Environmental Engineering
ABET Evaluation Summary
2015-2016

This document describes the evaluation of ABET Program Educational Objectives (PEOs) and Student Outcomes for the Environmental Engineering undergraduate program for 2015-16. Data were collected throughout the year and evaluated by the CEE Assessment Committee (Drs. Barr, Dupont, McNeill, and Tullis) in January and May 2016.

Program Educational Objectives

The Environmental Engineering (EnvE) Program Educational Objectives (PEOs) are reviewed by each of the program's three constituencies (Table 1).

Table 1: PEO Review Process and Schedule for EnvE Program Constituency

Constituency	Review opportunity	Frequency	Most recent reviews	Date of next review
Students	Freshman Orient. (CEE 1880)	Every freshman class (Fall and Spring)	Spring semester 2016	Fall semester 2016
	Junior design course (CEE 3880)	Every junior class (Spring)	Spring 2016	Spring 2017
	Senior exit interview	Every graduating class (Spring)	April 2016	April 2017
Employers	Advisory Board meeting	Annually (typically late Fall)	November 2015	November 2016
Faculty	CEE Faculty Retreat	Annually (August)	August 2015	August 2016

Students: The PEOs are introduced to the freshman class in CEE 1880 as part of a lecture on the accreditation and licensing processes (see the slides in Appendix A). PEOs are again shown to the juniors in CEE 3880. This reminds continuing students about the PEOs and allows transfer students (who typically do not take CEE 1880) to see the PEOs. Finally, as part of the senior exit interview process, graduating seniors are given an opportunity to review the PEOs in an effort to establish some big picture career goals. No feedback was received from students related to the PEOs.

CEE Advisory Board: The CEE Advisory Board met on November 3, 2015 (see Appendix B for meeting minutes). The PEOs were reviewed and discussion included the desire for the program to encourage students to improve their communication skills (PEO1) and support for including "sustainability considerations" in PEO2. The Advisory Board unanimously approved keeping the current PEOs. The PEOs will continue to be reviewed and discussed at all future annual Advisory Board Meetings.

Program Faculty: The PEOs are reviewed and discussed with the program faculty at the annual faculty retreat, which takes place every August just prior to the Fall semester. The faculty unanimously approved keeping the current PEOs during the 2015 faculty retreat (see Appendix C for meeting minutes). The PEOs will continue to be reviewed and discussed at all future annual faculty retreats.

Student Outcomes

Evaluation of the Student Outcome attainment is conducted by the CEE Assessment committee on a specified schedule with approximately one-third of the Student Outcomes assessed every year (Table 2). When deficiencies are identified, recommendations are made to fix specific problems and support continuous improvement.

Table 2: Evaluation Schedule for Student Outcomes

Evaluation Date	School Year	Outcomes evaluated
May 2015	2014-15	a, b, c, d
May 2016	**2015-16**	**e, f, g**
May 2017	2016-17	h, i, j, k
May 2018	2017-18	a, b, c, d
May 2019	2018-19	e, f, g
May 2020	2019-20	h, i, j, k

The assessment process uses data from three sources: student coursework, FE Exam results, and senior exit interviews. The 2015-16 Assessment of Student Outcomes includes data from Fall 2015 and Spring 2016.

Student Coursework: Outcomes e, f, and g were reviewed in 2015-16 (Table 2). Assessment data are summarized in Table 3 and Figure 1; detailed evaluation of each outcome is presented in Appendix D. Student assignments are evaluated on a 0-1-2 scale, which corresponds to the student's performance not meeting, partially meeting, and meeting the Outcome Objective, respectively. The EnvE program has two goals for student performance:

- Goal 1: a minimum of 70% of the students will perform at a 2 level
- Goal 2: a minimum of 80% of the students will perform at the 1 or 2 level.

Both goals were met for the three outcomes assessed this year. Note the "sample size" in Table **3** refers to the number of individual examples of student work that were assessed for each outcome, not the number of students.

Table 3: Aggregated Assessment Results for EnvE Classes, Fall 2015 and Spring 2016

Outcome	Sample size	2	1	0	Sum of 1&2 ratings
e	426	84%	10%	6%	94%
f	322	75%	23%	2%	98%
g	517	80%	16%	4%	96%

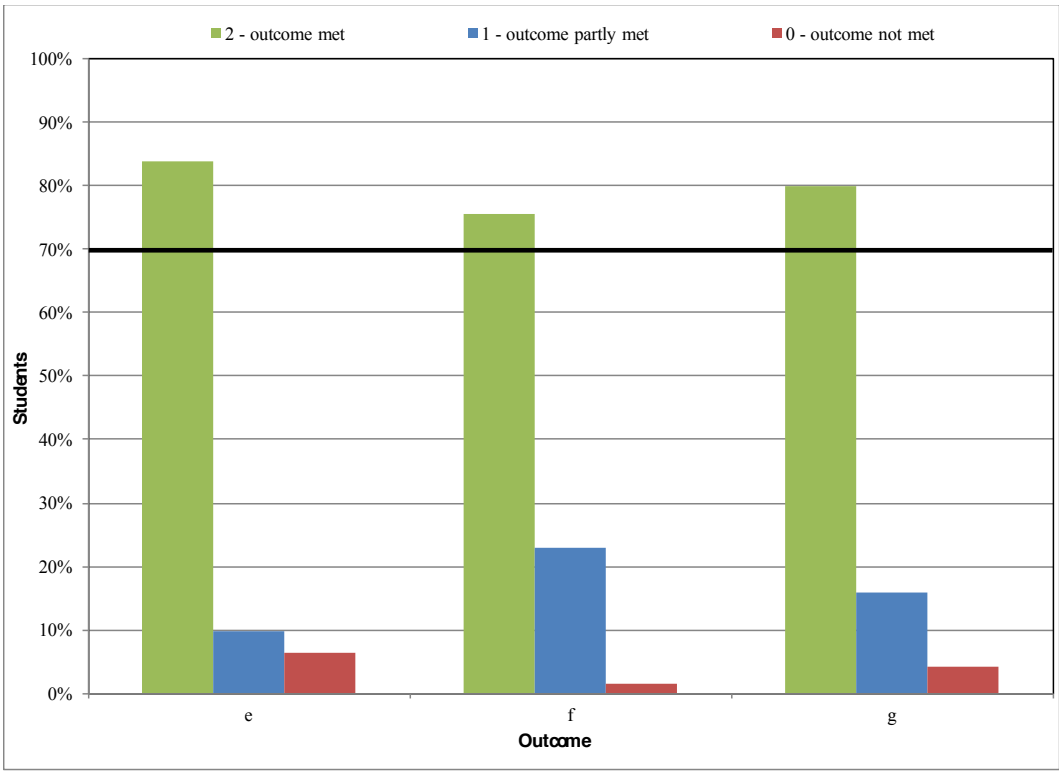


Figure 1: Aggregated Assessment Results for EnvE Classes for Fall 2015 and Spring 2016

Fe Exam: Our goal is to have 100% pass rate on the FE exam; our minimum acceptable level of performance is a pass rate at or above the national average. Table 4 summarizes the FE results for the past six years, including the percentage of students who had passed the FE exam by the time of graduation. The USU EnvE pass rate has been either 100% or comparable to the national average (considering the small number of USU EnvE graduates).

