2019-2020 SET Assessment Report

1 Program Mission and Educational Objectives

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 graduates, our employers and our Industrial Advisory Board. Major components of the SET Program's mission in the CSET Department are:

1. To educate a new generation of Software Engineering Technology students to meet current and future industrial challenges and emerging software trends;
2. To promote a sense of scholarship, leadership and professional service among our graduates;
3. To enable our students to create, develop, apply and disseminate knowledge within the field of software engineering;
4. To expose our students to cross-disciplinary educational programs;
5. To provide employers with graduates in software engineering and related professions.

The Program Educational Objectives of Oregon Tech's Software Engineering Technology Program are to produce graduates that:

1. Use their knowledge of engineering to creatively and innovatively solve difficult computer systems problems;
2. Regularly engage in exploring, learning and applying state-of-the-art hardware and software technologies to the solution of computer systems problems;
3. Will be an effective team member that contributes to innovative software design solutions to the resolution of real world problems;
4. Will communicate effectively both as an individual and within multi-disciplinary teams.

2 Program Description and History

The Software Engineering Technology (SET) program was implemented in Klamath Falls in 1984 and was initially accredited by TAC of ABET in 1991. The Portland program was established in Fall 1996 under the same accreditation and is currently located on the Wilsonville campus.

Enrollment

Campus	Fall 2014	Fall 2015	Fall 2016	Fall 2017	Fall 2018	Fall 2019
Klamath Falls	173	177	147	157	159	157
Wilsonville	116	128	136	116	111	115
Totals	289	305	283	273	270	408

Employment

Employed full time	93
Continuing education	1
Looking for employment	7
Not looking for employment	0
Median Salary	$69,500

3 Program Student Learning Outcomes

Our Program Student Learning Outcomes are taken from ABET ETAC. This is the first year we used these objectives.

Software Engineering Technology baccalaureate graduates will have demonstrated:

1) An ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly-defined engineering problems appropriate to the discipline an ability to select and apply

a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies;

2) An ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline;

3) An ability to apply written, oral, and graphical communication in broadly-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature

4) An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes an ability to identify, analyze, and solve broadly-defined engineering technology problems;

5) An ability to function effectively as a member as well as a leader on technical teams

4 Curriculum Map

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

Total16 Credit Hours

Senior
Year Fall

- BUS 304 - Engineering Management Credit Hours: 3
- CST 412 - Senior Development Project Credit Hours:
- CST 415 - Computer Networks Credit Hours: 4
- Humanities Elective Credit Hours: 3
- Technical Elective Credit Hours: 3 [a]

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 [a]

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 [a]

Total: 14 Credit Hours

Total for a B.S. in Software Engineering Technology: 187 Credit Hours

[a] Three additional CST upper division courses. One CST upper division elective course may be exchanged for an upper division MATH course

Mapping of courses to PSLOs and ESLOs

Course	Title	PSLO					ESLO					
		1	2	3	4	5	IA	T	QL	DP	C	ER
ANTH 452	Globalization									X		
BUS 304	Engineering Management											
CST 116	C++ Programming I	X	X									
CST 120	Embedded C	X	X									
CST 126	C++ Programming II	X	X									
CST 130	Computer Organization	X										
CST 131	Computer Architecture	X										
CST 136	Object-Oriented Programming with C++	X	X									
CST 162	Digital Logic I	X										
CST 211	Data Structures	X	X									
CST 223	Concepts of Programming Languages	X					X					
CST 229	Introduction to Grammars	X										
CST 236	Engineering for Quality Software	X	X						X			
CST 238	Graphical User Interface programming	X	X					X				
CST 240	Linux Programming	X	X		X							
CST 250	Computer Assembly Language	X	X									
CST 276	Software Design Patterns	X	X									
CST 316	Junior Team-Based Project Development I	X	X	X		X		X			X	
CST 320	Compiler Methods	X	X									
CST 324	Database Systems and Design	X	X		X							
CST 326	Junior Team-Based Project Development II	X	X	X	X	X	X	X	X		X	
CST 334	Project Proposal	X		X							X	
CST 336	Junior Team-Based Project Development III	X	X	X	X	X	X	X			X	
CST 352	Operating Systems	X	X									

