



CIVIL ENGINEERING TECHNOLOGY
STUDENT LEARNING OUTCOMES (SLOs) ASSESSMENT PLAN
Updated - May 2022

The student outcomes of the BSCET Program of CSU-Pueblo are adopted the same with the student outcomes ABET Engineering Technology Accreditation Commission. The program adopted five (5) Student Learning Outcomes (SLOs) following the recommendation of ETAC of ABET. They are listed below:

1. 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;
2. ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline;
3. 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. ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes;
5. ability to function effectively as a member as well as a leader on technical teams.

The departmental plans to evaluate three (3) consequent outcomes each year.

The mapping between the Program Educational Objectives and Student Learning Outcomes is shown in Table 1.

Table 1. Mapping between the Program Educational Objectives and Student Learning Outcomes

	1. 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;	2. ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline;	3. 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. ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes;	5. ability to function effectively as a member as well as a leader on technical teams.
Prepared to apply established engineering principles and standards of practice in developing solutions to civil engineering problems	X	X	X	X	
Prepared for successful careers in civil engineering by providing them with the ability to contribute to engineering teams in various practice areas including <ul style="list-style-type: none"> a. civil engineering analysis and design, b. construction planning, operation and management, c. surveying and standard testing d. technical documentation, computer application and e. operations and improvement 	X	X	X	X	X

The five SLOs and the performance indicators to be used in judging the student performance on the student outcomes are listed in **Table 2**.

Table 2. Performance Indicators to be used for Student Learning Outcomes

Student Learning Outcomes	Performance Indicators
1. 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;	<ul style="list-style-type: none"> • Chooses a mathematical model of a system or process appropriate for required accuracy • Applies mathematical principles to achieve analytical or numerical solution to model equations • Examines approaches to solving an engineering technology problem to choose the more effective approach
2. ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline;	<ul style="list-style-type: none"> • Problem statement shows understanding of the problem • Solution procedure and methods are defined. • Problem solution is appropriate and within reasonable constraints
3. 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;	<ul style="list-style-type: none"> • Writing conforms to appropriate technical style • Appropriate usage of graphics • Grammar and editorial aspects • Oral: body language and clarity of speech
4. ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes;	<ul style="list-style-type: none"> • Observes good lab practice and operates instrumentation with ease • Determines data that are appropriate to collect and selects appropriate equipment, protocols, etc. • Uses appropriate tools to analyze data and verifies and validates experimental results including the use of statistics to account for possible experimental error
5. ability to function effectively as a member as well as a leader on technical teams.	<ul style="list-style-type: none"> • Recognize participant roles in a team setting • Integrate input from all team members and makes decision • Improves communications among teammates and ask for feedback

Each outcome has been mapped to the engineering technology courses as depicted in **Table 3**.

Table 3. Mapping courses to the Student Learning Outcomes

Courses \ SLOs	1. 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.	2. ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline;	3. 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. ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes;	5. ability to function effectively as a member as well as a leader on technical teams.
CET 101 Intro to CET	X				
CET 102 Surveying I	X		X	X	X
CET 103 Surveying II	X		X	X	
CET 115 Civil Drafting I	X				
CET 116 Civil Drafting II	X				
CET 202 Statics	X				
CET 206 Strength of Materials	X		X	X	
CET 207 Construction Mat. and Meth.	X				
CET 208 Concrete and Asphalt			X	X	X
CET 222 Dynamics	X	X			
CET 226 Application of Computers	X				
CET 305 Construction Cost Est. II			X		
CET 315 Soil Mechanics Tech.	X	X	X	X	X
CET 316 Structural Analysis	X				
CET 317 Hydraulics	X		X	X	
CET 372 Traffic Analysis and Control	X	X	X	X	
CET 404 Structural Steel Design		X			
CET 405 Reinforced Concrete Design		X			
CET 412 Hydrology		X			
CET 415 Water and Sewer Sys Des		X			
CET 455 Design Seminar		X			X
CET 456 Senior Project		X			X
CET 473 Highway Design		X			

The listed performance indicators will be used in different courses and assignments to measure the achievement of general student outcomes. The performance indicators, their educational strategies, and methods of assessments are listed in **Tables 4a to 4e**.