Table 4: EnvE Graduates Passing FE Exam vs. National Pass Rate

	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
USU EnvE graduates	6	10	4	5	2	9
USU EnvE pass rate at graduation	100%	80%	100%	100%	100%	89%
National EnvE pass rate	85%	83%	88%	84%	77%	76%

FE Exam performance by first-time test takers for various engineering topics is summarized in Figures 2, 3, and 4. The uncertainty ranges are relatively large given the small number of students taking the exam, and the trend is skewed by the one high-performing student who took the exam in Spring 2015. Nevertheless, during the Fall 2015 and Spring 2016 testing periods, USU EnvE students performed at or above the national average on all engineering topics (including the uncertainty range) except for the water resources section in Spring 2016. Overall, the fact that nearly all EnvE students continue to pass the FE exam is a strong, independent, external indicator for meeting Student Outcomes e and f. It is also a strong indication of a good foundation for life-long (independent) learning skills.

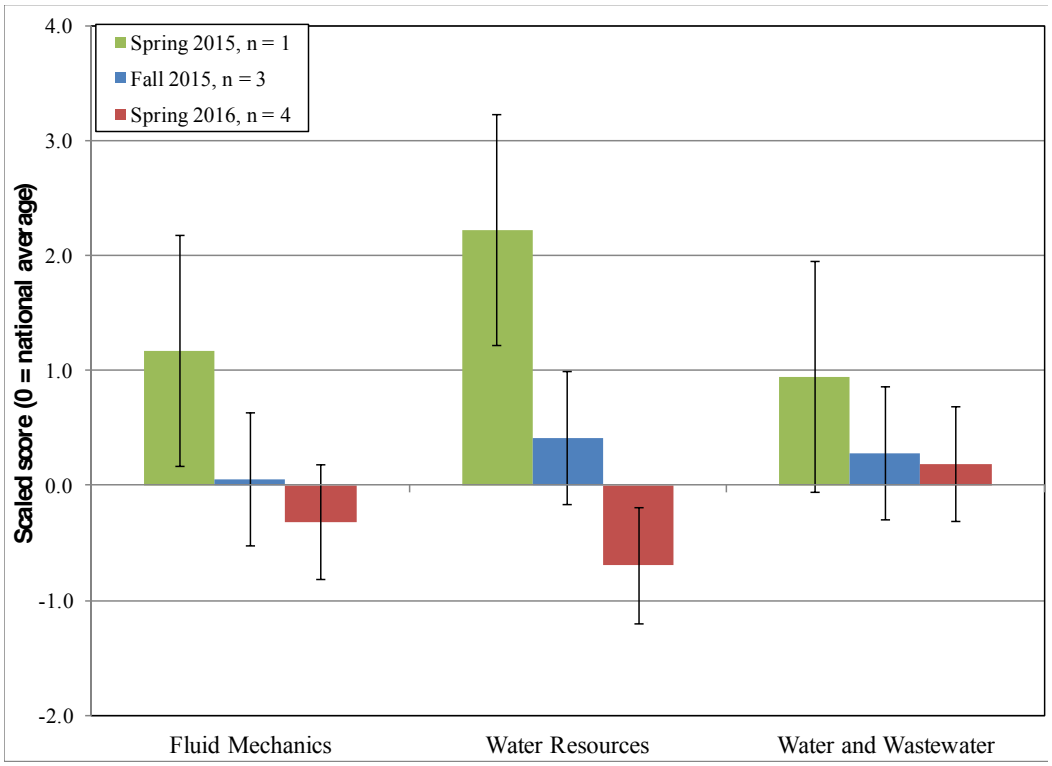


Figure 2: Scaled Fe Exam results (fluid mechanics, water resources, and water/wastewater). Error bars represent uncertainty range for scaled scores.

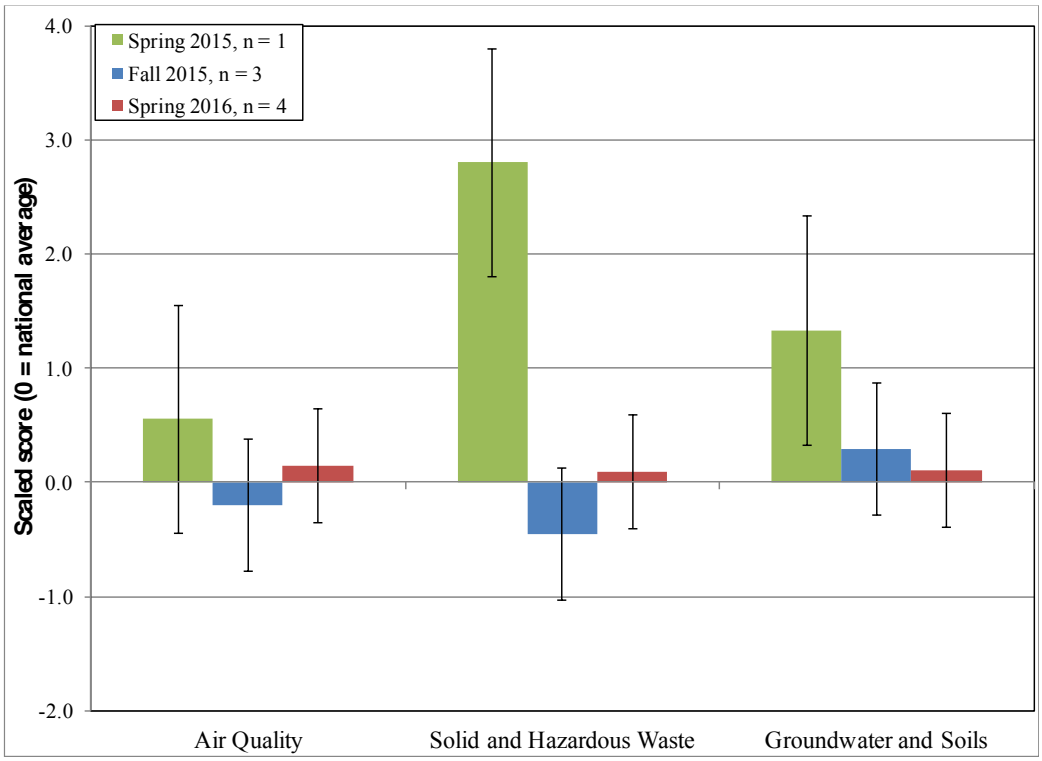


Figure 3: Scaled Fe Exam results (air quality, solid/hazardous waste, groundwater/soils). Error bars represent uncertainty range for scaled scores.

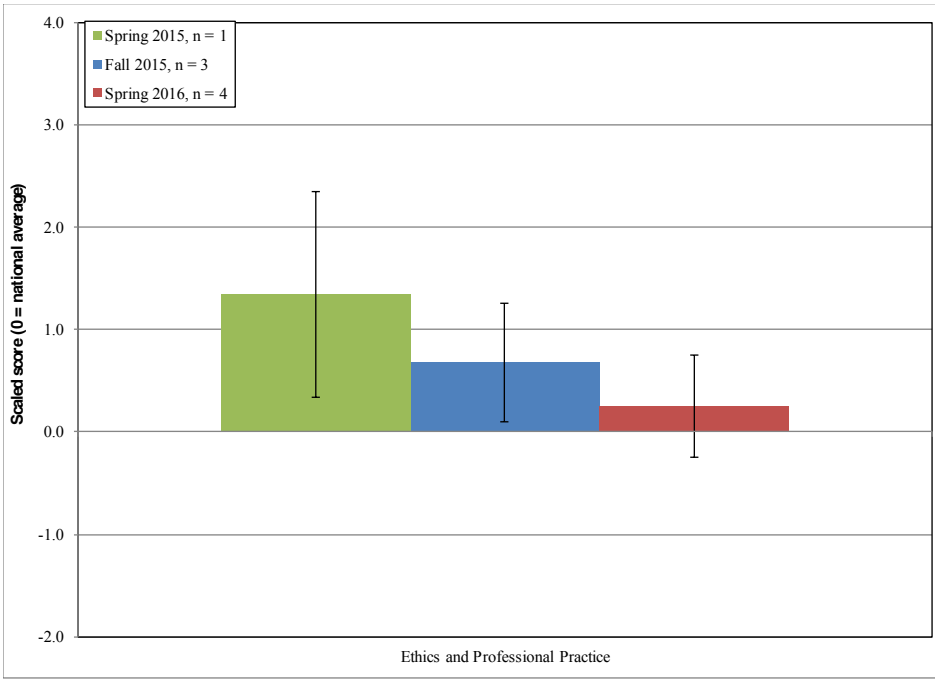


Figure 4: Scaled Fe Exam results (ethics and professional practice). Error bars represent uncertainty range for scaled scores.

