

CE OUTCOME ASSESSMENT RUBRICS

CIVIL ENGINEERING STUDENT OUTCOME ASSESSMENT RUBRIC					
Outcome 1					
Proficiency in fundamental science and engineering principles necessary for the practice of civil engineering including mathematics, chemistry, physics, solid mechanics, fluid mechanics, and environmental systems. ABET Criterion 3 a					
Scale 1.1: Mathematics					
	Not Acceptable	Below Expectations	Meets Expectations	Exceeds Expectations	Score
	< 60	60-70	70-90	>90	
1.1a: Demonstrate proficiency in application of mathematics					
Formulate and solve math models to analyze and/or evaluate system performance	Inability to apply correct mathematical concepts to formulate a math model and solve problems.	Apply correct mathematical concepts to formulate a math model and solve problems with instructor assistance.	Independently apply correct mathematical concepts to formulate a math model to solve problems with few conceptual or procedural errors.	Independently apply correct mathematical concepts to formulate a math model and solve problems with no conceptual or procedural errors.	
Apply concepts and governing equations to solve equilibrium problems	Inability to apply correct concepts and choose correct governing equations to solve problems.	Apply correct concepts and choose correct governing equations to solve problems with instructor assistance.	Independently apply concepts use governing equations to solve problems with few conceptual or procedural errors.	Independently apply correct concepts and choose correct governing equations to solve problems with no conceptual or procedural errors.	
1.1b: Demonstrate proficiency in computational and numerical methods					
Utilize appropriate computational tools and numerical methods necessary for engineering practice	Inability to choose and utilize appropriate computational tools and numerical methods to solve problems	Ability to choose and utilize appropriate computational tools and numerical methods to solve problems with significant instructor assistance.	Independently choose and utilize appropriate computational tools and numerical methods to solve problems with few conceptual and/or computational errors.	Independently choose and utilize appropriate computational tools and numerical methods to solve problems with no conceptual or computational errors.	

Scale 1.2: Basic Engineering Sciences					
	Not Acceptable < 60	Below Expectations 60-70	Meets Expectations 70-90	Exceeds Expectations >90	Score
1.2a: Demonstrate proficiency in application of physics and chemistry					
Apply fundamental concepts of physics and chemistry to solve problems	Inability to apply correct scientific concepts to solve problems.	Apply correct scientific concepts to solve problems with significant instructor assistance.	Independently apply correct scientific concepts to solve problems with few conceptual or procedural errors.	Independently apply correct scientific concepts to solve problems with no conceptual or procedural errors.	
Scale 1.3: Fundamental Engineering Principles					
	Not Acceptable < 60	Below Expectations 60-70	Meets Expectations 70-90	Exceeds Expectations >90	Score
1.3a: Demonstrate proficiency in statics and dynamics					
Develop fundamental knowledge of statics and dynamics	Inability to analyze basic structural elements for static and/or dynamic equilibrium	Analyze basic structural elements for static and/or dynamic equilibrium using appropriate mathematics and physics with instructor assistance	Independently analyze basic structural elements for static and/or dynamic equilibrium using appropriate mathematics and physics with few conceptual and/or computational errors	Independently analyze basic structural elements for static and/or dynamic equilibrium using appropriate mathematics and physics with no conceptual or computational errors	

1.3b: Demonstrate proficiency in solid mechanics					
Develop a fundamental knowledge of solid mechanics	Inability to analyze basic structural elements subjected to loading using appropriate mathematics and physics	Independently analyze basic structural elements subjected to loading using appropriate mathematics and physics with instructor assistance	Independently analyze basic structural elements subjected to loading using appropriate mathematics and physics with few conceptual and/or computational errors	Independently analyze basic structural elements subjected to loading using appropriate mathematics and physics with no conceptual or computational errors	

1.3c: Demonstrate proficiency in engineering hydrology and fluid mechanics

Develop a fundamental knowledge of engineering hydrology	Inability to apply concepts of engineering hydrology to solve problems related to prediction of runoff and groundwater flow.	Apply concepts of engineering hydrology to solve problems related to prediction of runoff and groundwater flow with significant instructor assistance.	Independently apply concepts of engineering hydrology to solve problems related to prediction of runoff and groundwater flow with few conceptual and/or computational errors.	Independently apply concepts of engineering hydrology to solve problems related to prediction of runoff and groundwater flow with no conceptual and computational errors.	
Develop a fundamental knowledge of fluid mechanics	Inability to apply conservation laws to solve fluid mechanics problems.	Apply conservation laws to solve fluid mechanics problems with significant instructor assistance.	Independently apply conservation laws to solve fluid mechanics problems with few conceptual and/or computational errors.	Independently apply conservation laws to solve fluid mechanics problems with no conceptual and computational errors.	

