

Annual Assessment Report 2015-2016 Academic Year

BACHELOR OF SCIENCE IN CIVIL ENGINEERING DEGREE PROGRAM

administered by the

Civil Engineering Department Oregon Institute of Technology

1. INTRODUCTION

The Civil Engineering Department at Oregon Institute of Technology administers a Bachelor of Science in Civil Engineering (BSCE) degree. This degree is accredited by the Engineering Accreditation Commission of ABET, Inc.

2. MISSION, OBJECTIVES, AND OUTCOMES

The mission, objectives, and student learning outcomes for the BSCE program are reviewed annually by the department at the fall retreat during convocation. They are also reviewed annually by the department's Industrial Advisory Council (IAC).

2.1 Program Mission

The mission of the Bachelor of Science in Civil Engineering (BSCE) program at Oregon Institute of Technology 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.

2.2 Program Objectives

The following objectives are what the faculty expects graduates from the program to be able to accomplish a few years after the commencement of their careers and stem directly from the program mission. In the annual review of the objectives with the IAC, the words "or continuing" were added to Objective 2. The other objectives remained unchanged and are as follows. The alumni from the BSCE program at Oregon Tech should:

1. practice in civil engineering or a related field
2. pursue advanced or continuing education in civil engineering or a related field
3. act as responsible, effective, and ethical citizens
4. communicate effectively
5. collaborate effectively

2.3 Program Outcomes

From these objectives stem a number of specific and measurable outcomes. In addition to being more specific, the outcomes state what students should be able to demonstrate while in the

program and provide evidence that the objectives are also being met. Upon graduating from the BSCE program at Oregon Tech, students should possess:

- (a). an ability to apply knowledge of mathematics, science, and engineering
- (b). an ability to design and conduct experiments, as well as to analyze and interpret data
- (c). an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- (d). an ability to function on multi-disciplinary teams
- (e). an ability to identify, formulate, and solve engineering problems
- (f). an understanding of professional and ethical responsibility as well as the importance of professional licensure
- (g). an ability to communicate effectively
- (h). the broad education necessary to understand the impact of engineering solutions in a global and societal context
- (i). a recognition of the need for, and an ability to engage in life-long learning
- (j). a knowledge of contemporary issues
- (k). an ability to use the techniques, skill, and modern engineering tools necessary for engineering practice
- (l). an ability to explain basic concepts in management, business, public policy, and leadership
- (m). an ability to evaluate concepts and ideas from alternative perspectives

3 ASSESSMENT CYCLE

The Civil Engineering Department follows a three-year assessment cycle during which the faculty members conduct numerous assessments to ensure the quality of the program. The 2013-2014 academic year was the third year in its cycle.

During the 2011 fall retreat, the civil engineering department developed a plan for targeted assessments. This plan called for a cycle in which each outcome is directly assessed at least twice in specific, targeted courses in the curriculum—courses where the outcome is normally taught, reinforced, or otherwise addressed.

This cycle was a work in progress and was constantly evolving. The department faculty met at the beginning of each term to discuss outcomes that were scheduled to be assessed during that term. Performance criteria for each outcome were developed, or reviewed if they had been used previously. After deciding on appropriate performance criteria, the faculty members discussed whether the targeted course was still an appropriate course in which to conduct the assessment or decided upon a new setting. Sometimes the newly-targeted course was during the same term and sometimes it was in a different term and so the outcome was moved to a new time in the cycle. As such, the assessment cycle was slightly changed from year to year. Table 1 summarizes the latest cycle as well as the courses that were targeted for assessments.

Table 1 Assessment Cycle with Targeted Courses

Outcome	Winter 12	Spring 12	Fall 12	Winter 13	Spring 13	Fall 13	Winter 14	Spring 14
a. fundamentals	CIV 328	ENGR 212					ENGR 211	
b. experimentation			ENGR 231	ENGR 213				
c. design			CIV 416	CIV 402				
d. teamwork						ENGR 101	CE 402	
e. problem solving	CIV 361	CIV 344				CE 212		
f. professionalism								CE 208/SRS
g. communication	*CIV 402							
h. broad education			CIV 315				CE 351	
i. life-long learning			ENGR 101	CIV 402				
j. contemporary issues						CE 539		CE 354
k. tools							CE 402	CE 312
l. leadership							CE 402	CE 208
m. alternative perspectives							ENGR 102	CE 354

*Multiple assessments will be done for this outcome in this course during this term

4. 2013-2014 TARGETED ASSESSMENT ACTIVITIES

As can be seen in Table 1, no targeted assessments were scheduled for the 2015-2016 academic year. This year was reserved for surveying alumni and employers and to close the loop for any open issues, one of which remained unresolved from the three-year cycle. Namely, the ethics portion of Outcome (f) was not successfully assessed. This direct assessment did take place in Fall 2014 and is summarized below.