Senior exit interview: Graduating seniors complete an anonymous online exit interview to provide feedback about the EnvE program. The performance goal is to have at least 80% of the students rating their attainment as "fully met" (2) or "partly met" (1), which was achieved with 83% of students rating Outcome e as "fully met" and 17% as "partly met" for a total of 100% for all three outcomes (Figure 5). Acknowledging that this is a subjective self-evaluation, these exit interview results are taken as a general indication that students feel they are meeting the outcome.

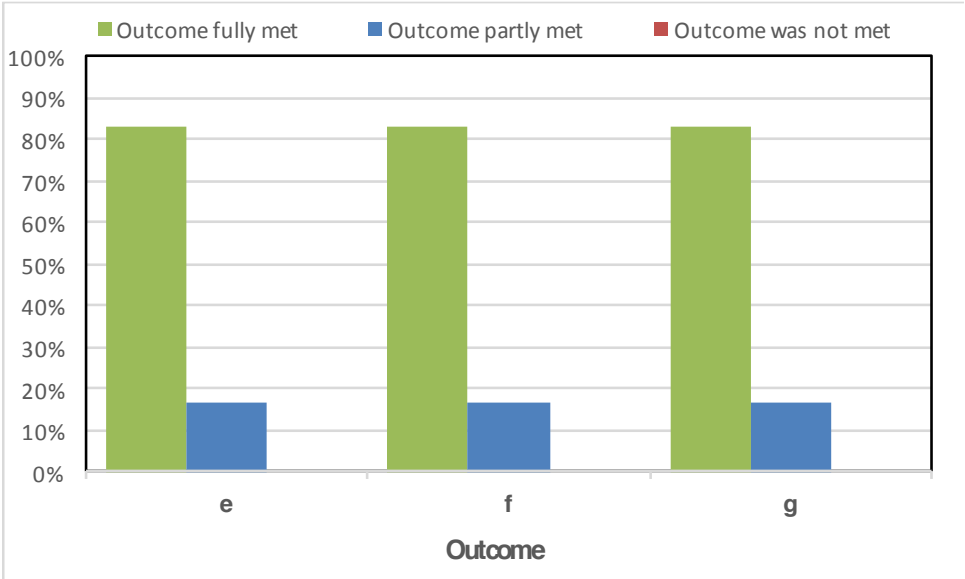
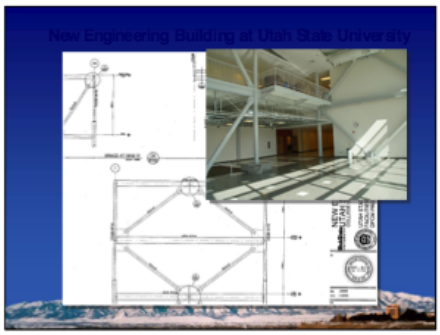


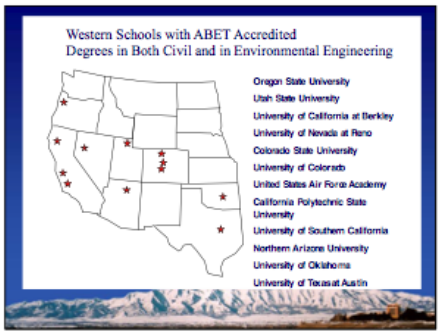
Figure 5: Student exit interview ratings of progress on Outcomes e, f, and g

Summary: The CEE Assessment Committee met in January and May 2016 and evaluated all of the assessment data presented herein.
The evaluation of student work, FE Exam results, and senior exit interviews indicates that Outcomes e, f, and g are being met.

Recommendations
Evaluate Outcomes e, f, and g as planned during the 2018-19 school year. Monitor performance on the Water Resources section of the FE Exam and adjust curriculum if necessary.

Appendix A
Slides from CEE 1880
(introducing freshmen students to ABET PEOs and outcomes)





ABET

ABET is a nonprofit, non-governmental organization that accredits college and university programs in the disciplines of applied science, computing, engineering, and engineering technology. ABET accredits over 3,300 programs at more than 680 colleges and universities in 24 countries. ABET provides specialized, programmatic accreditation that evaluates an individual program of study, rather than evaluating an institution as a whole.

ABET accreditation, which is voluntary and achieved through a peer review process, provides assurance that a college or university program meets the quality standards established by the profession for which the program prepares its students.
ABET is recognized by the Council for Higher Education Accreditation (CHEA).

Utah State University Mission Statement

The mission of Utah State University is to be one of the nation's premier student-centered land grant and space-grant universities by fostering the principle that academics come first, by cultivating diversity of thought and culture, and by serving the public through learning, discovery, and engagement.

College of Engineering Mission Statement

The mission of the USU College of Engineering is to foster a diverse and creative learning environment that will empower students and faculty with the necessary knowledge and facilities to be international leaders in creating new technologies and services that will improve

Program Educational Objectives

Program educational objectives (PEOs) are broad statements that describe what graduates are expected to attain within five years of graduation.

The PEOs for the Civil Engineering Program are that within five years of graduation:

PEO 1: Graduates will be successfully employed in civil engineering or related careers and will become independent thinkers and effective communicators, team members, and decision makers.

PEO 2: Graduates will incorporate economic, environmental, social, ethical, and sustainability considerations into the practice of civil engineering and will promote public health and safety.

PEO 3: Graduates will engage in life-long learning by pursuing advanced degrees or additional educational opportunities through coursework, professional conferences and training, or participation in professional societies.

PEO 4: Graduates will pursue professional licensure or other appropriate certifications.

Program Educational Objectives

Program educational objectives (PEOs) are broad statements that describe what graduates are expected to attain within five years of graduation.

The PEOs for the Environmental Engineering Program are that within five years of graduation:

PEO 1: Graduates will be successfully employed in environmental engineering or related careers and will become independent thinkers and effective communicators, team members, and decision makers.

PEO 2: Graduates will incorporate economic, environmental, social, ethical, and sustainability considerations into the practice of civil engineering and will promote public health and safety.

PEO 3: Graduates will engage in life-long learning by pursuing advanced degrees or additional educational opportunities through coursework, professional conferences and training, or participation in professional societies.

PEO 4: Graduates will pursue professional licensure or other appropriate certifications.

Student Outcomes

The Civil Engineering and Environmental Engineering Programs use 11 student outcomes to prepare graduates of the programs to attain the program educational objectives. By the time of graduation, students will have:

(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

(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

(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, skills, and modern engineering tools necessary for engineering practice.