1.3d: Demonstrate proficiency in environmental systems engineering					
Develop a fundamental knowledge of various water and wastewater treatment processes (i.e., physical, chemical, and biological)	Inability to analyze the performance of a unit process in water or wastewater treatment by applying fundamental knowledge of physical, chemical, and biological processes and current design criteria	Analyze the performance of a unit process in water or wastewater treatment by applying fundamental knowledge of physical, chemical, and biological processes and current design criteria with significant instructor assistance	Independently analyze the performance of a unit process in water or wastewater treatment by applying fundamental knowledge of physical, chemical, and biological processes and current design criteria with few conceptual and/or computational errors	Independently analyze the performance of a unit process in water or wastewater treatment by applying fundamental knowledge of physical, chemical, and biological processes and current design criteria with no conceptual and computational errors	
Develop an understanding and appreciation of the potential impacts of engineered systems on the environment	Inability to identify potential environmental benefits and adverse impacts associated with engineered systems	Identify potential environmental benefits and adverse impacts associated with engineered systems with significant instructor assistance	Independently identify potential environmental benefits and adverse impacts associated with engineered systems with a few omissions	Independently identify both potential environmental benefits and adverse impacts associated with engineered systems with no omissions	
Scale 1.4: Fundamental Engineering Laboratories					
	Not Acceptable	Below Expectations	Meets Expectations	Exceeds Expectations	Score
	< 60	60-70	70-90	>90	
1.4a: Demonstrate ability to collect and analyze laboratory and field data					
Collect, analyze, and synthesize data related to engineering surveying and field measurements	Inability to collect field measurements and analyze data using principles of engineering surveying	Independently collect field measurements and analyze data using principles of engineering surveying with significant instructor assistance	Independently collect field measurements and analyze data using principles of engineering surveying with few procedural errors	Independently collect field measurements and analyze data using principles of engineering surveying with no procedural errors	

Collect, analyze, and synthesize data related to the properties and behavior of soils in the geotechnical laboratory	Inability to perform fundamental laboratory tests or collect, analyze, or synthesize appropriate data	Observe the collection of samples, perform fundamental laboratory tests, and collect, analyze, and synthesize appropriate data with significant instructor assistance	Observe the collection of samples, independently perform fundamental laboratory tests, and collect, analyze, and synthesize appropriate data with few procedural errors	Observe the collection of soil samples, independently perform fundamental laboratory tests, and collect, analyze, and synthesize appropriate data with no procedural errors	
Collect, analyze, and synthesize data related to the behavior of water in open channels and piping systems in the fluid mechanics laboratory	Inability to perform fundamental laboratory tests or collect, analyze, and synthesize experimental data	Perform fundamental laboratory tests and collect, analyze, and synthesize experimental data with significant instructor assistance	Independently perform fundamental laboratory tests and collect, analyze, and synthesize experimental data with few procedural errors	Independently perform fundamental laboratory tests and collect, analyze, and synthesize experimental data with no procedural errors	

Collect, analyze, and synthesize data related to the mechanical and chemical behavior of engineering materials in the materials laboratory	Inability to collect samples, perform fundamental laboratory tests, or collect, analyze, and synthesize experimental data	Collect samples, perform fundamental laboratory tests, and collect, analyze, and synthesize experimental data with significant instructor assistance	Independently collect samples, perform fundamental laboratory tests, and collect, analyze, and synthesize experimental data with few procedural errors	Independently collect samples, perform fundamental laboratory tests, and collect, analyze, and synthesize experimental data with no procedural errors	
Total Points					
Outcome 1 Mean Score (Total/14)					

CIVIL ENGINEERING STUDENT OUTCOME ASSESSMENT RUBRIC

Outcome 2

Ability to complete engineering analysis and design problems in structural, geotechnical, environmental and water resources, and transportation and materials areas of civil engineering, as individuals and as a member of multidisciplinary teams using engineering principles and the latest technologies and engineering tools. ABET Criterion 3 a, c, d, e, k

Scale 2.1: Structural Engineering

	Not Acceptable	Below Expectations	Meets Expectations	Exceeds Expectations	Score
	< 60	60-70	70-90	>90	

2.1a: Demonstrate proficiency in structural analysis using appropriate tools

Develop a fundamental knowledge of structural analysis	Inability to take a determinant or indeterminate system and analyze the system in terms of moments, shears, internal forces	Take a determinant or indeterminate system and analyze the system in terms of moments, shears, internal forces with significant instructor assistance	Take a determinant or indeterminate system and independently analyze the system in terms of moments, shears, internal forces with few conceptual and/or computational errors	Take a determinant or indeterminate system and independently analyze the system in terms of moments, shears, internal forces with no conceptual and/or computational errors	
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2.1b: Demonstrate ability to design a structure using appropriate tools

