legal Liaison

**Registrar's Office**, Wendy Ivie,  
University Registrar

**Seattle at Boeing**, John Addison,  
Program Director

**Sponsored Projects & Grants  
Administration**, Barbara Neal,  
Director

**Student Success Center**, Erin  
Ferrara, Director

**University General Counsel**, David  
Groff

## Oregon Tech Foundation Board of Directors

Diedra Thompson, President  
James Blair, Vice President  
Don Young, Treasurer  
Trevor Mauch, Secretary  
Mark Bansemer  
Lance Bishop  
Don Boyd  
Ann Cavanaugh  
Sarah Dammen  
John Davis  
James De Hoog  
Bill DeWitt  
Gerald Freschi  
Steven Hyde  
Sally Jones  
Douglas Kintzinger  
George Merhoff  
Robert Neathamer  
Keven Ferrasci-O'Malley  
Alan Polaski  
Doug Pratt  
Tim Ross  
Darrel Samuels

### **Emeritus Directors**

Timothy Bailey  
Marge Bocchi  
Sherrill Boyd  
Greg Bulkley  
Nancy Coffin-DeFeyer  
Dave Cowan  
Alan Craigmiles  
William Early  
Trudy Farr  
Fred Foulon  
John Gerbert  
Winifred Hood  
Gerda Hyde  
Gary Johnston  
Susan Laubengayer  
Ron Loveness  
James McCobb  
John Novak  
Andy Peterson  
Jean Pinniger  
Richard Siemens  
Joan Staunton  
Lois Stilwell  
Don VanLuvanee  
Tom Van Thiel  
Nancy Wendt

### **Ex-Officio**

Tracy Ricketts, Interim Executive  
Director  
Nagi Naganathan, Oregon Tech  
President  
Brian Fox, Oregon Tech Vice  
President for Finance and  
Administration  
Ken Vandehey, Oregon Tech Alumni  
Advisory Board President  
Jeremy Morris, President, Shaw  
Historical Library

## Administration

**Jan Abeita** (2005), Access Services Manager, Library Services. B.S. (1990), Eastern Oregon University; M.S. (1992), Southern Oregon University.

**Jillian Alexander** (2016), Financial Aid Counselor, Portland-Metro. B.A. (2011), George Mason University; M.A. (2015) University of Cambridge, England.

**Holly Anderson** (2012) Associate Director Campus Life – Student Engagement. B.S. (2008), Warner Pacific College.

**Diana Angeli** (2006), Executive Assistant, Vice President, Finance and Administration.

**Jennifer Bavarskas** (2005), Health Educator, Integrated Student Health Center. B.A. (1991), University of Oregon; M.S. (2000), San Jose State University.

**Casey Bennett** (2017), Executive Assistant, Vice President, Strategic Enrollment Management.

**Jennifer Betschart** (2015), Assistant Director of Student Services, Portland-Metro. B.S. (1999), University of Puget Sound; M.Ed. (2012), Oregon State University.

**Karen Blevins** (2013), Payroll Manager, Business Affairs.

**Rebecca Burkeen** (2017), Alumni Relations Manager, Development.

**Kelly Caleb** (2007), Athletic Trainer, Athletics. A.S. (1996), Oregon Institute of Technology; B.S. (1999), Oregon State University.

**Katie Cavendish** (2015), Executive Assistant to Associate Vice President, Development.

**Vivian Chen** (2015), Contracts Officer & Legal Liaison. B.A. (2006) Wellesley College; J.D. (2011) University of California, Berkeley.

**Cindy Childers** (2006), Accounting Manager, Business Affairs. B.S. (2004), Oregon Institute of Technology.

**Kim Cholewinski** (2017), HR Consultant, Human Resources.

**Mandi Clark** (2004), Director, Housing and Residence Life. B.A. (1997), Kansas State University; M.S. (1999), University of Nebraska.

**Tammy Clark** (2007), Executive Assistant, Dean College Health, Arts and Sciences.

**Andrew Clifton** (2016), Head Volleyball Coach. M.Ed., (2008) National University.

**Jason "Jake" Coatney** (2007), Senior Counselor, Financial Aid. A.A. (2002), College of the Siskiyous; B.S. (2005), Eastern Oregon University.

**Barbara Conner** (2013), Director, Retention. B.S. (1985), Texas A & M; M.Ed. (2004), University of Southern Maine.

**Chris Cook** (2014), Grounds Supervisor, Facilities Management Services.

**Michael Corbitt** (2016), Manager of Application Services.

**Jeffrey Corkill** (2013), Head Golf Coach, Athletics. B.S. (1976), California Polytechnic University.

**Edward Daniels** (1988), Director, Campus Safety.

**Julie Daniels** (2007), Scholarship Officer/Counselor, Financial Aid. B.A. (2003), Southern Oregon University.

**Krista Darrah** (2017), Operations Manager, Development.

**Thom Darrah** (2016), Director, Facilities Management Services.

**Lindsey Davis** (2013), Academic Specialist, Retention. B.A. (2008), University of Idaho; M.A. (2010) Washington State University.