ABET Accreditation at Utah State University leads to proficiency in at least 4 areas of Civil and Environmental Engineering

- Structural Engineering
- Geotechnical Engineering
- Hydraulics and Fluid Mechanics
- Water Resources
- Transportation Engineering
- Environmental Engineering

Most USU graduates will achieve proficiency in 5 to 6 areas

Code of Ethics (from ASCE)

Fundamental Principles

Engineers uphold and advance the integrity, honor and dignity of the engineering profession by:

- using their knowledge and skill for the enhancement of human welfare and the environment;
- being honest and impartial and serving with fidelity the public, their employers and clients;
- striving to increase the competence and prestige of the engineering profession; and
- supporting the professional and technical societies of their disciplines.

Fundamental Canons (from ASCE)

- Engineers shall hold paramount the safety, health and welfare of the public and shall strive to comply with the principles of sustainable development3 in the performance of their professional duties.
- Engineers shall perform services only in areas of their competence.
- Engineers shall issue public statements only in an objective and truthful manner.
- Engineers shall act in professional matters for each employer or client as faithful agents or trustees, and shall avoid conflicts of interest.
- Engineers shall build their professional reputation on the merit of their services and shall not compete unfairly with others.
- Engineers shall act in such a manner as to uphold and enhance the honor, integrity, and dignity of the engineering profession.
- Engineers shall continue their professional development throughout their careers, and shall provide opportunities for the professional development of those engineers under their supervision.

And after graduation, becoming a Licensed Professional Engineer

Graduation with a Bachelors of Science in Civil and / or Environmental Engineering from an **ABET accredited degree program**

↓

FE (Fundamentals of Engineering) exam

↓

Experience working for a licensed engineer

↓

PE exam (Professional Engineer) Given by the state where you will practice

↓

Licensed Professional Civil Engineer

Note: non-ABET related items have been removed from these minutes

Appendix B
Minutes of the CEE Advisory Board Meeting Nov 3, 2015

- **Laurie McNeill-ABET**
  - Process:
    - Fall 2013-Spring 2014:self-study report
    - Submitted and had a site visit in Sept 2014 by program evaluators
    - January 2015 received draft report from evaluators
    - Feb 2015 and May 2015 CEE submitted responses to the draft report
  - Did we pass?
    - YES!
    - Accredit to September 20, 2021
      - Maximum time period offered by ABET
  - Deficiency: criterion, policy, procedure is not satisfied
  - Weakness: program lacks the strength of compliance with a criterion, policy, or procedure to ensure the quality of the program will not be compromised
  - Concern: program currently satisfies a criterion policy, or procedure
    - Continuous improvement: the program must regularly use appropriate, documented processes for assessing and evaluation the extent to which student outcomes are being attained
    - We received a concern in each area, and are working to improve everything we can
  - Student coursework, FE exam results
    - We can pick out how well or poor students do in certain areas of the exam
    - Student exit interviews
  - Outcome F
    - Understanding of professional and ethical responsibility
    - We now have guest speakers attend classes and give real life examples of ethics, etc
  - Outcome B
    - Ability to design and conduct experiments, as well as analyze and interpret data
    - Marc Maguire is addressing this in his class
  - To do list
  - Keep assessing one outcome in e,f,g categories
  - Keep implementing structural design
  - Program educational objectives
    - Are these still things we should be expecting from our students?

        - Email feedback
- Abet wants the advisory board to make sure we are all on the same page
    - Allow to take PE exam early
    - Can we track who's graduated, and is professional?
        - Alumni survey
        - How many pass the PE, but not individual identifiers
- How is PEO 1 tracked?
    - We aren't required to formally track them
    - Do we want to track these officially?
- PEO 2
    - Report issued annually
    - Depending on if you have a sustainability program in place, it benefits individual businesses
- Oral communication is extremely important, and people don't do this anymore
    - Don't be shy about selling yourself!
        - It's your opportunity to show what you're able to do
    - Give them the opportunity to interact with other people face to face

Note: non-ABET related items have been removed from these minutes

Appendix C
CEE Annual Faculty/Staff Retreat Minutes
August 19, 2015

ABET evaluation: Laurie

- Did we pass?
    - We don't know…
    - Handout
    - There is no formal process to evaluate PEOs, but no comments from faculty now
    - Breaking up A-K
- Student course work:
    - Rating scale: 0-2
    - Performance goals
    - Student outcome
        - Outcome B
        - Not necessarily worried
            - Wording out outcome is design and conducted experiments
                - We didn't have them design experiments
                - "how would you collect the data"?
                - New thing that we're continuing to implement
        - FE Exam
            - Goal 100% pass rate
            - Wanting to be above national average
            - 93% last year
            - Probability and statistics is below zero
                - Maybe because we no longer offer 3030?
            - Otherwise above or at zero axis
            - Water, transportations, surveying divisions are above average
        - Senior exit interviews
            - Response rate has improved
            - Online survey has helped
            - 80% met or partly met goal
            - Indication of their self-assessment is positive!
- To do
    - Outcomes E,F,G in all UG classes, each time taught
    - Keep implementing experimental design activities
- In the doghouse:
    - Jim Bay
    - Gilberto Urroz

Appendix D
Detailed Evaluation for Outcomes e, f, and g

See following pages

Environmental Engineering
ABET Outcome Summary
2015-2016

Outcome e: an ability to identify, formulate, and solve engineering problems

Student Course Work Assessment

Student work is rated on a 0 – 1 – 2 scale:

0 = student did not understand the fundamental principle or component
1 = student applied some but not all of the fundamental principles in their solution
2 = student applied the correct fundamental principles in their solution

The EnvE program has two goals for student performance for student course work assessment:

Goal 1: a minimum of 70% of the students will perform at a 2 level
Goal 2: a minimum of 80% of the students will perform at the 1 or 2 level.

This outcome was assessed in ten classes, ranging from 2000-level sophomore courses to 5000-level upper-division classes, using 426 samples of student work including homework, quizzes, a group project, and exams (see Table E-1 on the next page). Student performance met both goals, with 84% of students rating a 2 and 94% rating a 1 or 2 (Figure E-1).