Table 4a. Relating Performance Indicators with Courses or Assignments to be used for SLO#1. 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

Performance Indicators	Educational Strategies	Method(s) of Assessment
Chooses a mathematical model of a system or process appropriate for required accuracy	CET 101, 102, 103, 115, 116, 202, 206, 207, 222, 226, 315, 316, 317, 372	HW, Quiz, Exam, Final Exam
Applies mathematical principles to achieve analytical or numerical solution to model equations	CET 101, 102, 103, 115, 116, 202, 206, 207, 222, 226, 315, 316, 317, 372	HW, Quiz, Exam, Final Exam
Examines approaches to solving an engineering technology problem to choose the more effective approach	CET 101, 102, 103, 115, 116, 202, 206, 207, 222, 226, 315, 316, 317, 372	HW, Quiz, Exam, Final Exam

Table 4b. Relating Performance Indicators with Courses or Assignments to be used for SLO#2.ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline

Performance Indicators	Educational Strategies	Method(s) of Assessment
Problem statement shows understanding of the problem	CET 315, 372, 404, 405, 412, 415, 455, 456, 473, 475	HW, Quiz, Exam, Final Exam
Solution procedure and methods are defined.	CET 315, 372, 404, 405, 412, 415, 455, 456, 473, 475	HW, Quiz, Exam, Final Exam
Problem solution is appropriate and within reasonable constraints	CET 315, 372, 404, 405, 412, 415, 455, 456, 473, 475	HW, Quiz, Exam, Final Exam

Table 4c. Relating Performance Indicators with Courses or Assignments to be used for SLO#3. 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

Performance Indicators	Educational Strategies	Method(s) of Assessment
Writing conforms to appropriate technical style	CET 102, 103, 115, 116, 206, 207, 208, 315, 317, 372	Lab Report, Semester Project Report
Appropriate usage of graphics	CET 102, 103, 115, 116, 206, 207, 208, 315, 317, 372	Lab Report, Semester Project Report, Power-point slides
Grammar and editorial aspects	CET 102, 103, 115, 116, 206, 207, 208, 315, 317, 372	Lab Report, Semester Project Report, Power-point slides
Oral: body language and clarity of speech	CET 102, 103, 115, 116, 206, 207, 208, 315, 317, 372	Lab Report, Semester Project Report, Oral presentation

Table 4d. Relating Performance Indicators with Courses or Assignments to be used for SLO#4.ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes

Performance Indicators	Educational Strategies	Method(s) of Assessment
Observes good lab practice and operates instrumentation with ease	CET 102, 103, 206, 208, 315, 317, 372	Lab Testing, Field Testing
Determines data that are appropriate to collect and selects appropriate equipment, protocols, etc. for measuring the appropriate variables to get required data experimental results including the use of statistics to account for possible experimental error	CET 102, 103, 206, 208, 315, 317, 372	Lab Report, Survey Report
Uses appropriate tools to analyze data and verifies and validates experimental results including the use of statistics to account for possible experimental error	CET 102, 103, 206, 208, 315, 317, 372	Lab Report, Survey Report

Table 4e. Relating Performance Indicators with Courses or Assignments to be used for SLO#5. ability to function effectively as a member as well as a leader on technical teams.

Performance Indicators	Educational Strategies	Method(s) of Assessment
Recognize participant roles in a team setting	CET 101, 102, 208, 315, 455, 456	Instructor Survey, Peer Evaluation, Interviews
Integrate input from all team members and makes decision	CET 101, 102, 208, 315, 455, 456	Instructor Survey, Peer Evaluation, Interviews
Improves communications among teammates and ask for feedback	CET 101, 102, 208, 315, 455, 456	Instructor Survey, Peer Evaluation, Interviews

The rubric to evaluate students' work is presented in **Table 5**. Four criteria are generally used to make the evaluation simple and effective.

Table 5. Grading Rubric for Different Performance Indicators

Good	Fair	Poor	Unable
100%	75%	50%	0%
100%	75%	50%	0%
100%	75%	50%	0%
100%	75%	50%	0%