**Ryan Deady** (2016), Counselor, Admissions. B.A. (2014) University of Montana.

**Carrie Dickson** (2014), Director, Online Learning, B.S. (2009), Oregon Institute of Technology; M.B.A. (2013), Southern Oregon University.

**William Dowling** (2016), Counselor, Integrated Student Health Center

**Nyesia Driver** (2015), Coordinator of Testing Services, Student Success Center. B.S. (2013) University of Arkansas; M.S. (2015) Arkansas Tech University.

**Melissa Dubois** (2014), Director, South Metro-Salem STEM Hub, B.S. (1999), Northeastern University, Ph.D. (2005), University of Wisconsin.

**Marla Edge** (1983), Assistant Professor; Director, Academic Agreements. B.S. (1976), M.Ed. (1989), Oregon State University.

**Kaiulani Evans-Bautista** (2016), Assistant Director, Campus Visits & Programs, Admissions.

**Kerry Farris** (2017), Faculty Instructor, Environmental Sciences. B.S. (1996), University of Idaho; M.S. (2000), University of Idaho.

**Erin Ferrara** (2014), Director, Student Success Center. B.S. (2003) University of Wyoming; M.A. (2006) University of Wyoming.

**Erin Foley** (1999), Vice President of Student Affairs; Dean of Students. B.S. (1988), University of Arizona; M.A. (1991), Michigan State University; Ph.D. (1996), Indiana University.

**Brian Fox** (2016), Vice President of Finance & Administration. B.S. (2010), Southern Oregon University; MBA (2013), University of Oregon.

**Sandra Fox** (2014) University Board Secretary & Community Relations Director. B.S. (1994), Cal Poly, San Luis Obispo; MBA (1996), Cal Poly, San Luis Obispo.

**Brenda Garibay-Cervantes** (2016), Interpreter, Dental Hygiene-Chemeketa.

**Michael Garrard** (2007), Sports Information/Marketing Director, Athletics.

**Jamie Goodpaster** (2016), Disability Services Specialist, Portland-Metro.

**Mark Granlund** (2018), Chief Development Officer NW Region, Development. B.A., Marylhurst University.

**Corrine Graves** (2018), Admissions Counselor, Admissions.

**Karissa Guthrie** (2010), Accounts Receivable Manager, Business Affairs.

**Sandi Hanan** (2008), HR Consultant, Human Resources. A.S. (1999), Oregon Institute of Technology; B.S. (2013), Oregon Institute of Technology.

**Lori Harris** (2009), Senior Fiscal Manager, Business Affairs. A.S. (1983), Oregon Institute of Technology.

**Leticia Hill** (2006), Procurement and Risk Officer. B.S. (2016), Oregon Institute of Technology.

**Shaundrea Hirengen** (2015), Coordinator of Peer Consulting, Student Success Center. B.A. (2014), George Fox University.

**Trish Hower** (2009), Executive Assistant, Vice President for Research/Associate Provost. B.A. (2004) Oregon State University.

**Brenda Hubbard** (2017), Executive Secretary, President's Office.

**Josie Hudspeth** (2014), Associate Director Campus Life - Multicultural Inclusion. B.A. (2011), California State University, Fullerton; M.A. (2013), California State University, Fullerton.

**Wendy Ivie** (1999), University Registrar, Registrar's Office. B.S. (1997), Oregon State University; M.S. (2005), Southern Oregon University.

**Erik Johnson** (2018), Director, Admissions.

**Jim Jones** (2017), Associate Vice President & Chief Information Officer. B.S. (2007) Gonzaga University; M.A. (2010) Gonzaga University.

**Joshua Jones** (2016), Pre-College Coordinator, Academic Agreements.

**Mark Kasper** (2006), Custodial Supervisor, Facilities Services.

**Jennifer Kass** (2015), Director-Career Services, Portland-Metro. B.A. (1980) University of Michigan; M.B.A. (1988) New York University.

**Michal Kawka** (2015), Program Director, Student Success Center. B.A. (2008) University of Wroclaw, Poland.

**Jack Kegg** (2011), Head Track & Field and Cross Country Coach, Athletics. B.S. (1996) Western Oregon University.

**Richard Krause** (2016), STEM Professional Learning Coordinator, Office of Strategic Partnerships.

**Dr. Gary Kuleck, Ph.D.** (2017), Provost and Vice President for Academic Affairs. B.S. (1975), University of Maryland; Ph.D. (1991), University of Pennsylvania.

**James Lake** (1988), Maintenance Supervisor, Facilities Services. A.S. (1984), Sierra College.

**Tracey Lehman** (1999), Director, Financial Aid. A.S. (1986), Mohawk Valley Community College; B.A. (1988), State University of New York; M.S. (2005), Southern Oregon University.