4.1 Outcome (f) an understanding of professional and ethical responsibility as well as the importance of professional licensure

In the fall of 2015, 22 students from ENGR 101, Introduction to Engineering I, completed an ethics assignment asking them to evaluate an ethical dilemma. They responded to the situation in writing and these responses were evaluated by the course instructor using an Ethics Rubric that was developed and used across the university. Table 2 contains the results as well as the performance criteria on which the students were judged. As can be seen, students met the benchmarks set for minimum acceptable performance, suggest that they do have an understanding of ethical responsibility, even if at a basic, freshmen-level.

Table 2, Summary of First Assessment of Outcome (f): Ethics

Performance Criteria	Assessment Methods	Measurement Scale	Minimum Acceptable Performance	Results
Demonstrates knowledge of the professional code of ethics	Ethics assignment evaluated by course instructor using Oregon Tech's Ethics Rubric	1-4 according to attached criteria	80% of students scoring 2 or higher 20% of students scoring 3 or higher	86% ≥ 2 41% ≥ 3
Describes ethical issue using code of ethics				100% ≥ 2 50% ≥ 3
Describes parties involved and discusses their points of view				96% ≥ 2 50% ≥ 3
Describes and analyzes possible alternative approaches				100% ≥ 2 46% ≥ 3
Chooses an approach and explains benefits and risks				100% ≥ 2 36% ≥ 3

This outcome was assessed again in the winter of 2016. An ethical situation was given to the 26 students enrolled in CE 402, Design Project II. The students evaluated the case study and wrote a summary and response. These papers were evaluated by one of the course instructors using the university's adopted rubric. Table 3 summarizes the results of this assessment and reveal that the minimum levels of acceptable performance were met in each performance criteria. These results provide evidence that the students do understand ethical responsibility.

Table 3, Summary of Second Assessment of Outcome (f): Ethics

Performance Criteria	Assessment Methods	Measurement Scale	Minimum Acceptable Performance	Results
Demonstrates knowledge of the professional code of ethics	Ethics assignment evaluated by course instructor using Oregon Tech's Ethics Rubric	1-4 according to attached criteria	75% of students scoring 3 or higher	75% ≥ 3 75% = 4
Describes ethical issue using code of ethics				75% ≥ 3 75% = 4
Describes parties involved and discusses their points of view				75% ≥ 3 25% = 4
Describes and analyzes possible alternative approaches				100% ≥ 3 50% = 4
Chooses an approach and explains benefits and risks				67% ≥ 3 One group did not answer this question

5 OTHER ASSESSMENT ACTIVITIES

The department's assessment coordinator routinely surveys graduates from the program regarding achievement of outcomes. During the 2015-2016 academic year, alumni and employers were also surveyed. The tables in Appendix A summarizes the results of these surveys for each outcome. The benchmarks for these surveys is 80% of each responded group marking "proficiency" or "high proficiency" for each outcome. These benchmarks were met for the vast majority of the outcomes. One exception was Outcome (j), Contemporary Issues in which 27% of the employers and 24% of graduates responded with Some/No/Limited proficiency. The other exception was Outcome (l), Leadership in which 31% of graduates, 24% of alumni, and 27% of employers responded with Some/No/Limited proficiency. These are outcomes that the department consistently struggles with and it constantly trying to improve upon. We will meet and discuss these results at the fall retreat to discuss further steps toward improving the achievement of these outcomes.

6 DATA STORAGE AND MANAGEMENT

All of the paperwork associated with the assessments described herein is kept with the department's assessment coordinator, Sean St.Clair. This paperwork includes assessment reports, summary sheets, raw data, student work, and assessment/evaluation instruments.

7 OPEN ISSUES

No open issues remain from the 2011-2014 assessment cycle. A new cycle will begin in 2018 with a new assessment coordinator.

8 CONCLUSION

The 2013-2014 academic year was the third year in a three-year assessment cycle. One issue remained open at the end of this cycle, the ethics portion of Outcome (f). This outcome was assessed in the 2015-2016 academic year and was successful. Also, indirect assessments in the

form of surveys administered to graduates, alumni, and employers were also conducted and were almost uniformly successful.