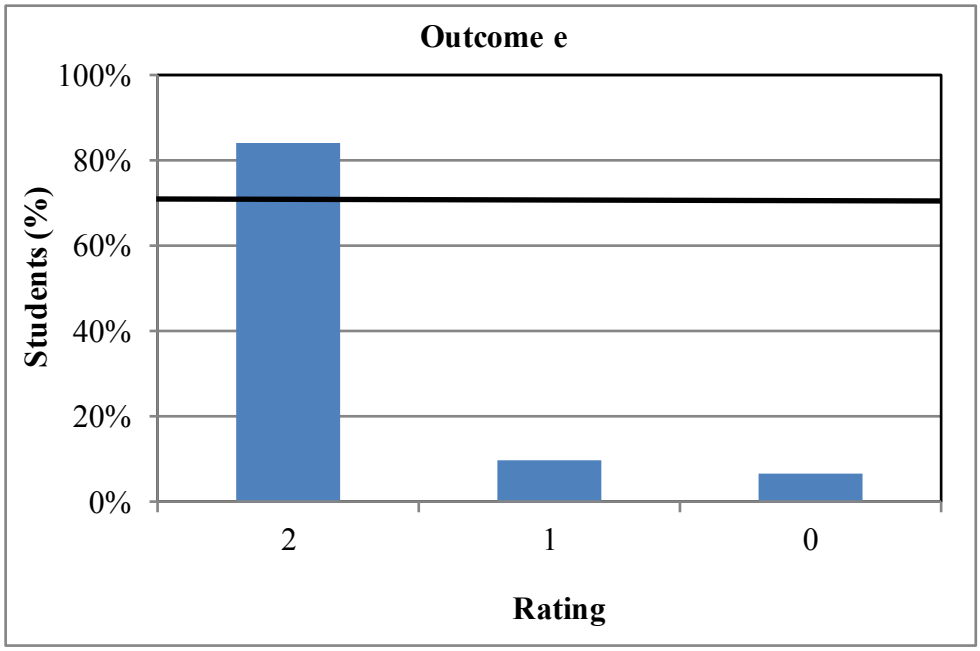


Figure E-1: Summary of ratings of student work on Outcome e

Table E-1: List of student work assessed for Outcome e

Class		Name	Instructor	Term	Enrol.	Method	Description	2	1	0
CEE	2870	Intro to Programming	Urroz	F2015	97	HW	calc discharge and velocity in pipeline	98%	0%	2%
CEE	3430	Engineering Hydrology	Tarboton	Sp2016	73	HW	design det basin for flash flooding	70%	20%	11%
CEE	3510	Hydraulics	Urroz	Sp2016	69	HW	rating curve for irregular x-section open channel	78%	10%	12%
CEE	3610	Environmental Management	McNeill	F2014	67	HW	risk analysis - cancer risk from chem exp	85%	6%	9%
CEE	3610	Environmental Management	McNeill	F2015	72	HW	calc oxygen demand from organic sample	89%	7%	4%
CEE	3640	Water and Wastewater Trt	McNeill	Sp2016	21	HW	design filter, adsorption, ion exchange	86%	10%	5%
CEE	3640	Water and Wastewater Trt	Dupont	Sp2016	21	group project	design wastewater system for local town	62%	38%	0%
CEE	3670	Transport Phenomena	Neilson	Sp2016	10	HW	energy balance for heat transfer problem	89%	11%	0%
CEE	5430	Groundwater Engineering	Kaluarachichi	F2015	6	exam	well hydraulics in groundwater eng	67%	33%	0%
CEE	5730	Analysis/fate Org Contam	Doucette	F2015	1	quiz	partitioning between air/water/sediment	100%	0%	0%

FE Exam Results

Our goal is to have 100% pass rate on the FE exam; our minimum acceptable level of performance is a pass rate at or above the national average. Table E-2 summarizes the FE results for the past six years, including the percentage of students who had passed the FE exam by the time of graduation. The USU EnvE pass rate has been either 100% or comparable to the national average (considering the small number of USU EnvE graduates).

Table E-2: EnvE Graduates Passing FE Exam vs. National Annual Pass Rate

	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
USU EnvE graduates	6	10	4	5	2	9
USU EnvE pass rate at graduation	100%	80%	100%	100%	100%	89%
National EnvE pass rate	85%	83%	88%	84%	77%	76%

FE Exam performance by first-time test takers for various engineering topics is summarized in Figures E-2 and E-3. The uncertainty ranges are relatively large given the small number of students taking the exam, and the trend is skewed by the one high-performing student who took the exam in Spring 2015. Nevertheless, during the Fall 2015 and Spring 2016 testing periods, USU EnvE students performed at or above the national average on all engineering topics (including the uncertainty range) except for the water resources section in Spring 2016. Overall, the fact that nearly all EnvE students continue to pass the FE exam is a strong, independent, external indicator for meeting Student Outcome e. It is also a strong indication of a good foundation for life-long (independent) learning skills.

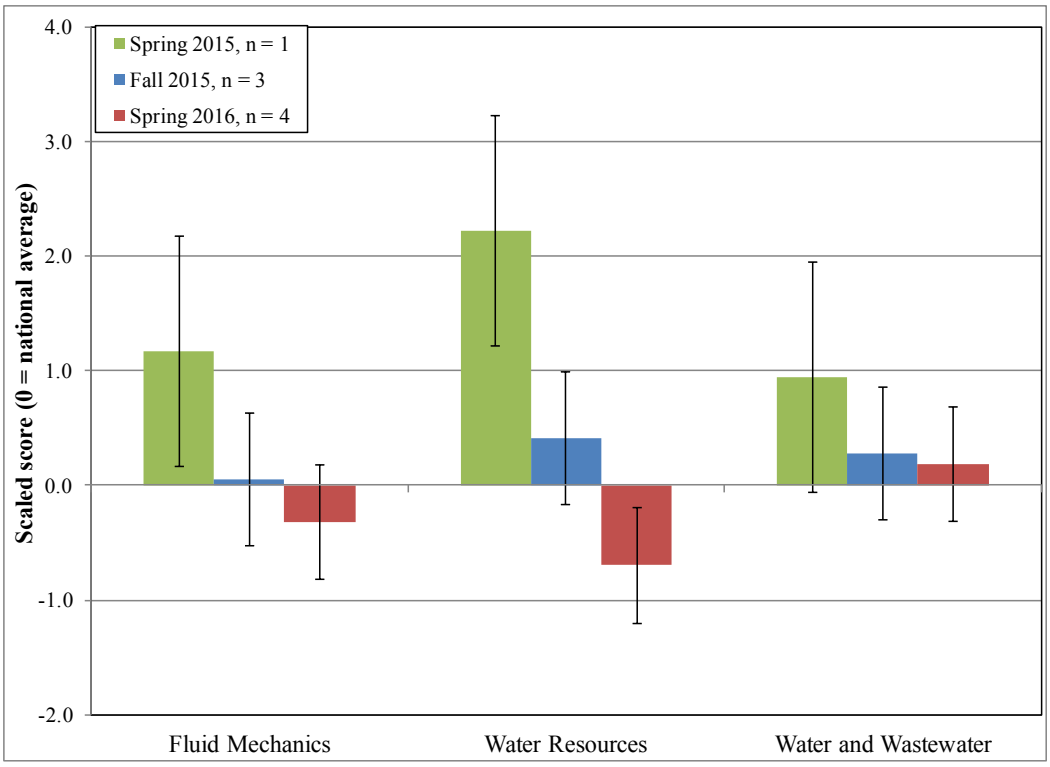


Figure E-2: Scaled Fe Exam results (fluid mechanics, water resources, and water/wastewater). Error bars represent uncertainty range for scaled scores.