**Lisa Leonard** (2018), Assistant, Provost and Vice President of Academic Affairs.

**Tabitha Maldonado** (2014), Counselor, Financial Aid. B.A. (2008), Concordia University (Oregon).

**Anne Malinowski** (1990), Assistant Registrar & Veterans Certifying Official, Portland-Metro Operations.

**James Marquit** (2017), Admissions Counselor, Admissions.

**Sarah Matchett** (2016), Residence Life Coordinator, Housing and Residence Life.

**LeAnn Maupin** (1997), Dean, College of Health, Arts and Sciences. B.S. (1992), Oregon Institute of Technology; M.Ed. (2001), University of Phoenix.

**Gaylyn Maurer** (2013), Administrative Director, Integrated Student Health Center. B.S. (1993), University of Houston; M.A. (1996), University of Denver.

**Mark McClure** (2016), Counselor, Integrated Student Health Center. B.S. (2010), Victory University; M.S. (2013), Victory University.

**Scott Meredith** (2009), Head Women's Basketball Coach, Athletics. B.A. (1987) Humboldt State University, M.A. (2000) St. Mary's College.

**Michelle Meyer** (2014), Accounting Services Manager, Business Affairs. B.S. (2004), Oregon State University; Certified Public Accountant, Oregon.

**Brittany Miles** (2011), Industry Outreach and Government Relations Manager, Portland-Metro. B.A. (2004), Occidental College.

**Matthew Miles** (2007), Head Baseball Coach, Athletics. A.A. (1992), Oregon Institute of Technology.

**Mindy Miranda** (2016), Veteran Affairs Certifying Officer, Financial Aid.

**Michelle Monteith** (2017), Office Specialist, Financial Aid.

**Sarah Moore** (2016), Assistant Director, Career Services.

**Brian Moravec** (1989), Associate Dean, College of ETM. B.S.M.E. (1980); M.S.A.A. (1987), University of Washington.

**Harmony Muller** (2018), HR Consultant, Human Resources

**Matthew Munhall** (2012), Head Men's Soccer Coach, Athletics. B.A. (2007), Principia College; M.S. (2011) Ohio University.

**Corey Murphy** (2014), Coordinator, Retention. (2011), Oregon State University.

**Nagi Naganathan** (2017), President. B.E. (1978), National Institute of Technology; M.S. (1981), Clarkson University; Ph.D. (1986), Oklahoma State University.

**Barbara Neal** (2016), Sponsored Projects, Director, Grants & Sponsored Research.

**Valjean Newsome** (1997), Executive Assistant to Dean of Engineering, Technology, and Management.

**Mary Lou Nicholson** (2016), Accountant, Development.

**Brenda Odesha** (2015), Academic Specialist, Student Success Center. B.S. (2015), Oregon Institute of Technology.

**Dana Onorato** (2013), Associate Dean of Students, Portland-Metro. B.S. (1996) University of Illinois; M.A. (1999) University of Wisconsin-Madison.

**Brian Page** (2017), Director, Cyber Defense Center.

**Deanne Pandozzi** (2002), Coordinator of Academic Enrichment, Retention. B.S. (2010), Oregon Institute of Technology.

**Justin Parnell** (2012), Head Men's Basketball Coach, Athletics. B.S. (2011), Oregon Institute of Technology.

**Adria Paschal** (2007), Senior Executive Assistant to the President. A.A. (2016), Oregon Institute of Technology.

**Diane Patterson** (2015), Business Manager, Facilities Management Services. B.S. (2013) University of Phoenix.

**Ashlie Pence** (2016), Counselor, Admissions.

**Suzet Petersen** (2002), Assistant Director, Financial Aid. A.A. (1996), B.S. (1998), Oregon Institute of Technology.

**Stephanie Pope** (2017), Director, Budget & Resource Planning.

**Brandon Porter** (2015), Head Women's Soccer Coach, Athletics.

**Lara Pracht** (2016), Director, Lab Education & Operations, Portland-Metro.

**Leanne Reed** (2014), Counselor, Portland-Metro. B.A. (1994), Centenary College; M.A. (2005), Southern Methodist University.

**Anthony "Tony" Richey** (2003), Manager, Information Technology Operations & Educational Technology. A.A. (1989), B.S. (2005), Oregon Institute of Technology.

**Tracy Ricketts** (2010), Associate Vice President, Development and Alumni Relations. B.S. (1999), University of Oregon.

**Christina Rubidoux** (2016), Academic Specialist, Retention. B.S. (2013), Oregon Institute of Technology.

**Grace Rusth** (2011), Academic Partnerships Coordinator, Academic Agreements. B.S. (2009), Oregon Institute of Technology; M.A. (2014), Chicago School of Professional Psychology.