Appendix A
Survey Results of Outcome Achievement

Outcome (a)

Survey Group	Degree of Proficiency	Count	Percent	
Graduates	High Proficiency	24	47%	
	Proficiency	27	53%	
	Some Proficiency	0	0%	
	No/Limited Proficiency	0	0%	
Alumni	High Proficiency	17	45%	
	Proficiency	21	55%	
	Some Proficiency	0	0%	
	No/Limited Proficiency	0	0%	
Employers	High Proficiency	50	52%	
	Proficiency	40	42%	
	Some Proficiency	6	6%	
	No/Limited Proficiency	0	0%	

Outcome (b)

Survey Group	Degree of Proficiency	Count	Percent	
Graduates	High Proficiency	13	25%	
	Proficiency	31	61%	
	Some Proficiency	7	14%	
	No/Limited Proficiency	0	0%	
Alumni	High Proficiency	14	40%	
	Proficiency	19	54%	
	Some Proficiency	2	6%	
	No/Limited Proficiency	0	0%	
Employers	High Proficiency	34	36%	
	Proficiency	47	49%	
	Some Proficiency	14	15%	
	No/Limited Proficiency	0	0%	

Outcome (c)

Survey Group	Degree of Proficiency	Count	Percent	
Graduates	High Proficiency	12	24%	
	Proficiency	30	59%	
	Some Proficiency	9	18%	
	No/Limited Proficiency	0	0%	
Alumni	High Proficiency	9	25%	
	Proficiency	24	67%	
	Some Proficiency	3	8%	
	No/Limited Proficiency	0	0%	
Employers	High Proficiency	32	34%	
	Proficiency	50	53%	
	Some Proficiency	11	12%	
	No/Limited Proficiency	1	1%	

Outcome (d)

Survey Group	Degree of Proficiency	Count	Percent	
Graduates	High Proficiency	24	47%	
	Proficiency	23	45%	
	Some Proficiency	4	8%	
	No/Limited Proficiency	0	0%	
Alumni	High Proficiency	20	51%	
	Proficiency	16	41%	
	Some Proficiency	3	8%	
	No/Limited Proficiency	0	0%	
Employers	High Proficiency	41	43%	
	Proficiency	41	43%	
	Some Proficiency	14	15%	
	No/Limited Proficiency	0	0%	

Outcome (e)

Survey Group	Degree of Proficiency	Count	Percent	
Graduates	High Proficiency	20	39%	
	Proficiency	28	55%	
	Some Proficiency	3	6%	
	No/Limited Proficiency	0	0%	
Alumni	High Proficiency	22	58%	
	Proficiency	13	34%	
	Some Proficiency	3	8%	
	No/Limited Proficiency	0	0%	
Employers	High Proficiency	46	48%	
	Proficiency	44	46%	
	Some Proficiency	5	5%	
	No/Limited Proficiency	0	0%	

Outcome (f)

Survey Group	Degree of Proficiency	Count	Percent	
Graduates	High Proficiency	39	76%	
	Proficiency	10	20%	
	Some Proficiency	2	4%	
	No/Limited Proficiency	0	0%	
Alumni	High Proficiency	24	62%	
	Proficiency	13	33%	
	Some Proficiency	2	5%	
	No/Limited Proficiency	0	0%	
Employers	High Proficiency	52	56%	
	Proficiency	39	42%	
	Some Proficiency	2	2%	
	No/Limited Proficiency	0	0%	

Outcome (g)

Survey Group	Degree of Proficiency	Count	Percent	
Graduates	High Proficiency	27	53%	
	Proficiency	20	39%	
	Some Proficiency	4	8%	
	No/Limited Proficiency	0	0%	
Alumni	High Proficiency	17	44%	
	Proficiency	18	46%	
	Some Proficiency	4	10%	
	No/Limited Proficiency	0	0%	
Employers	High Proficiency	46	48%	
	Proficiency	43	45%	
	Some Proficiency	6	6%	
	No/Limited Proficiency	0	0%	

Outcome (h)

Survey Group	Degree of Proficiency	Count	Percent	
Graduates	High Proficiency	23	45%	
	Proficiency	23	45%	
	Some Proficiency	5	10%	
	No/Limited Proficiency	0	0%	
Alumni	High Proficiency	12	32%	
	Proficiency	22	58%	
	Some Proficiency	4	11%	
	No/Limited Proficiency	0	0%	
Employers	High Proficiency	30	33%	
	Proficiency	50	54%	
	Some Proficiency	12	13%	
	No/Limited Proficiency	0	0%	