CST 412	Senior Development Project	X	X	X							X	
CST 415	Computer Networks	X	X									X
CST 422	Senior Development Project	X	X	X	X		X				X	
CST 432	Senior Development Project	X	X	X	X						X	
Humanities elective										X		
Humanities elective										X		
Humanities Elective										X		
MATH 111	College Algebra	X										
MATH 112	Trigonometry	X										
MATH 251	Differential Calculus	X										
MATH 252	Integral Calculus	X										
MATH 254N	Vector Calculus I	X										
MATH 327	Discrete Mathematics	X										
MATH 465	Mathematical Statistics	X							X			
MGT 345	Engineering Economy											
PHY 221	General Physics with Calculus	X					X					
PHY 222	General Physics with Calculus	X					X					
PHY 223	General Physics with Calculus	X					X					
PSY 201	General Psychology									X		
Social Science elective										X		
Social Science elective										X		
SPE 111	Public Speaking										X	
SPE 321	Small Group and Team Communication					X		X			X	
Technical Elective		X	X									
Technical Elective		X	X									
Technical Elective		X	X									
WRI 121	English Composition										X	
WRI 122	Argumentative Writing										X	
WRI 227	Technical Report Writing										X	
WRI350	Documentation Development										X	

5 Assessment Cycle

PSLO	2019-2020	2020-2021	2021-2022
1) An ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly-defined engineering problems appropriate to the discipline			X
2) An ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline	X		
3) An ability to apply written, oral, and graphical communication in broadly-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature	X	X	
4) An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes			X
5) An ability to function effectively as a member as well as a leader on technical teams.	X		

6 Assessment Activities

6.1 PSLO 2: An ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline

6.1.1 Assessment activities:

1. Senior Project (CST 412-432); Evaluate the design documentation delivered throughout the year
2. Indirect: An exit survey was given to graduating seniors. As part of the survey, students were asked to rate their proficiency on each of our PSLO's.

6.1.2 Rubric

See Section 9 for a list of CSET rubrics

6.1.3 Klamath Falls Results

For Senior Project, 74.1% of students scored a 3 or above on four of the criteria and 77.8% scored 3 or above on the other three criteria.

6.1.4 Portland-Metro Results

For Senior Project, about 60% of students scored a 3 or above on the seven criteria.

6.1.5 Discussion

This criterion was assessed last year, and at both campuses seniors performed below juniors. We re-ran the assessment on this year's seniors to determine if we had a cohort problem or if this drop was systematic with seniors. This year's Klamath Falls seniors performed acceptably, but the Portland-Metro data indicates we may have a problem with seniors in Portland-Metro.

For 2020-2021, the senior project instructor in Portland-Metro will monitor students to determine if this is a burn-out issue or if there is another explanation for why seniors in Portland-Metro perform so poorly on this criterion.

6.2 PSLO 3: An ability to apply written, oral, and graphical communication in broadly-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature

6.2.1 Assessment activities:

1. Junior Project (CST 316-336); Evaluate documents and presentations given throughout the year
2. Senior Project (CST 412-432); Evaluate documents and presentations given throughout the year
3. Indirect: An exit survey was given to graduating seniors. As part of the survey, students were asked to rate their proficiency on each of our PSLO's.

6.2.2 Rubric

See Section 9 for a list of CSET rubrics

6.2.3 Klamath Falls Results

Junior Project: 85% of students met all criteria except "justification", which was not evaluated because it was not deemed relevant to the work that was done.

Senior Project: over 75% of students met the criteria except in two categories: "Focus and Organization" and "Style and Conventions". For both of these categories, 67% of students met the criteria.

Indirect: 92% of students reported that they were either proficient or highly proficient at this PSLO

6.2.4 Portland-Metro Results

Junior Project: 85% or more students met all the criteria that were assessed. Support and Justification were not assessed because they were not relevant to the assignments given.

Senior Project: 75% or more students met all the criteria.

6.2.5 Discussion

At both campuses there was a drop in the percentage of students that met some of the criteria. This could be because junior project is done as a group while senior project is done individually. Students who are weaker in communication skills would benefit from the input of their group during junior project, but they would have to stand on their own during senior project.

Since this criterial was met by both junior and seniors, no action is necessary.

6.3 PSLO 5: An ability to function effectively as a member as well as a leader on technical teams

6.3.1 Assessment activities:

4. Junior Project (CST 316-336); Teamwork behavior was assessed both in the fall and in the spring.
5. Indirect: An exit survey was given to graduating seniors. As part of the survey, students were asked to rate their proficiency on each of our PSLO's.