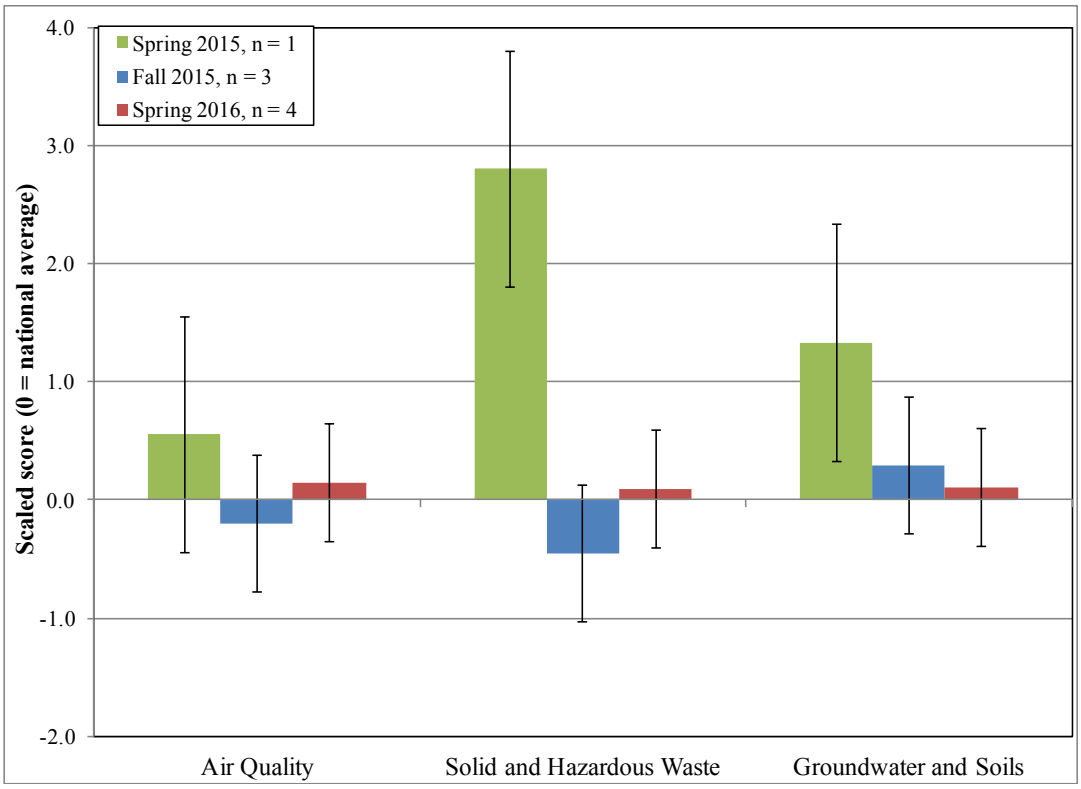


Figure E-3: Scaled Fe Exam results (air quality, solid/hazardous waste, groundwater/soils). Error bars represent uncertainty range for scaled scores.

Senior Exit Interviews

Graduating seniors complete an anonymous online exit interview to provide feedback about the EnvE program. The performance goal is to have at least 80% of the students rating their attainment as "met (2)" or "partly met (1)", which was achieved with 83% of students rating Outcome e as "met" and 17% as "partly met" for a total of 100% (Figure E-4). Acknowledging that this is a subjective self-evaluation, these exit interview results are taken as a general indication that students feel they are meeting the outcome.

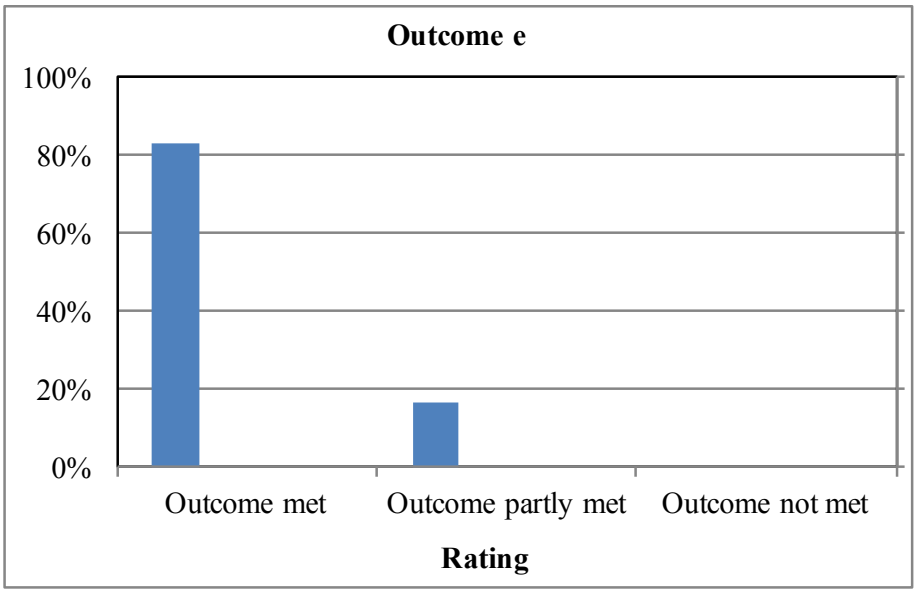


Figure E-4: Student exit interview ratings of progress on Outcome e

Summary

The evaluation of student work, FE Exam results, and senior exit interviews indicates that Outcome e is being met.

Recommendations

Evaluate Outcome e as planned during the 2018-19 school year. Monitor performance on the Water Resources section of the FE Exam and adjust curriculum if necessary.

Environmental Engineering
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Outcome f: an understanding of professional and ethical responsibility

Student Course Work Assessment

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The EnvE program has two goals for student performance for student course work assessment:

Goal 1: a minimum of 70% of the students will perform at a 2 level
Goal 2: a minimum of 80% of the students will perform at the 1 or 2 level.

Student attainment was assessed in seven classes through a group writing assignment on the ethics associated with an engineering failure, an essay about ethics, homework, and quizzes (322 samples of student work; see Table F-1 on the next page). Results indicate that both performance goals were met (Figure F-1).

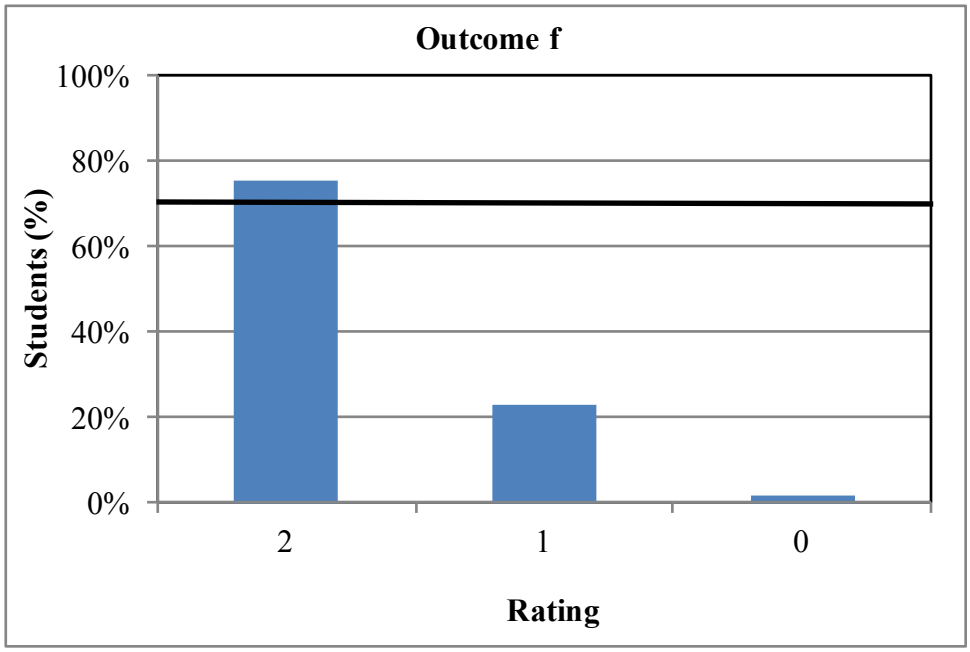

Figure F-1: Summary of ratings of student work on Outcome f

Table F-1: List of student work assessed for Outcome f

Class		Name	Instructor	Term	Enrol.	Method	Description	2	1	0
CEE	1880	CEE Orientation	Rahmeyer	F2015	73	group report	summarize ethics of an eng failure	39%	61%	0%
CEE	1880	CEE Orientation	Rahmeyer	Sp2016	60	group report	summarize ethics of an eng failure	68%	32%	0%
CEE	2890	Sophomore Seminar	Stevens	Sp2016	13	quiz	quiz on ethics	91%	9%	0%
CEE	3610	Environmental Management	McNeill	F2015	72	quiz	quiz on code of ethics	94%	0%	6%
CEE	3640	Water and Wastewater Trt	McNeill	Sp2016	21	essay HW	ethical issues in Flint, MI drinking water	100%	0%	0%
CEE	3780	Solid and Haz Waste Mgmt	Dupont	F2015	43	HW	essay on LEED design agreement	76%	21%	2%

