



**BACHELOR OF SCIENCE IN CIVIL ENGINEERING (BSCE)  
STUDENT LEARNING OUTCOMES (SLOs) ASSESSMENT PLAN  
Updated – 2025 May**

The student learning outcomes for the BSCE Program at CSU Pueblo were adopted from the Engineering Accreditation Commission (EAC) of ABET. The program adopted all seven (7) Student Outcomes (SO's) of the EAC of ABET listed below:

1. 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.

The BSCE program faculty plan to evaluate three (3) consequent outcomes each year starting from the AY 2024-2025.

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**

| <b>Student Learning Outcomes</b>  | <p>The objectives of the BSCE program is to provide an integrated educational experience so that its graduates:</p> <ul style="list-style-type: none"><li>• successfully enter as entry-level engineers or planners and continue practicing in different civil engineering areas</li><li>• continue rapid, life-long learning for professional growth and/or higher-level education in different civil engineering areas</li></ul> |
|---|--|
| 1. Ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics;  | X  |
| 2. 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;                   | X  |
| 3. Ability to communicate effectively with a range of audiences;  | X  |
| 4. 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; | X  |
| 5. 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;   | X  |
| 6. Ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions;  | X  |
| 7. Ability to acquire and apply new knowledge as needed, using appropriate learning strategies.   | X  |

The SLOs, the Performance Indicators and the Methods of Assessment 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**

| <b>Student Learning Outcomes</b>  | <b>Performance Indicators</b>  | <b>Method(s) of Assessment<br/>(Instructor may choose similar<br/>other methods)</b> |
|---|--|--|
| 1. Ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics;  | • Chooses a mathematical model of a system or process appropriate                                | HW, Quiz, Exam   |
|   | • Applies mathematical principles to achieve analytical or numerical solution to model equations | HW, Quiz, Exam   |
|   | • Examines approaches to solving an engineering problem to choose the more effective approach    | HW, Quiz, Exam   |
| 2. Ability to apply engineering design to produce solutions that meet specified needs with consideration of public health.....              | • Problem statement shows understanding of the problem   | HW, Quiz, Exam   |
|   | • Solution procedure and methods are defined.  | HW, Quiz, Exam   |
|   | • Problem solution is appropriate and within reasonable constraints                              | HW, Quiz, Exam   |
| 3. Ability to communicate effectively with a range of audiences;  | • Writing conforms to appropriate technical style  | Lab Report, Semester Project Report, drawings, Exam                                  |
|   | • Appropriate usage of graphics  | Lab Report, Semester Project Report, Power-point slides, Exam                        |
|   | • Grammar and editorial aspects  | Lab Report, Semester Project Report, Power-point slides, Exam                        |
|   | • Oral: body language and clarity of speech  | Lab Report, Semester Project Report, Power-point slides                              |
| 4. Ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments....                 | • Identifies ethical issues in engineering practice  | HW, Exam, Survey, Interviews   |
|   | • Makes informed decisions considering various impacts   | HW, Exam, Survey, Interviews   |
|   | • Understands and applies professional standards.  | HW, Exam, Survey, Interviews   |
| 5. Ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment... | • Recognize participant roles in a team setting  | Instructor Survey, Peer Evaluation, Interviews                                       |
|   | • Integrate input from all team members and makes decision                                       | Instructor Survey, Peer Evaluation, Interviews                                       |
|   | • Improves communications among teammates and ask for feedback                                   | Instructor Survey, Peer Evaluation, Interviews                                       |
| 6. Ability to develop and conduct appropriate experimentation, analyze and interpret data...  | • Designs and conducts experiments following proper procedures                                   | Lab Report, Presentation   |
|   | • Collects and analyzes experimental data accurately   | Lab Report, Presentation   |
|   | • Draws valid conclusions based on data analysis.  | Lab Report, Presentation   |
| 7. Ability to acquire and apply new knowledge as needed, using appropriate learning strategies.   | • Overall understanding of civil engineering   | Instructor Survey, Peer Evaluation, Interviews, Report, HW, Quiz, Exam               |
|   | • Applies new knowledge to solve engineering problems  | Instructor Survey, Peer Evaluation, Interviews, Report, HW, Quiz, Exam               |
|   | • Stays current with advancements in civil engineering.  | Instructor Survey, Peer Evaluation, Interviews, Report, HW, Quiz, Exam               |

Each outcome has been mapped to the civil engineering courses as depicted in **Table 3**. Although a course may satisfy many SLOs, only major satisfying outcomes are listed and used for assessment.

**Table 3. Mapping courses to the Student Learning Outcomes**

| <div style="text-align: center;"> <b>SLOs</b><br/> <b>Courses</b> </div> | 1. Ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics; | 2. 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. ability to communicate effectively with a range of audiences; | 4. 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. 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. Ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions; | 7. Ability to acquire and apply new knowledge as needed, using appropriate learning strategies. |
|--|--|---|--|---|---|--|---|
| CE 101 Introduction to Civil Engineering                                 |  |   |  | X   |   |  |   |
| CET 102 Surveying I  | X  |   | X  |   | X   | X  |   |
| EN 103 Problem Solving for Engineers                                     | X  |   |  |   |   |  |   |
| CET 115 Civil Drafting I   | X  |   | X  |   |   |  |   |
| CET 116 Civil Drafting II  | X  |   | X  |   |   |  |   |
| CET 208 Concrete and Asphalt Materials                                   |  | X   | X  |   | X   | X  |   |
| CET 207 Construction Materials and Methods                               | X  |   |  |   |   |  |   |
| EN 211 Engineering Mechanics I   | X  |   |  |   |   |  |   |
| EN 212 Engineering Mechanics II  | X  | X   |  |   |   |  |   |
| CE 233 Strength of Materials with Lab                                    | X  |   | X  |   |   | X  |   |
| CE 321 Geotechnical Engineering I with Lab                               | X  | X   | X  |   | X   | X  |   |
| CE 331 Structural Analysis   | X  |   |  |   |   |  |   |
| CE 341 Introduction to Transportation Engineering with Lab               | X  | X   | X  |   |   | X  |   |
| CE 351 Hydraulics with Lab   | X  | X   | X  |   |   | X  |   |
| CE 361 Construction Engineering  |  |   |  | X   |   |  | X   |
| EN 375 Stochastic Systems Engineering                                    | X  |   |  |   |   |  | X   |
| CE 404 Structural Steel Design   |  | X   |  |   |   |  |   |
| CE 405 Reinforced Concrete Design  |  | X   |  |   |   |  |   |
| CE 412 Hydrology   |  | X   |  |   |   |  |   |
| CE 415 Water & Sewer System Design                                       |  | X   |  |   |   |  |   |
| CE 421 Geotechnical Engineering II                                       |  | X   |  |   |   |  |   |
| CE 473 Highway Design  |  | X   |  |   |   |  |   |
| CE 487 Senior Project Seminar  |  |   |  | X   |   |  | X   |
| CE 489 Senior Design Project   |  | X   | X  | X   | X   |  | X   |

The rubric to evaluate students' work is presented in **Table 4**. Four criteria are generally used to make the evaluation simple and effective.

**Table 4. Grading Rubric for Performance Indicators based on Instructor's Judgement (Instructor may choose his/her own rubric)**

| Performance Level | Good | Fair | Poor | Unable |
|-------------------|------|------|------|--------|
| Score be given    | 100% | 75%  | 50%  | 0%     |

**Performance Target:** 75% students will achieve 70% score in each SLO combining the score in all Performance Indicators.