Outcome (i)

Survey Group	Degree of Proficiency	Count	Percent	
Graduates	High Proficiency	32	63%	
	Proficiency	17	33%	
	Some Proficiency	2	4%	
	No/Limited Proficiency	0	0%	
Alumni	High Proficiency	19	50%	
	Proficiency	16	42%	
	Some Proficiency	2	5%	
	No/Limited Proficiency	1	3%	
Employers	High Proficiency	38	40%	
	Proficiency	47	50%	
	Some Proficiency	8	9%	
	No/Limited Proficiency	1	1%	

Outcome (j)

Survey Group	Degree of Proficiency	Count	Percent	
Graduates	High Proficiency	12	24%	
	Proficiency	27	53%	
	Some Proficiency	11	22%	
	No/Limited Proficiency	1	2%	
Alumni	High Proficiency	11	29%	
	Proficiency	22	58%	
	Some Proficiency	5	13%	
	No/Limited Proficiency	0	0%	
Employers	High Proficiency	19	21%	
	Proficiency	47	52%	
	Some Proficiency	24	26%	
	No/Limited Proficiency	1	1%	

Outcome (k)

Survey Group	Degree of Proficiency	Count	Percent	
Graduates	High Proficiency	17	33%	
	Proficiency	30	59%	
	Some Proficiency	4	8%	
	No/Limited Proficiency	0	0%	
Alumni	High Proficiency	16	42%	
	Proficiency	17	45%	
	Some Proficiency	5	13%	
	No/Limited Proficiency	0	0%	
Employers	High Proficiency	34	36%	
	Proficiency	48	51%	
	Some Proficiency	11	12%	
	No/Limited Proficiency	1	1%	

Outcome (l)

Survey Group	Degree of Proficiency	Count	Percent	
Graduates	High Proficiency	13	25%	
	Proficiency	22	43%	
	Some Proficiency	14	27%	
	No/Limited Proficiency	2	4%	
Alumni	High Proficiency	9	23%	
	Proficiency	21	54%	
	Some Proficiency	8	21%	
	No/Limited Proficiency	1	3%	
Employers	High Proficiency	23	24%	
	Proficiency	45	47%	
	Some Proficiency	22	23%	
	No/Limited Proficiency	5	5%	

Outcome (m)

Survey Group	Degree of Proficiency	Count	Percent	
Graduates	High Proficiency	18	35%	
	Proficiency	25	49%	
	Some Proficiency	8	16%	
	No/Limited Proficiency	0	0%	
Alumni	High Proficiency	20	51%	
	Proficiency	14	36%	
	Some Proficiency	4	10%	
	No/Limited Proficiency	1	3%	
Employers	High Proficiency	29	31%	
	Proficiency	49	53%	
	Some Proficiency	14	15%	
	No/Limited Proficiency	1	1%	

Appendix B
Mapping of Program Outcomes to Courses

Math and Science Courses		BSCE Program Outcomes												
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)
CHE 221/222	General Chemistry	I	I											
GEOL 201	Physical Geology	I	I		I		R	R	I					
PHY 221/222	General Physics with Calculus	I	I											
Math 251	Differential Calculus	I												
Math 252	Integral Calculus	R												
Math 254N	Vector Calculus I	R												
Math 321	Applied Differential Equations I	R												
Math 361	Statistical Methods	R												
	Math/Science Elective	R												

I: Introduced, R: Reinforced

General Education Courses		BSCE Program Outcomes												
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)
SPE 111	Fundamentals of Speech				I			I						
WRI 121/122	English Composition						I	I						
WRI 227	Technical Report Writing						I	R						I
COM 401/402	Civil Engineering Project				R			R	R	I				I
ANTH 452	Globalization						R		R		R			R
*ANTH 335	The Built Environment						I		I		I			I
*HIST 335	The Engineering Profession						I		I		I			I
	Social Science Electives								I					
	Humanities Electives								I					

I: Introduced, R: Reinforced

*Students must take *either* ANTH 335 or HIST 335

Introductory and Core Engineering Courses		BSCE Program Outcomes												
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)
ENGR 101/102	Introduction to Engineering	I	I	I	I	I	I	I	I	I		I		I
CE 203	Engineering Graphics							I				I		
CE 205	Computational Methods	R				I						I		
CE 212	Civil Engineering Materials	I	I					I				I		
GME 134	Geographical Information Systems	I					I				I	I		
GME 161	Plane Surveying I	I				I						I		
ENGR 211	Engineering Mechanics: Statics	R				I						I		
ENGR 213	Engineering Mechanics: Strength of Materials	R	R			R		R				I		I
ENGR318	Engineering Mechanics: Fluids	R	R		I	R		I						