FE Exam Results

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National EnvE pass rate	85%	83%	88%	84%	77%	76%

FE Exam performance by first-time test takers on the ethics and professional practice section is summarized in Figure F-2. The uncertainty ranges are relatively large given the small number of students taking the exam, and the trend is skewed by the one high-performing student who took the exam in Spring 2015. Nevertheless, students performed at or above the national average, considering the uncertainty range (error bars). Overall, the fact that nearly all EnvE students continue to pass the FE exam is a strong independent external indicator for meeting Student Outcome f. It is also a strong indication of a good foundation for life-long (independent) learning skills.

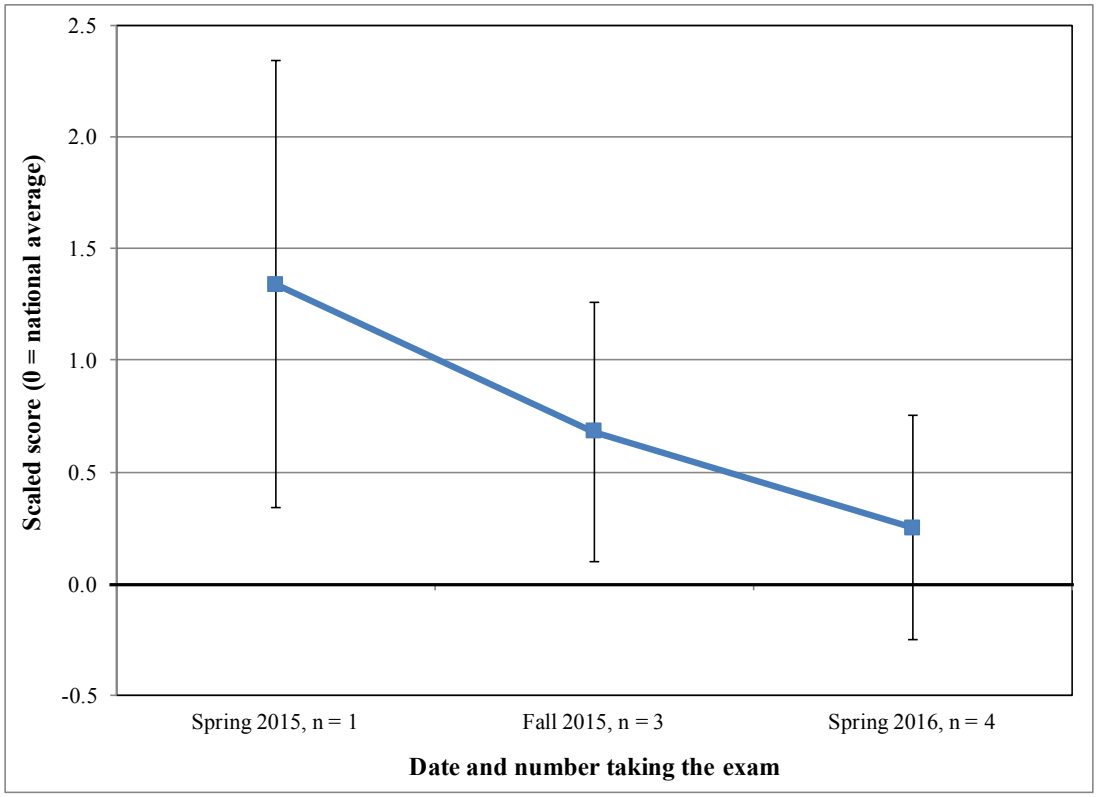

Figure F-2: Scaled Fe Exam results for ethics and professional practice. Error bars represent uncertainty range for scaled scores.

Senior Exit Interviews

Graduating seniors complete an anonymous online exit interview to provide feedback about the EnvE program. The performance goal is to have at least 80% of the students rating their attainment as "met (2)" or "partly met (1)", which was achieved with 83% of students rating Outcome e as "met" and 17% as "partly met" for a total of 100% (Figure F-3). Acknowledging that this is a subjective self-evaluation, these exit interview results are taken as a general indication that students feel they are meeting the outcome.

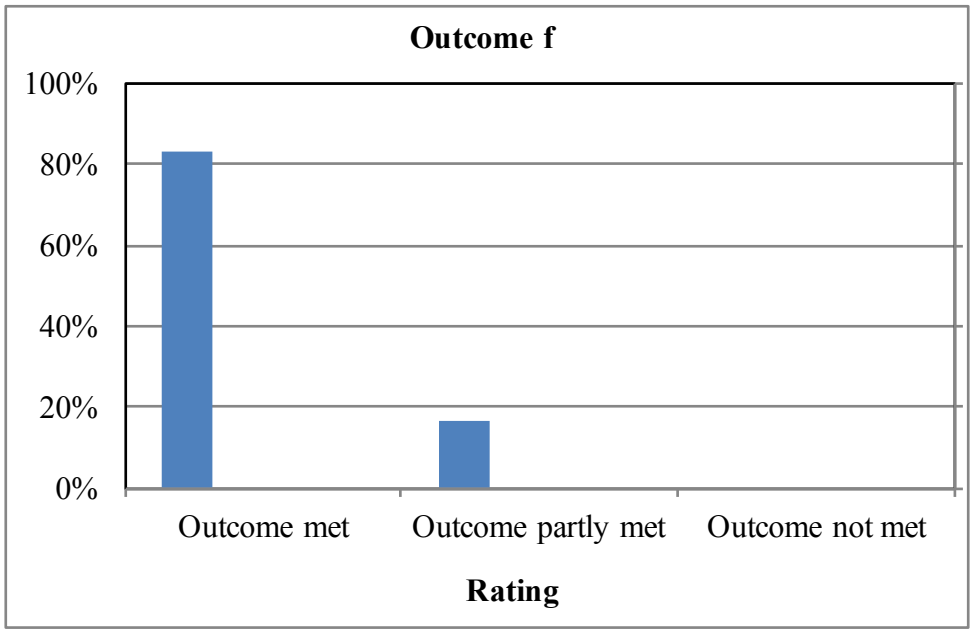

Figure F-3: Student exit interview ratings of progress on Outcome f

Summary

The evaluation of student work, FE Exam results, and senior exit interviews indicates that Outcome f is being met.

Recommendations

Evaluate Outcome f as planned during the 2018-2019 school year.

Environmental Engineering
ABET Outcome Summary
2015-2016

Outcome g: an ability to communicate effectively

Student Course Work Assessment

Student work is rated on a 0 – 1 – 2 scale:

0 = student did not understand the fundamental principle or component
1 = student applied some but not all of the fundamental principles in their solution
2 = student applied the correct fundamental principles in their solution

The EnvE program has two goals for student performance for student course work assessment:

Goal 1: a minimum of 70% of the students will perform at a 2 level
Goal 2: a minimum of 80% of the students will perform at the 1 or 2 level.