6.3.2 Rubric

See Section 9 for a list of CSET rubrics

6.3.3 Klamath Falls Results

The data show that most of our students are effective team members. Some categories showed growth from fall to spring term. Two categories show a decrease in effectiveness. In both cases, the decrease boiled down to a couple of students who were less engaged spring term. This may be due to the Covid-19 pandemic, and moving to remote classes, or it may be due to burnout. But the data does not show a systematic problem in our program or our students.

Indirect: 92% of students reported that they were either proficient or highly proficient at this PSLO

6.3.4 Portland-Metro Results

The Portland-Metro students met all criteria except two fall term, and met all criteria spring term. Growth was shown in all areas.

6.3.5 Discussion

The data show that our students can function effectively as a member of a group. Our Industrial Advisory Board consistently comments on the value of our junior project sequence in developing teamwork.

7 Data-driven Action Plans: Changes Resulting from Assessment

7.1 PSLO A: an ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities

Scores for seniors were significantly lower than for juniors. The instructor for senior project felt that the issue was not that the students weren't able to perform at a higher level, simply that they did not care to do so. During the current academic year, we will have conversations as a program to determine possible causes for this. Possibilities include (but are not limited to)

1. Our program is difficult enough that students are burning out by the end of their senior year
2. Students have already found employment early enough in their senior year that they've lost some motivation to work hard at finishing their schooling.
3. This was a one-year blip the was reflective of the particular students in this cohort, but it does not reflect a problem in our program.

7.2 PSLO D: an ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives

The data showed a significant problem writing for our junior class. The previous iteration of assessing this PSLO did not show as significant a problem with writing. We evaluate this year's juniors to see if the problem is systemic or if it is a cohort problem. We will also look for other courses where we can give students an opportunity to write design specifications so they have practice before getting to junior project.

7.3 PSLO I: an understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity

Based on the data we collected, students did a good job evaluating ethical situations. We will look at reformulating the assessment assignment to make it easier to evaluate using the Ethical Reasoning rubric.

Students showed an awareness of the need for reaching a global audience, but were less willing to invest the time up front to facilitate this. We will continue to emphasize the value of this in our GUI class.

7.4 PSLO K: a commitment to quality, timeliness, and continuous improvement

Based on the data we collected, students are doing OK on this outcome. However, particularly on the Klamath Falls campus, we need to continue to work on instilling in our students a commitment to timeliness.

8 Rubrics

8.1 PSLO 1 Rubric

ABET 1: An ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly-defined engineering problems appropriate to the discipline

Category: A	4 Highly Proficient	3 Proficient	2 Some Proficiency	1 Limited or no Proficiency	Score
Applies the knowledge, techniques, skills of Software Engineering Technology to solve broadly-defined engineering technology problems	Works independently to find and implement good solutions to technical problems	Can solve many technical problems, but their solutions are not always of highest quality	Has difficulty finding solutions to technical problems	Unable to solve many technical problems	
Selects appropriate modern tools of Software Engineering Technology	Is able to identify and use appropriate tools on their own	Requires assistance in choosing tools but is able to learn and use them on their own	Requires some assistance in both choosing and learning tools.	Highly dependent on others for tool choice and use	
Selects correct principles and applied procedures or methodologies to solve engineering problems	Selects correct principles, procedures, and methodologies and is able to explain why those choices are correct	Selects correct principles, procedures, and methodologies but is unclear as to why those choices are correct	Selects some of the correct principles, procedures, and methodologies	Shows little understanding of the principles necessary to solve engineering problems.	
Applies principles and applied procedures or methodologies to solve engineering problems	Can consistently apply procedures or methodologies and explain why each step is necessary and what each step accomplishes	Can consistently apply procedures or methodologies but isn't always sure why each step is necessary or what each step accomplishes	Inconsistently applies procedures or methodologies because they sometimes skip steps.	Unable to follow procedures or methodologies	

8.2 PSLO 2 Rubric

CSET Designing a System, Component or Process Rubric

ETAC 2: An ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline.

Performance Criteria	**High Proficiency (4)**	**Proficiency (3)**	**Developing Proficiency (2)**	**Limited/No Proficiency (1)**
Identify critical elements of the design	Identified at least 85% of the critical design elements.	Identified at least 75% of the critical design elements.	Identified at least 60% of the critical design elements.	Identified less than 60% of the critical design elements.
Create a detailed design specification addressing each of the identified critical design elements	The document is sufficiently complete and clear so that another developer could pick it up and complete the project.	Some aspects of the document need additional clarification.	Major portions of the design are not sufficiently documented.	The design is poorly documented.
Generate an implementable solution for each of the identified critical design elements	Student has a reasonable chance of implementing the entire design within the project timeline with minimal changes to the design.	There are some aspects of the design that may need to be reworked or re-scoped for the project to be completed.	Project design requires significant rework in order to be implementable.	Project can't be implemented as designed.