**Di Saunders** (2014), Associate Vice President, Communication and Public Affairs.

**Briana Schwenk** (2018), Academic Specialist, Student Success Center.

**Mohammed Shabbir** (2018), Enrollment Specialist, Retention Services.

**Heather Smith** (2010), Assistant Registrar, Registrar's Office. B.S. (2009), Oregon Institute of Technology.

**Stuart Sockman** (2016), Director, Emergency Management and Environmental Health and Safety. B.A. (1986), Occidental College; M.A. (2015), University of Colorado.

**Carleen Starr** (2013), Academic Partnerships Coordinator, Academic Agreements. B.S. (2005), Oregon State University; M.A.I.S. (2007), Oregon State University.

**Greg Stewart** (2004), Head Women's Softball Coach, Athletics. B.S. (1992), Sterling College.

**Nellie Stewart** (2007), Executive Assistant, Academic Excellence. B.S. (2011), Oregon Institute of Technology.

**Cynthia Stripling** (2013), Office Coordinator, Admissions.

**Carl Thomas** (2011), Regional Recruiter, Admissions. B.S. (1994); MiM (2002), Southern Oregon University.

**Erika Veth** (2011), Associate Vice President, Strategic Enrollment Management & Dean, Online Learning. B.A. (2004), University of North Carolina; M.A. (2008), University of Alaska, Anchorage.

**Michelle Vitali** (2017), Executive, Vice President of Portland-Metro.

**Kendal Vreeland** (2012), Assistant Director-Recruitment, Admissions. B.S. (2007), Southern Oregon University; M.Ed. (2012), Arizona State University.

**Wakaya Wells** (2017), Multicultural Student Services Coordinator, Campus Life. B.A. (2015), Dartmouth College.

**Dierdre Williams** (2009), Executive Assistant, Provost and Vice President of Academic Affairs.

**Erin Williams** (2013), Athletic Programs Operations, Athletics.

**Shellie Wilson** (2004), Manager, College Union. A.S. (2001), B.S. (2004), Oregon Institute of Technology; M.B.A. (2009), Southern Oregon University.

**Rachel Winters** (2014), Executive Secretary to the Vice President of Student Affairs.

**Suzette Yaezenko** (2016), Associate Vice President, Human Resources. B.A., Boise State University.

## Instructional Faculty

*This listing reflects faculty for the 2017-18 academic year. In some cases, changes taking effect for 2017-18 are included in the faculty lists under the department descriptions.*

**Mateo Aboy** (2005), Professor, Electrical Engineering and Renewable Energy. B.S. (2002), B.S.E.E. (2002), M.S.E.C.E. (2004), Portland State University; Dipl. Ing. (2003), M.Phil. (2004), Ph.D. (2005), ETSIT-University of Vigo; Exec. Cert. (2007), Massachusetts Institute of Technology; M.B.A. (2011), L.L.B./QLD (2014), University of London. Registered Professional Engineer (PE), European Union (COIT No. 12684). Registered US Patent Agent (USPTO Bar Admission No. 64040). Certified Licensing Professional (CLP).

**Abdelouahab Abrous** (2014), Associate Professor, Manufacturing and Mechanical Engineering and Technology. B.S. (1981), University of Science & Technology, Algeria; M.S. (1984), University of Washington, Seattle; Ph.D. (1988), University of Washington, Seattle. Registered Professional Engineer, Washington, Idaho, Oregon, and California.

**Kathleen Adams** (2015), Associate Professor, Humanities and Social Sciences, Director, MS Marriage and Family Therapy. B.S. (1978), University of Wisconsin, Milwaukee; M.S. (1980), University of Wisconsin, Madison; Ph.D. (2001), Iowa State University.

**Steve Addison** (2016), Associate Professor, Manufacturing and Mechanical Engineering and Technology. B.A. (1984), Ph.D. (1991), University of Cambridge.

**Seth Anthony** (2011), Associate Professor, Natural Sciences. B.A. (2004), North Carolina State University; M.S. (2011), Ph.D. (2014), Colorado State University.

**Dawn Bailey** (2017), Associate Professor, Humanities and Social Sciences, Clinical Director/Practicum Coordinator MS Applied Behavior Analysis Program. B.S. (1996), M.S. (2005), Ph.D. (2008), Florida State University.

**Richard L. Bailey** (1991), Professor, Management. B.S. (1984), M.A. (1985), Utah State University. Certified Public Accountant.

**Sandra Bailey** (2000), Professor, Management. B.S. (1985), Utah State University; M.Ed. (2005), Oregon State University.

**Rachelle Barrett** (2018), Instructor, Medical Laboratory Science. Certificate (2013), University of Texas Medical Branch; B.S. (2005), Oregon State University; B.S. (2006), Oregon Institute of Technology.

**Krista Beaty** (2017), Instructor, Dental Hygiene. A.A.S. (2004), Clark College; B.S. (2008), Eastern Washington University; M.S.(c), Idaho State University.