Written and oral communication skills are emphasized throughout the curriculum, starting with the freshman orientation seminar (CEE 1880) and continuing into upper-division classes and the capstone design sequence. Outcome g was assessed in 17 different classes, with 517 samples of student work (see Table G-1 on the next page). Student performance is satisfactory and meets both Goal 1 and Goal 2 (Figure G-1). We note, however, that students in the junior/senior design sequence only rated a 1 on their capstone design reports and presentations. The faculty mentors will work with future teams to improve these projects to a 2 rating.

Since Spring 2014, students in the EnvE program have been taking a new college-specific course, ENGR 3080 – Technical Communication, which replaced the broader ENGL 3080 class. The consensus from students and faculty is that the ENGR 3080 class is a great success and is improving communication skills.

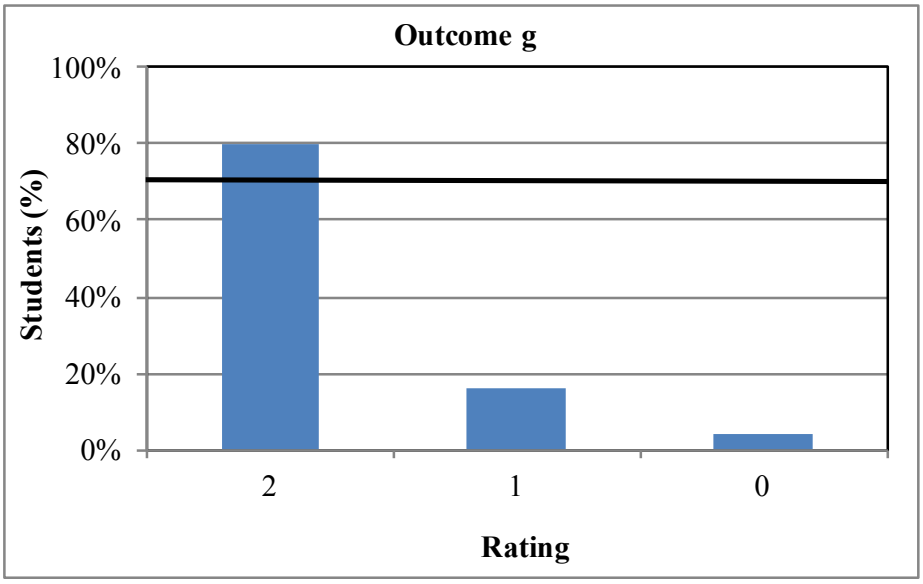

Figure G-1: Summary of ratings of student work on Outcome g

Table G-1: List of student work assessed for Outcome g

Class		Name	Instructor	Term	Enrol.	Method	Description	2	1	0
CEE	1880	CEE Orientation	Rahmeyer	F2014	62	group project	written report	79%	19%	2%
CEE	1880	CEE Orientation	Rahmeyer	F2014	62	group project	powerpoint slides	92%	6%	2%
CEE	1880	CEE Orientation	Rahmeyer	F2014	62	group project	oral presentation	85%	11%	3%
CEE	3610	Environmental Management	McNeill	F2014	67	essay HW	summarize EIS - language mechanics	88%	0%	12%
CEE	3610	Environmental Management	McNeill	F2015	72	essay HW	summarize EIS - language mechanics	81%	15%	4%
CEE	3640	Water and Wastewater Trt	McNeill	Sp2016	21	essay HW	ethical issues in Flint, MI drinking water	76%	24%	0%
CEE	3640	Water and Wastewater Trt	McNeill	Sp2016	21	group project	water master plan for local community	57%	43%	0%
CEE	3640	Water and Wastewater Trt	Dupont	Sp2016	21	group project	wastewater design for local community	52%	38%	10%
CEE	3780	Solid and Haz Waste Mgmt	Dupont	F2015	43	group project	oral presentation	100%	0%	0%
CEE	3780	Solid and Haz Waste Mgmt	Dupont	F2015	43	group project	written report	69%	19%	12%
CEE	3880	CEE Design I - EnvE	Peralta	Sp2016	9	group project	written report	0%	100%	0%
CEE	4870	CEE Design II - EnvE	Peralta	F2015	4	group report	oral presentation	0%	100%	0%
CEE	4880	CEE Design III - EnvE	Peralta	Sp2016	4	group report	written report	0%	100%	0%
CEE	5610	Env Quality Analysis	McLean	F2015	6	lab exercise	written report on DO	100%	0%	0%
CEE	5610	Env Quality Analysis	McLean	F2015	6	lab exercise	written report on hardness	100%	0%	0%
CEE	5635	Env Eng in Devel Countries	Adams	F2015	4	oral presentation	disease/health issue in developing world	75%	25%	0%

FE Exam Results

Not applicable to this outcome.

Senior Exit Interviews

Graduating seniors complete an anonymous online exit interview to provide feedback about the EnvE program. The performance goal is to have at least 80% of the students rating their attainment as "met (2)" or "partly met (1)", which was achieved with 83% of students rating Outcome g as "met" and 17% as "partly met" for a total of 100% (Figure G-2). Acknowledging that this is a subjective self-evaluation, these exit interview results are taken as a general indication that students feel they are meeting the outcome.

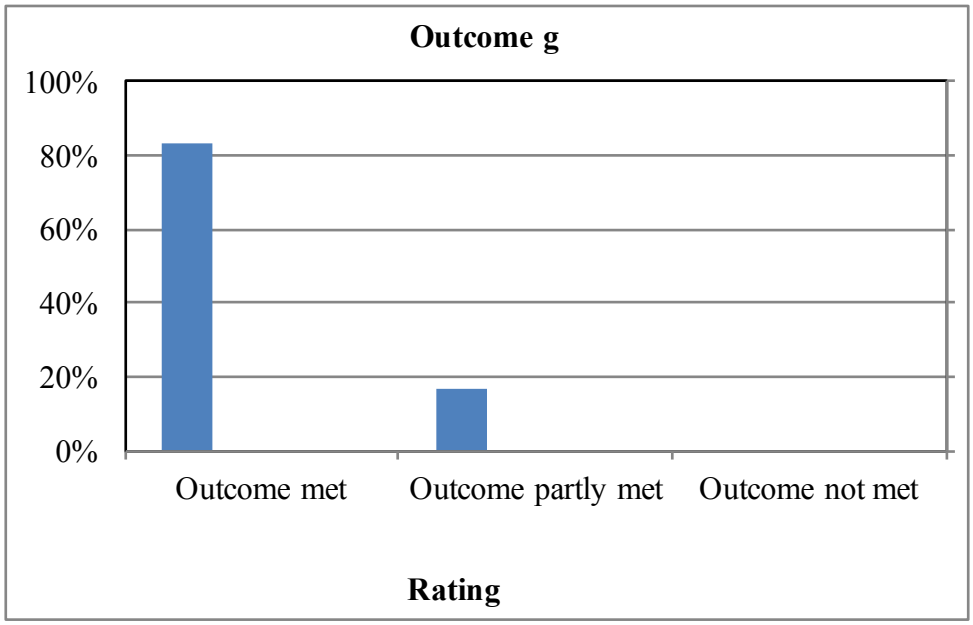

Figure G-2: Student exit interview ratings of progress on Outcome g

Summary

The evaluation of student work and senior exit interviews indicates that Outcome g is being met.

Recommendations

Evaluate Outcome g as planned during the 2018-19 school year.