

Continuous Improvement of the Civil Engineering Program

The Civil Engineering Program is assessed on a continuous basis to ensure that students are meeting the following Student Outcomes (SOs), which support the Program Educational Objectives (PEOs).

Attainment of these outcomes prepares graduates to enter the professional practice of civil engineering.

At the time of graduation, CE students will have:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. An ability to communicate effectively with a range of audiences
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

CE Program Assessment Schedule (2016-2022)

Student Outcomes		16-17		17-18		18-19		19-20		20-21		21-22					
		F 16	S 17	F 17	S 18	F 18	S 19	F 19	S 20	F 20	S 21	F 21	S 22				
1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.				CEE361 Archilla CEE355 Jiang FE Ooi				CEE361 Archilla CEE355 Jiang FE Ooi		CEE 490 Chen						
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.				CEE 462 Zhang CEE 490 Babcock	CEE485 Robertson		CEE485 Robertson	CEE490 Babcock CEE464 Chen								
3	An ability to communicate effectively with a range of audiences.				CEE 490 Babcock	CEE 444 Prevedouros		CEE 375 Shen	CEE 444 Prevedouros CEE 490 Babcock								
4	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.				FE Ooi	CEE 489C Babcock		CEE489C Babcock	FE Ooi								
5	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.				CEE490 Babcock	CEE444 Prevedouros			CEE 444 Prevedouros CEE490 Babcock								
6	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.				CEE320 Francis	CEE375 Shen CEE 330 Yan		CEE375 Shen CEE330 Yan	CEE320 J. Lee								
7	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.				CEE421 Bateni CEE 462 Zhang				CEE421 Bateni CEE 464 Chen								
Meaning of the coloring of cells:				New ABET outcomes not available.		Assess/Evaluate		Change		Assess/Evaluate		Change		ABET Visit		Review ABET Report and Update Assessment Procedures	

Scorecards for Student Outcomes 1 through 7

Scorecard used for student outcome 1.

An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics				
	<u>Unsatisfactory</u> 1	<u>Developing</u> 2	<u>Acceptable</u> 3	<u>Good</u> 4
Performance Criteria CONCEPT 1: Problem identification and formulation				
Problem identification and formulation.	Cannot identify or formulate problem correctly.	Major errors in problem formulation that lead to unsafe solution.	Minor errors in problem formulation that do not result in unsafe solution.	Correctly formulates and identifies problem.
CONCEPT 2: Solve engineering problems				
Analyze and solve complex engineering problems applying principles of engineering, science, and mathematics.	Incorrect problem analysis leading to incorrect solution.	Major errors in analysis and/or solution of problems leading to unsafe design.	Minor errors in analysis and/or solution of problems resulting in uneconomical but safe design.	Correct analysis and solution arriving at safe, economical design.
CONCEPT 3: Knowledge of mathematics				
Uses appropriate mathematics to formulate and solve engineering problems	Formulation is riddled with mistakes, unable to solve problems, or uses inappropriate mathematics	Formulates and solves using somewhat appropriate mathematics but with numerous errors	Formulates and solves using mostly appropriate mathematics with few mistakes	Correctly formulates and solves engineering problems using appropriate mathematics without mistakes

Scorecard used for student outcome 3.

An ability to communicate effectively with a range of audiences				
	<u>Unsatisfactory</u> 1	<u>Developing</u> 2	<u>Acceptable</u> 3	<u>Good</u> 4
Performance Criteria CONCEPT 1: Contributes to group discussions/presentations				
Can express opinions effectively	Has no opinions or does not share them intelligibly	Attempts to express opinions, but they are not relevant	Expresses opinions such that others are interested and respond	Convincingly expresses opinions
Can make effective technical presentations	Presentation is unorganized, not well-planned, or inappropriate for the audience	Presentation is reasonably well-organized, but the oral presentation is poor or inappropriate for the audience	Presentation is well-organized and planned, and oral presentation is acceptable, and appropriate for the audience	Presentation is well-organized and planned, and oral presentation is good and appropriate for the audience
CONCEPT 2: Values other viewpoints				
Listens to and respects other viewpoints	Does not listen to others or dismisses their views	Listens to others, but has difficulty recognizing value of alternative views	Listens to others and values their views	Encourages others to express their views so as to enrich the discussion
CONCEPT 3: Speaks effectively				
Speaks clearly and engages the audience	Speaks unintelligibly and/or avoids any eye contact	Speaks relatively clearly with some eye contact, but does not engage the audience	Speaks well, good eye contact and attempts to engage the audience	Speaks well, good eye contact, and involves the audience

Scorecard used for student outcome 3 (Continued).