**Sharon Beaudry** (2014), Assistant Professor, Management. B.S. (1985), College of New Rochelle; J.D. (2009), Northwestern California University; M.B.A. (2013), Northcentral University. Senior Professional in Human Resources (SPHR).

**Vanessa Bennett** (2008), Assistant Professor, Medical Imaging Technology. B.S. (2001), Oregon Institute of Technology; M.Ed. (2015), Western Governors University. Certified Nuclear Medicine Technologist (CNMT).

**Mitch Besser** Assistant Professor, Computer Software Engineering Technology. M.S.(c), University of St. Thomas.

**Aja Bettencourt-McCarthy** (2014), Assistant Professor, Head of Public Services, Library Services. B.A., B.S. (2007), University of California, Davis; MLIS (2012), University of Washington.

**Jeannie Bopp** (2016), Instructor, Dental Hygiene. B.S. Dental Hygiene (2011), Oregon Institute of Technology.

**John Borgen** (2016), Assistant Professor, Humanities and Social Sciences.

**Charisse Botsch** (2015), Instructor, Dental Hygiene (Salem). B.S. (1985), Oregon Health Sciences University.

**Monica Breedlove** (2013), Assistant Professor, Medical Imaging Technology. B.S. (1996), Oregon Institute of Technology; M.Ed. (2015), Western Governors University. Registered Technologist (R, M, CT, MR, ARRT).

**Todd W. Breedlove** (1999), Professor, Computer Systems Engineering Technology. B.S. (1996), Oregon Institute of Technology; M.S. (1999), Southern Oregon University.

**Dustin Brown** (2016), Instructor, Medical Laboratory Science. B.S. (1978), Idaho State University; B.S. (1979), Idaho State University; M.T. (A.S.C.P.) Certified.

**Kevin J. Brown** (2001), Professor, Communication. A.A. (1986), Ricks College; B.A. (1988), Idaho State University; M.A. (1991), Washington State University; Ph.D. (2000), University of Utah.

**Ryan Brown** (2016), Assistant Professor, Medical Laboratory Science.

**Ben S. Bunting, Jr.** (2013), Assistant Professor, Humanities and Social Sciences. B.A. (2003), Kent State University; M.A. (2007); Ph.D. (2012), Washington State University.

**Calvin K. Caldwell** (1986), Professor, Computer Systems Engineering Technology. B.S. (1981), Oregon Institute of Technology; M.S. (1989), California State University, Chico.

**Barry Canaday** (2009), Associate Professor, Medical Imaging Technology. B.S. (1968), Oregon State University; M.S. (1973), Western Washington University; A.A.S. (1978), Peninsula College; A.A.S. (1992), Spokane Community College. Registered Nurse (1978); Registered Cardiac Sonographer (A) – (1992) CCI; Registered Diagnostic Cardiac Sonographer (AE) – (1992) ARDMS. Fellow of the American Society of Echocardiography (FASE) (2012).

**Dan Carrere** (2017), Assistant Professor, Information Technology. B.S (1998), M.MIS (2000), Georgia College and State University.

**Richard D. Carson** (2006), Assistant Professor, Medical Imaging Technology. B.S. (1997), Oregon Institute of Technology; M.Ed. (2012), Western Governors University. Registered Technologist (R) (CT) ARRT.

**Christopher L. Caster** (1999), Associate Professor, Medical Imaging Technology. A.A. (1975), Oregon Institute of Technology; B.S. (1979), Eugene Bible College; B.S. (1996), Oregon Institute of Technology; M.Ed. (2002), University of Phoenix.

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**Sarah Woodman** (2013), Assistant Professor, Respiratory Care and Sleep Health. B.S. (2010), Oregon Institute of Technology; M.H.A. (2012), Pacific University.

**Sherry Yang** (1997), Professor, Computer Systems Engineering Technology. B.S. (1986), M.S. (1989), Ph.D. (1996), Oregon State University.

**Yuehai Yang** (2016), Assistant Professor, Natural Sciences.

**Laurie Yates** (2015), Visiting Professor, Management. B.A. (1973), Portland State University; M.B.A. (2002), University of Oregon; DMgt (2011), George Fox University.