8.3 PSLO 3 Rubric

PSLO 3: An ability to apply written, oral, and graphical communication in broadly-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature.

For this rubric we have adopted Oregon Tech's communication ESLO rubric.

Oregon TECH

Essential Student Learning Outcome – Communication Rubric

Definition

Communication is the creation, development, and expression of ideas. The Communication ESLO differentiates between oral and written communication. The two forms of communication operate much the same but differ in the criterion Style and Delivery because of their differing forms of expression. Both forms of communication involve purposeful presentation designed to increase knowledge, to foster understanding, or to promote change in attitudes, values, beliefs, or behaviors.

Performance Criteria	High Proficiency (4)	Proficiency (3)	Some Proficiency (2)	Limited Proficiency (1)
	The work *meets listed requirements* for this criterion; little to no development needed.	The work *meets most requirements*; minor development would improve the work.	The work needs moderate development in *multiple requirements.*	The work does not meet this criterion: it needs substantial development in ***most*** *requirements.*
Purpose and Audience	• Content serves a specific, identifiable purpose (e.g., inform, persuade, analyze). • Purpose and content are appropriate to the needs of a specific, identifiable, and appropriate audience. • Content is tailored to the level of expertise, authority, and values of the audience.	Examples: • Purpose may be inferred, but is not clearly stated • Minor changes in approach or medium would make the work more meaningful or useful to the intended audience. • Some content is too advanced/basic for the intended audience.		Examples: • Purpose is unclear, or requires substantial inference from the audience. • Intended audience is unclear or overly broad. • The work would not be meaningful or useful to the intended audience. • The work omits or dismisses key audience concerns.

	• Communication medium (essay, memo, report, speech, etc.) matches purpose and audience.			
Focus and Organization	• Content is focused on a specific and appropriate organizing element: a thesis statement, purpose statement, or theme. • Content is organized so that ideas relate clearly to each other and to the organizing element. • Distinctions between major and minor claims are clear, providing consistent focus in content. • Transition language (and other organizing elements, such as headings or lists) throughout organizes ideas and guides audience understanding.	Examples: • Organizing element is present, but needs development (it is too broad, narrow, or trivial). • Minor gaps in organization detract from the effectiveness of the work. • Minor changes in organization would clarify the hierarchy of claims and information. • Minor changes in transition language would improve the work (transitions between key ideas are choppy or abrupt).		Examples: • Organizing element is underdeveloped, inconsistent, or missing. • Order and structure are unclear. • Digressions compromise or obscure the work's purpose. • Transitional elements are underdeveloped, inconsistent, or missing.
Performance Criteria	**High Proficiency (4)**	**Proficiency (3)**	**Some Proficiency (2)**	**Limited Proficiency (1)**
	The work *meets listed requirements* for this criterion; little to no development needed.	The work *meets most requirements*; minor development would improve the work.	The work needs moderate development in *multiple requirements.*	The work does not meet this criterion: it needs substantial development in ***most*** *requirements.*
Support and Documentation	• Claims are consistently supported with appropriate, relevant, and specific evidence, whether drawn from disciplinary knowledge, careful reasoning, or credible research. • Evidence derived from sources supports and develops original content. • Source material is credible; it is introduced and interpreted to provide context. • Source material is documented accurately according to the appropriate conventions	Examples: • The work includes few instances of claims unsupported by appropriate evidence. • Additional or more carefully chosen details would improve the work. • The work includes (but does not rely on) evidence that lacks rigor, based on the audience's or discipline's standards. • Additional context or discussion of credentials for sources of evidence would add value to the work. • The work contains few, minor documentation errors (according to academic citation style or disciplinary approach).		Examples: • The work includes frequent instances of unsupported claims or key missing details. • The work relies on evidence that lacks rigor, based on the audience's or discipline's standards. • The work relies on demonstrably biased evidence (without providing appropriate context or qualification of that evidence). • The work treats sources with bias, or demonstrates incomplete understanding of source material.