An ability to communicate effectively with a range of audiences				
	<u>Unsatisfactory</u> 1	<u>Developing</u> 2	<u>Acceptable</u> 3	<u>Good</u> 4
Performance Criteria		CONCEPT 4: Writes Effectively		
Grammar and punctuation	Subjects and verbs do not agree, incorrect use of pronouns, sentence fragments and run-ons, , incorrect use of punctuation	Some subjects/verbs do not agree, mixed use of pronouns, some run-on sentences and/or sentence fragments	All subjects/verbs agree, mostly correct use of pronouns, mostly no run on or sentence fragments, all punctuation is correct	All subjects/verbs agree, correct use of pronouns, no run-on or sentence fragments, all punctuation is correct
Clarity and composition	Many wordy sentences, all passive verbs, dangling modifiers, repetitive words/ sentences, many misspellings	Some wordy sentences, too many passive verbs, some sentence/word variety, incorrect level of formality, misspellings	Mostly direct sentences, uses active verbs, uses balanced ideas, uses a variety of sentences/ words, no dangling modifiers, correct degree of formality, almost no misspellings	Direct and concise sentences, uses active verbs, no dangling modifiers, uses balanced parallel ideas, uses appropriate voice, no misspellings
Content and style	Does not fully respond to the assignment, disorganized, few facts or evidence, lack of detail, non-analytical, incomplete thoughts/descriptions, only uses basic ideas, includes clichés	Fairly responsive, some evidence of organization of ideas, some correct facts and evidence, somewhat thoughtful or reflective, incorrect use of terminology/jargon/clichés	Responsive to assignment, mostly organized ideas/arguments, good use of facts and evidence and details, fairly thorough/ analytical, at least somewhat thoughtful/ reflective, correct use of terminology/jargon, no clichés	Fully responsive to question, uses organized arguments, correct use of facts/evidence, provides details, thoughtful/reflective, thorough, analytical, nuanced, correct use of terminology/jargon, no clichés

Scorecard used for student outcome 4.

An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts				
	<u>Unsatisfactory</u> 1	<u>Developing</u> 2	<u>Acceptable</u> 3	<u>Good</u> 4
Performance Criteria				
CONCEPT 1: Can use code of ethics				
Use of ASCE code to guide decisions	Does not correctly reference sections of the ASCE Code of Ethics in an ethics case study	Cites applicable sections of the ASCE Code, but may not correctly use in decision process	Correctly cites applicable sections of the ASCE Code and explains how they guide the decision/choice	Correctly cites several applicable sections of the ASCE Code for each specific dilemma/decision and explains the meaning/implications
CONCEPT 2: Understands complexity of ethics				
Recognizing ethical issues	Realizes something is not “right” but not able to correctly identify professional/ethical issues at play. Sees mostly “black & white”	Can identify what is legal/illegal, acceptable by the ASCE Code, acceptable to an employer, but not clear on ethics in “gray” areas.	Is able to clearly identify/name the inherent ethical choices and implications involved in various engineering decisions	Clearly identifies the inherent ethical choices and implications involved in various engineering decisions. Understands the effects of perspective, context, and personal views, codes, and laws
CONCEPT 3: Making ethical decisions				
Using ethical decision-making framework	Shows little evidence of use of a systematic decision-making framework.	Is able to recognize ethical issues, determine alternatives, and make a decision without reflecting deeply or considering multiple perspectives.	Uses a logical, systematic decision process. Recognizes issues, states facts, evaluates alternatives from different perspectives, is able to make a decision.	Uses a logical, systematic decision process. Identifies each step, provides reflective data, evaluates alternatives from different perspectives, is able to defend decision.

Scorecard used for student outcome 5.

An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives				
	<u>Unsatisfactory</u> 1	<u>Developing</u> 2	<u>Acceptable</u> 3	<u>Good</u> 4
Performance Criteria				
CONCEPT 1: Makes contributions				
Information gathering, calculations, presentations, reports	Gathered some information, performed few calculations, worked on presentations and reports inconsistently or very little	Gathered some information, performed some calculations, worked on presentations and reports inconsistently	Gathered information, performed calculations, worked on presentations and reports consistently as assigned	Gathered information, performed calculations, led work on presentations and reports consistently
CONCEPT 2: Takes responsibility				
Reliability, timeliness, attendance, deadlines	Not reliable or timely, misses meetings, misses deadlines	Performs some duties reliably, mostly timely, misses some meetings, meets some deadlines	Performs duties reliably and timely, attends meetings, meets deadlines	Performs all duties reliably and timely, attends all meetings, meets all deadlines, provides leadership
Leadership, acceptance, collaboration, assistance	Rarely takes leader role, generally accepts assignments, has difficulty collaborating, sometimes willing to assist teammates	Occasionally leads, usually accepts assignments, mostly collaborates, generally willing to assist teammates	Shows an ability to lead when necessary, to accept assignments, to collaborate, and is willing to assist teammates	Takes leadership role, accepts all assignments, is a good collaborator, and always willing to assist teammates
CONCEPT 3: Values other viewpoints				
Listens, values other perspectives, compromises	Not a very good listener, may not always see or understand others' points of view, not willing to compromise	Fairly good listening skills, can usually appreciate other perspectives, may not be willing to compromise	Good listening skills, values teammate perspectives and experiences, often willing to compromise to complete tasks	Listens to teammates and values their perspectives, knowledge, and experiences. Always willing to compromise to complete tasks