## Faculty Senate Presidents

1965-1966 Eugene A. Wellman  
1966-1967 Max A. Saunders  
1967-1968 Arthur A. LeCours  
1968 George E. Miller  
1968-1969 Dalhart R. Eklund  
1969-1970 Walter R. Richartz  
1970-1971 William L. Bradford, Jr  
1971-1972 Dale W. King  
1972-1973 Larsen S. Svanevik  
1973-1974 Sherman A. Anderson  
1974-1975 Thomas J. Connors  
1975-1976 James J. Boyle  
1976-1977 Joseph T. Riker  
1977-1978 Robert C. DeRosier  
1978-1979 Richard H. Zbinden  
1979-1980 Gary E. Wehr  
1980-1981 Keith L. Spickler  
1981-1982 Earl D. Kurtz  
1982-1984 Charles V. Higbee  
1984-1985 Edward Silling  
1985-1987 Herbert H. Jolliff  
1987-1988 Charles E. Harris  
1988-1989 Ross S. Carroll  
1989-1990 Pearl O. Juris  
1990-1991 John V. Stec  
1991-1993 James R. Etchison  
1993-1995 Bradley D. Burda  
1995-1997 Valerie J. Vance  
1997-1999 David C. Warner  
1999-2000 Alberto Bello, Jr.  
2000-2002 Mark Clark  
2002-2003 Timothy Thompson  
2003-2006 Bradley D. Burda  
2006-2008 Mark Neupert  
2008-2009 Marla Miller  
2009-2010 Debbie Caldwell  
2010-2012 Matt Schnackenberg  
2012-2014 Dan Peterson  
2014-2016 Robyn Cole  
2016-2018 David Thaemert  
2018-Present Terri Torres