	(academic citation style or disciplinary approach).		• The work does not meet academic citation or disciplinary standards.
Style and Conventions	• Students deliver content in spoken, written, or visual forms and media, as appropriate to context. • Use of language (terminology and word choice, sentence structure, etc.) is clear and professional, demonstrating mastery of content and form. • In written form, students demonstrate correct grammar, spelling, syntax, usage, and mechanics. • In oral form, both verbal and nonverbal delivery demonstrate poise, preparation, mastery of material and audience awareness/ engagement.	Examples: • (Where students have a choice in form or medium) a minor change in form or medium would make the work more accessible or engaging to the audience. • Minor changes in terminology, word choice, sentence structure, or tone would improve the work. • Written: the work contains minor, isolated errors in spelling, grammar, syntax, usage, and/or mechanics; an editing pass would improve the work. • Oral: the work contains minor, isolated issues in verbal and/or non-verbal delivery; additional preparation or practice would improve the work.	Examples: • (Where students have a choice in form or medium) the choice or form or medium is inappropriate to audience, purpose, or context. • Terminology, word choice, sentence structure, or tone are not in keeping with professional or academic expectations for the work. • Written: prevalent or distracting spelling, grammar, syntax, usage, and/or mechanics errors compromise the work's impact, credibility, or coherence. • Oral: prevalent or distracting verbal and/or non-verbal delivery issues compromise the work's impact, credibility, or coherence.

Performance Criteria	High Proficiency (4)	Proficiency (3)	Some Proficiency (2)	Limited Proficiency (1)
	The work *meets listed requirements* for this criterion; little to no development needed.	The work *meets most requirements*; minor development would improve the work.	The work needs moderate development in *multiple requirements.*	The work does not meet this criterion: it needs substantial development in ***most*** *requirements.*
Visual Communication (where appropriate)	As appropriate to purpose and audience: • High quality visuals are employed to illustrate, contribute to, or develop content, and not for purely aesthetic appeal. • All visuals are appropriately introduced and interpreted. • All visuals are documented according to the appropriate conventions (academic citation style or disciplinary approach).	Examples: • Minor changes in content, organization, or appearance would enhance the visuals in the work. • Additional or more carefully-chosen visuals would improve the work. • Some (but a minority of) visuals in the work serve a purely aesthetic purpose, and relate only tangentially to the work's purpose and content. • Additional context and interpretation of visuals would improve the work. • The work contains few, minor documentation errors of visuals, or the information presented in visual format (according to academic citation style or disciplinary approach).		Examples: • The work includes any visuals that are inappropriate to audience or context. • Necessary visuals are missing from the work. • Most (or all) visuals in the work serve a purely aesthetic purpose, and relate only tangentially to the work's purpose and content. • The work presents most (or all) visuals without context or interpretation. • The work presents most (or all) visuals without documentation (according to academic citation style or disciplinary approach).
Justification (Self-Assessment)	Students: • Articulate a clear rationale for communication choices (purpose and audience, focus and organization, support and documentation, style and conventions, and visual communication). • Self-assess the quality of their work (including process and product). • Elicit and effectively use feedback to improve their work.	Examples: • Student omits evaluation of one ESLO criterion. • Student's self-evaluation would be improved by a more rigorous analysis. • Student's self-evaluation addresses only process, or only product, but does not address both. • A more rigorous approach to eliciting and using feedback would improve the work.		Examples: • Student omits discussion of multiple ESLO criteria. • Student's self-evaluation is cursory, facile, or is compromised by lack of insight (student overlooks obvious deficiencies in the work). • Student demonstrates an inability or unwillingness to elicit or use feedback to improve the work.

8.4 PSLO 4 Rubric

CSET Conducting Standardized Tests Rubric

ABET 4: An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes

Performance Criteria	**High Proficiency (4)**	**Proficiency (3)**	**Developing Proficiency (2)**	**Limited/No Proficiency (1)**
Analysis	Organizes and synthesizes evidence to reveal insightful patterns, differences, or similarities related to focus.	Organizes evidence to reveal important patterns, differences, or similarities related to focus.	Organizes evidence, but the organization is not effective in revealing important patterns, differences, or similarities.	Lists evidence, but it is not organized and/ or is unrelated to focus.
Interpretation	States a conclusion that is a logical extrapolation from the inquiry findings.	States a conclusion focused solely on the inquiry findings. The conclusion arises specifically from and responds specifically to the inquiry findings.	States a general conclusion that, because it is so general, also applies beyond the scope of the inquiry findings.	States an ambiguous, illogical, or unsupportable conclusion from inquiry findings.
Application	Student is able to easily go from the data to a solution to improve the system.	Student was able to go from the data to a solution, but their solution did not maximize positive impact on the system	The student made changes to the system based on the data, but the changes did not improve the system in significant ways.	Student was unable to correlate the data to changes that should improve the system

8.5 PSLO 5 Rubric

PSLO 5: An ability to function effectively as a member as well as a leader on technical teams.