I: Introduced, R: Reinforced

Civil Engineering Core Courses		BSCE Program Outcomes												
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)
CE 208	Principles of Professional Practice	R				R	R	R	I	R	I	R	I	I
CE 311	Introduction to Geotechnical Engineering	R	R			R	R	R	R		I	R		I
CE 312	Earth Pressures and Foundations	R	R			R	R	R	R		I	R		I
CE 331	Structural Analysis	R				R						R		
CE 341	Elementary Structural Design	R		I		R						R		
CE 351	Introduction to Transportation Engineering	R	R			R	I	I	I		I	R		I
CE 354	Traffic Engineering	R	R	R		R	I	I			I	R		I
CE 371	Closed Conduit Design	R		I		R		R				R		I
CE 374	Hydrology	R	I		I	R		R	I		I	R		I
CE 401/402	Civil Engineering Project	R		R	R	R	R			I				
CE 405	Sustainability and Infrastructure	R		R		R	R		R	R	R	R	R	R

I: Introduced, R: Reinforced

Senior Elective Courses		BSCE Program Outcomes												
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)
*GME 351	Construction and Engineering Surveying	R				R		R				R		
*GME 372	Subdivision Planning and Platting	R				R		R				R		
GME 425	Remote Sensing	R				R						R		
ENV 435	Atmospheric Physics	R	R			R			R		R			
MATH 341	Linear Algebra I	R				R								
MATH 425	Vector Analysis	R				R								
MATH 451	Numerical Methods I	R				R		R						
MATH 465	Mathematical Statistics	R				R								
CE 411	Engineering Geology	R	R	R		R		R		R		R		
CE 413	Advanced Soils	R	R			R								
CE 432	Structural Loading and Lateral Forces	R		R		R				R	R	R		
**CE 442	Advanced Reinforced Concrete Design	R		R		R						R		
**CE 444	Intermediate Steel Design	R		R		R				R	R	R		
CE 447	Masonry Design	R		R		R						R		
CE 448	Timber Design	R		R		R						R		
CE 456	Pavement Engineering	R	R	R		R	R				R	R		I
CE 457	Transportation and Land Development	R	R			R	R	R			R	R		I
CE 473	Groundwater	R	I	I		R	I	R				R		I
CE 481	Environmental Engineering I	R		I	I	R	I	R	I	I	R	R		I
CE 489	Treatment Wetlands	R	I	I	R	I	I	R	R		I	R		R
CE 511	Seepage and Earth Structures	R	R	R		R		R		R		R		
CE 512	Earthquake Engineering	R	R	R		R		R		R		R		
CE 513	Deep Foundations	R	R	R		R		R		R		R		
CE 522	Advanced Shear Strength of Soils	R	R			R		R			R	R		R
CE 533	Structural Matrix Analysis	R				R						R		
CE 534	Advanced Solid Mechanics	R				R						R		
CE 535	Structural Dynamics	R				R						R		
CE 539	Highway Bridge Rating	R				R	R	I		R	R	R		R
CE 542	Prestressed Concrete Design	R		R		R					R	R		R
CE 544	Advanced Steel Design	R		R		R				R	R	R		
CE 549	Bridge Design	R		R		R	R	I		R	R	R		R
CE 550	Transportation Structures	R		R		R	R	I		R	R	R		R
CE 551	Geometric Design of Roadways	R	R	R		R	R				R	R		I
CE 554	Advanced Traffic Engineering	R	R	R		R	R	I			R	R		I
CE 558	Transportation Safety	R			R	R	R	I	I		R	R	I	I
CE 568	Traffic Demand Modeling	R				R	R				R	R		
CE 571	Open-Channel Hydraulics	R		R		R	R	R				R		
CE 572	Hydrometry	R		R	R	I	I	R		I		R		
CE 574	Environmental River Mechanics	R		R	R	R	R	R	I		I	R		I
CE 576	Applied Hydraulic Design	R		R	I	R	R	R				R		I
CE 586	Water and Wastewater Treatment	R		R	I	R	R	R	I			R		
CE 587	Environmental Remediation Technologies			I	I	I	I	R	I	I	R	I	I	I

I: Introduced, R: Reinforced

500-level electives may be used toward the BSCE Degree

* Only one of these courses can be counted toward the BSCE Degree

**Students must complete either CE 442 or CE 444 for BSCE Degree