## Emeritus Faculty

**Marshall Ager**, B.S., Assistant Professor, Civil Engineering and Geomatics, 1977-2004.

**Randal Albert**, M.S., Computer Systems Engineering Technology, 1984-2013

**Robert E. Baird**, E.E., Professor, Electrical Engineering and Renewable Energy, 1958-1979.

**Lynda M. Baker**, M.F.A., Professor, Humanities and Social Sciences, 1989-2012.

**James Ballard**, Ed.D., Associate Professor, Mathematics, 2000-2016.

**William Bradford**, M.S., Professor, Medical Laboratory Technology, 1960-1986.

**Judy Bronkey**, M.A., Associate Professor, Director, Ethnic and International Student Services, 1969-1995.

**Gene Bruner**, M.S., Professor, Electrical Engineering and Renewable Energy, 1982-2004.

**Ralph Carestia**, M.S., Computer Systems Engineering Technology, 1990-2013

**Ross Carroll**, Ph.D., Professor of Communication, 1984-2003.

**Thomas J. Connors**, Ph.D., Professor and Vascular Technology Program Director, 1969-1999.

**Harriet Cornachione**, M.S., Professor, Civil Engineering, 1995-2010.

**Michael Cornachione**, M.S., Professor, Civil Engineering, 1992-2010.

**Ben Cornelius**, M.A., Mathematics, 1980-2013

**Jesse Crabtree**, Assistant Professor, Civil Engineering Technology, 1947-1976.

**G. Gene Culver**, B.S., Associate Professor, Associate Director, Geo-Heat Center, 1960-1995.

**Hugh Currin**, Ph.D., Manufacturing and Mechanical Engineering Technology, 1984-2013

**W.M. Douglass**, M.Ed., Professor and Dean of Administration, 1954-1983.

**Elaine M. Deutschman**, M.B.S., Professor, Mathematics, 1983-2004.

**David Dyrud**, Ph.D., Professor of Communication, 1975-2003.

**Marilyn Dyrud**, Ph.D., Professor of Communication, 1983-2017.

**James R. Etchison**, M.Ed., Professor and Chair, Electrical Engineering and Renewable Energy, 1986-2004.

**Marian Ewell**, B.S., Assistant Professor, Allied Health Partnerships, Clinical Laboratory Science, 2001-2012.

**Jeanne Ford**, R.N., Assistant Professor, Administrative Director, Student Health Service, 1964-1983.

**Abraham Furman**, Clinical Laboratory Science, 2001-2016.

**C. Fred Foulon**, M.Ed., Professor, Civil Engineering Technology, 1954-1986.

**James R. Gerhardt**, M.S., Professor, Medical Imaging Technology, 1967-1992.

**Charles C. Glover**, B.S., Associate Professor, Diesel Power Technology, 1966-1990.

**Harold E. Godfrey, Jr.**, B.S., Assistant Professor, Medical Imaging Technology, 1975-1997.

**Yolanda Guran-Postlethwaite**, M.S.E.E., Professor, Electrical Engineering and Renewable Energy, 1986-2004.

**Charles E. Harris**, M.S., Professor, Department of Extended Studies and Summer Session, 1976-1996.

**Irving H. (Bud) Hart, III**, M.S., Professor, Mathematics, 1972-1999.

**Donald R. Hefty**, M.S.E.E., Professor, Electrical Engineering and Renewable Energy, 1973-1993.

**Charles A. Hermach**, M.S., Professor, Manufacturing and Mechanical Engineering and Technology, 1983-1993.

**Fred Hess**, M.S., Professor, Mathematics, 1969-1991.

**Charles V. Higbee**, M.B.A., Professor, Business, 1970-1987.

**David M. Hull**, M.S., Professor, Civil Engineering Technology, 1962-1987.

**Margaret Huntley**, Professor, Management, 1975-2006.

**Herbert H. Jolliff**, M.S., Professor and Department Chair, Mathematics, 1968-1999.

**Charles Jones**, Ph.D., Dean, College of Engineering, Technology, and Management. 1997-2015

**Lewis Jones**, M.A., Professor, Computer Systems Engineering Technology, 1969-1986.

**Pearl O. Juris**, M.S., Professor, Nursing, 1977-1992.

**Jenny Kellstrom**, M.Ed., Professor, Medical Imaging Technology, 1992-2016.

**Richard A. King**, M.S.E.E., Professor, Computer Systems Engineering Technology, 1982-2002.

**David G. Korzan**, M.S., Professor, Natural Sciences, 1973-2003.

**Cecil R. Lake**, M.Ed., Professor, Director of Planning and Research, 1949-1986.

**Arthur LeCours**, M.Ed., Professor, Physics, 1959-1982.

**John W. Lund**, Ph.D., Professor, Civil Engineering, and Director, Geo-Heat Center, 1967-1999.

**Russell Madsen**, M.Ed., Professor, Diesel Power Technology, 1958-1986.

**James C. McAtee**, M.S., Professor, Dean, Computer Systems Engineering Technology, 1969-1996.

**Marla Miller**, M.S., Management, 1998-2013

**Robert H. Mitchell**, M.S., Professor, Natural Sciences, 1975-1998.

**Richard M. Moore**, Ph.D., Professor and Director, Portland-Metro Operations, 1972-1997.

**W. Howard Morris**, M.Ed., Professor, Physical Education, Director of Athletics, 1962-1992.

**Julianne Murray**, M.A., Associate Professor, Management, 1987-2011.

**Gary J. Naseth**, Ph.D., Professor, Humanities and Social Sciences, 1975-2009.

**JoAnne M. Ogborn**, M.S., Professor, Director, Extended Studies and Summer Session, 1968-1996.

**Kenneth R. Ostrom**, M.S., Professor, Mathematics-Physics, 1966-1995.

**Alf L. Peterson**, M.S., Professor, Business Technologies, 1969-1990.

**Ralph L. Pettit**, M.S., Professor, Humanities and Social Sciences, 1969-1986.

**Donald Phillips**, M.S., Professor, Computer Systems Engineering Technology, 1972-1995.

**Wayne Phillips**, M.E., Professor, Manufacturing and Mechanical Engineering and Technology, 1979-1989.

**David N. Pockock**, M.S.E., Associate Professor, Electrical Engineering and Renewable Energy, 1991-2008.

**Richard Pope**, M.Ed., Professor, Manufacturing and Mechanical Engineering and Technology, 1957-1984.

**Lawrence W. Powers**, M.A., Dean, College of Health, Arts, and Sciences, 1993-2013.

**John R. Puckett**, B.A. Associate Professor, Communication 1986-2012.

**Winston D. Purvine**, L.L.D., President, Oregon Institute of Technology, 1947-1976.