For this criterion we have adopted Oregon Tech's Teamwork ESLO rubric.

OIT Team and Group Work Rubric				
Performance Criteria	**No/Limited Proficiency (1)**	**Some Proficiency (2)**	**Proficiency (3)**	**High Proficiency (4)**
1. Identify and achieve goal/purpose	Clear goals are not formulated or documented; thus all members don't accept or understand the purpose/task of the group. Group does not achieve goal.	Individuals share some goals but a common purpose may be lacking. Priorities may be unrealistic and documentation may be incomplete. Group may not achieve goal.	Group shares common goals and purpose. Some priorities may be unrealistic or undocumented. Group achieves goal.	When appropriate, realistic, prioritized and measurable goals are agreed upon and documented and all team members share the common objectives/purpose. Team achieves goal.
2. Assume Roles and Responsibilities	Members do not fulfill roles and responsibilities. Leadership roles are not defined and/or shared. Members are not self-motivated and assignments are not completed on time. Many members miss meetings.	Some members may not fulfill roles and responsibilities. Leadership roles are not clearly defined and/or effectively shared. Some members are not motivated and some assignments are not completed in a timely manner. Meetings rarely include most members.	Members often fulfill roles and responsibilities. Leadership roles are generally defined and/or shared. Generally, members are motivated and complete assignments in a timely manner. Many members attend most meetings.	Members consistently and effectively fulfill roles and responsibilities. Leadership roles are clearly defined and/or shared. Members move team toward the goal by giving and seeking information or opinions, and assessing ideas and arguments critically. Members are all self-motivated and complete assignments on time. Most members attend all meetings.
3. Communicate Effectively	Members do not communicate openly and respectfully. Members do not listen to each other. Communication patterns undermine teamwork	Members may not consistently communicate openly and respectfully. Members may not listen to each other.	Members usually communicate openly and respectfully. Members often listen to most ideas. Members usually support	Members always communicate openly and respectfully. Members listen to each other's ideas. Members support and encourage each

			and encourage each other.	other. Communication patterns foster a positive climate that motivates the team and builds cohesion and trust.
	Limited Proficiency (1)	**Some Proficiency (2)**	**Proficiency (3)**	**High Proficiency (4)**
4. Reconcile Disagreement	Members do not welcome disagreement. Difference often results in voting. Subgroups are present.	Few members welcome disagreement. Difference often results in voting. Some members respect and accept disagreement and work to account for differences. Subgroups may be present.	Many members welcome disagreement and use difference to improve decisions. Most members respect and accept disagreement and work to account for differences. Subgroups rarely present.	All members welcome disagreement and use difference to improve decisions. All members respect and accept disagreement and employ effective conflict resolution skills. Subgroups absent.
5. Share Appropriately	Contributions are unequal. Certain members dominate discussions, decision making, and work. Some members may not contribute at all. Individuals work on separate sections of the work product, but have no coordinating effort to tie parts together.	Contributions are unequal although all members contribute something to discussions, decision making and work. Coordination is sporadic so that the final work product is of uneven quality.	Many members contribute to discussions, decision-making and work. Individuals focus on separate sections of the work product, but have a coordinator who ties the disparate parts together (they rely on the sum of each individual's work)	All members contribute significantly to discussions, decision making and work. The work product is a collective effort; team members have both individual and mutual accountability for the successful completion of the work product.
6. Develop Strategies for Effective Action	Members seldom use decision making processes to decide on action. Individuals often make decisions for the group. The group does not share common norms and expectations for outcomes. Group fails to reach consensus on most decisions. Group does not produce plans for action.	Members sometimes use decision making processes to decide on action. Some of the members of the group do not share norms and expectations for outcomes. Group sometimes fails to reach consensus. Plans for action are informal and often arbitrarily assigned.	Members usually use effective decision making processes to decide on action. Most of the group shares norms and expectations for outcomes. Group reaches consensus on most decisions and produces plans for action.	Members use effective decision making processes to decide on action. Group shares a clear set of norms and expectations for outcomes. Group reaches consensus on decisions and produces detailed plans for action.

7. Cultural Adaptation	Members do not recognize differences in background or communication style.	Members may recognize, but do not adapt to differences in background and communication style	Members usually recognize and adapt to differences in background and communication style.	Members always recognize and adapt to differences in background and communication style.