**Wayne Rawson**, M.Ed., Professor, Civil Engineering Technology, 1955-1986.

**Margaret E. Reid**, M.S., Associate Professor, Nursing, 1981-1997.

**Suzanne Riverman**, M.N., Professor, Nursing, 1971-1989.

**Alfred Roberson**, M.Ed., Associate Professor, Director of Advising, 1966-1991.

**Robert Rogers**, M.S., Professor, Manufacturing and Mechanical Engineering and Technology, 1992-2007.

**Errol Roy**, M.B.A., Professor, Management, 1992-2004.

**Mata A. Rust**, M.S., Professor, Communication Department, 1972-1999.

**Kathleen Sale**, M.S., Associate Professor, Natural Sciences, 1992-2011.

**Joseph E. Sarsenski**, Ph.D., Professor, Civil Engineering, 1998-2008.

**Andrew J. Sedlock**, M.S., Professor, Electrical Engineering and Renewable Energy, 1988-2008

**Edward Silling**, Ph.D., Professor, Communication Department, 1975-2003.

**Jay F. Silva**, M.S., Professor, Manufacturing and Mechanical Engineering and Technology, 1962-1981.

**Donald R. Skudstad**, Ph.D., Professor, Manufacturing and Mechanical Engineering and Technology, 1976-1996.

**Susan K. Snyder**, M.S., Professor, Physical Education, 1964-1995.

**John V. Stec**, M.B.A., Professor, Management, 1986-1990 and 1992-2007.

**James V. Stewart**, M.Ed., Professor, Mathematics, 1984-2002.

**Charles R. (Dick) Strohkirsch**, M.S., Professor, Medical Imaging Technology, 1972-1998.

**Edward R. Stuedli**, D.D.S., Professor, Dental Hygiene, 1976-1998.

**Pauline Stuedli**, Assistant Professor, Dental Hygiene, 1977-1999.

**Rees Stuteville**, M.Ed., Professor, Medical Imaging Technology, 1991-2007.

**Larsen S. Svanevik**, Ph.D., Professor, Natural Sciences, 1966-1997.

**Ron Swisher**, Ph.D., Professor, Natural Sciences, 1976-2016.

**Donald P. Theriault**, Ed.D., Professor, Assistant to the President, Director of Development, 1962-1986.

**Timothy C. Thompson**, Professor, Mathematics, 1997-2017.

**Francis M. (Mel) Turner**, Associate Professor, Electrical Engineering and Renewable Energy, 1982-2000.

**David J. Vargas**, M.S.C.E., Associate Professor, Civil Engineering Technology, 1985-1997.

**Eric E. Wakkuri**, M.S., Professor, Mathematics, 1975-2004.

**John G. Ward**, M.B.A., Professor, Management Department, 1969-1995.

**David C. Warner**, Ph.D., Professor, Natural Sciences, 1984-2002.

**Gary E. Wehr**, M.A., Professor, Department Chair, General Studies, 1969-1996.

**John M. Yarbrough**, M.A., Professor, Electrical Engineering and Renewable Energy, 1972-2002.

**Linda S. Young**, Ph.D., Professor, Communication, 1983-2017.

**Richard H. Zbinden**, B.S.C.E., Professor and Chair, Civil Engineering Technology, 1976-1997.

**James W. Zipay**, Assistant Professor, Electrical Engineering and Renewable Energy, 2001-2017.

**Raenelle J. Zumbo**, M.S., Assistant Professor, Communication, 1976-2008.

## Emeritus Administration

**Linda "Abbie" Allen**, M.S., Student Services Specialist, 1988-2015.

**Mary J. Bradford**, M.S., Aquatics Director/Softball Coach, 1975-2004.

**Christopher Campbell**, A.A., Facilities Services, 1990-2014.

**Paula Cloud**, Executive Secretary to the President, 1997-2008.

**Delores "Lita" Colligan**, Associate Vice President, Strategic Partnerships, 2007-2017.

**Joemae Cox**, M.S., Online Learning, 1994-2010.

**Nancy K. Cox**, Executive Secretary to the President, 1961-1999.

**Barb DeKalb**, M.A.T., Online Learning, 1986-2013.

**Ted E. Dobson**, M.A., Executive Director, Institutional Advancement, 1986-2001.

**William R. Dodge**, B.A., Director of Paper Owl Bookstore, 1985-1999.

**Martha Anne Dow**, Ph.D., President, 1998-2007.

**Christian H. Eismann**, Ph.D., Professor and Dean of Academic Affairs, 1986-1996.

**Sharon Hanson**, Media Services Coordinator, Information Technology, 1986-2009.

**David "Haldane" Harris**, M.B.A., Budget Officer, Financial Administration, 1990-2008.

**Roger Hulet**, A.A., Facilities Services, 1983-2014.

**Mary Jane Isensee**, B.S., Director, Student Health Center, 1983-1997.

**Charles Jones**, Ph.D., Dean, College of Engineering, Technology, and Management. 1997-2015.

**Sandra "Sam" King**, Payroll Supervisor, Business Office, 1990-2012.

**April C. Leifeste**, A.A., Executive Secretary, Academic Affairs, 1972-2006.

**Paul Lienau**, M.S., Professor and Director of the Geo-Heat Center, 1968-1997.

**John Lund**, Ph.D., Geo-Heat Center, 1967-2010.

**Ron McCutcheon**, B.A., Chief Human Resources and Civil Rights/Diversity Officer, 1996-2016.

**Cheryl Meyers**, Executive Assistant, Provost and Vice President of Academic Affairs, 1989-2015.

**Daniel J. Miles**, B.A., Athletic Director and Men's Basketball Head Coach, 1970-2002.

**Beth Murphy**, M.S., Assessment, 1990-2010.

**J. Samuel Murphy**, Ph.D., CFLAT Specialist, Student Services, Assistant Professor, 1990-2011.

**E. Susan Richards**, B.S., Registrar's Office, 1989-2013.

**Raymond Setters**, B.S., Purchasing Manager, Business Affairs, 1989-2008.

**Sandra Setters**, Benefits Officer, Human Resources, 1989-2008.

**Timothy J. Stanaway**, Ed.D., Interim Provost and Vice President for Student Affairs, 1975-1999.

**Robert Thompson**, B.S., Sports Information Director, Athletics, 1993-2007.

**Gary L. Willhide**, M.S., Director, Public Affairs, 1988-2005.

**Shelby Wilsdon**, B.S., Director, Human Resources, 1971-2003.

**Lawrence Wolf**, President Emeritus, Professor, Manufacturing and Mechanical Engineering and Technology, 1991-2017.

**Douglas P. Yates**, Ed.D., Vice President for Finance and Administration, 1980-2002.

**Betty J. Young**, Office Manager, Business Office, 1961-1999.

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