Apply fundamental principles of structural systems to design a structure	Inability to design a structure using structural materials by applying fundamental knowledge of structural concepts using current design criteria and specifications	Design a structure using structural materials by applying fundamental knowledge of structural concepts using current design criteria and specifications with significant instructor assistance	Independently design a structure using structural materials by applying fundamental knowledge of structural concepts using current design criteria and specifications with a few conceptual and/or computational errors	Independently design a structure using structural materials by applying fundamental knowledge of structural concepts using current design criteria and specifications with no conceptual and computational errors	
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Scale 2.2: Geotechnical Engineering					
	Not Acceptable	Below Expectations	Meets Expectations	Exceeds Expectations	Score
	< 60	60-70	70-90	>90	
2.2a: Demonstrate proficiency in fundamentals of soil properties					
Develop fundamental knowledge of soil properties	Inability to assess fundamental soil properties using results of appropriate laboratory analyses	Assess fundamental soil properties using results of appropriate laboratory analyses with significant instructor assistance	Independently assess fundamental soil properties using results of appropriate laboratory analyses with a few conceptual and/or computational errors	Independently assess fundamental soil properties using results of appropriate laboratory analyses with no conceptual and/or computational errors	
2.2b: Demonstrate ability to analyze interactions between soils and structures using appropriate tools					
analyze systems involving the interaction soils and structures	Inability to incorporate fundamental soil properties into the analysis and design of soil and structure interactions	Incorporate fundamental soil properties into the analysis and design of soil and structure interactions with significant instructor assistance	Independently incorporate fundamental soil properties into the analysis and design of soil and structure interactions with a few conceptual and/or computational errors	Independently incorporate fundamental soil properties into the analysis and design of soil and structure interactions with no conceptual and/or computational errors	

Scale 2.3: Environmental and Water Resources Engineering					
	Not Acceptable	Below Expectations	Meets Expectations	Exceeds Expectations	Score
	< 60	60-70	70-90	>90	
2.3a: Demonstrate ability to design water and wastewater system components using appropriate tools					
Design a water or wastewater treatment process, piping network, pumping system, or wastewater collection system	Inability to apply fundamental concepts of fluid mechanics and environmental engineering to design an environmental system	Apply fundamental concepts of fluid mechanics and environmental engineering to design an environmental system with significant instructor assistance	Independently apply fundamental concepts of fluid mechanics and environmental engineering to design an environmental system with few conceptual and/or computational errors	Independently apply fundamental concepts of fluid mechanics and environmental engineering to design an environmental system with no conceptual or computational errors	
Apply modern commercial engineering design and analysis software for water and wastewater systems	Inability to use computer software to analyze the performance of a piping system	Use computer software to analyze the performance of a piping system with instructor assistance	Independently use computer software to analyze the performance of a piping system with a few conceptual and/or computational errors	Independently use computer software to analyze the performance of a piping system with no conceptual and computational errors	
Prepare engineering drawings including plans, profiles, and cross sectional elements as part of a design project	Inability to prepare suitable engineering drawings showing plans, profiles, and cross sectional elements of a proposed structure or system	Prepare fair quality engineering drawings using computer aided design software including plans, profiles, and cross sectional elements of a proposed structure or system	Prepare good quality, detailed engineering drawings using computer aided design software including plans, profiles, and cross sectional elements of a proposed structure or system	Independently prepare high quality, detailed engineering drawings using computer aided design software including plans, profiles, and cross sectional elements of a proposed structure or system	

Prepare a preliminary cost estimate as part of a design project	Inability to prepare a preliminary cost estimate for a proposed structure or system using appropriate methods of engineering economics	Prepare a preliminary cost estimate for a proposed structure or system using appropriate methods of engineering economics with instructor assistance	Independently prepare a preliminary cost estimate for a proposed structure or system using appropriate methods of engineering economics with few conceptual and/or computational errors	Independently prepare a preliminary cost estimate for a proposed structure or system using appropriate methods of engineering economics with no conceptual or computational errors	
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2.3b: Demonstrate ability to perform hydrologic analysis and environmental impacts using appropriate tools

Perform a hydrological analysis and prepare a design of drainage systems associated with a highway system	Inability to apply concepts of engineering hydrology and fluid mechanics to design a drainage system	Apply concepts of engineering hydrology and fluid mechanics to design a drainage system with significant instructor assistance	Independently apply concepts of engineering hydrology and fluid mechanics to design a drainage system with few conceptual and/or computational errors	Independently apply concepts of engineering hydrology and fluid mechanics to design a drainage system with no conceptual or computational errors	
Perform an environmental impact assessment related to a proposed highway system	Inability to prepare an environmental impact assessment	Prepare an environmental impact assessment with significant instructor assistance	Independently prepare an environmental impact assessment with a few omissions	Independently prepare a complete environmental impact assessment with no omissions	

Scale 2.4: Transportation and Materials Engineering

	Not Acceptable	Below Expectations	Meets Expectations	Exceeds Expectations	Score
	< 60	60-70	70-90	>90	

2.4a: Demonstrate ability to analyze traffic capacity and traffic safety using appropriate tools

Perform capacity, level of service, and safety analyses for major traffic facilities	Inability to apply concepts of capacity, level of service, and safety to analyze the performance of a major traffic facility	Apply concepts of capacity, level of service, and safety to analyze the performance of a major traffic facility with significant instructor assistance	Independently apply concepts of capacity, level of service, and safety to analyze the performance of a major traffic facility with few conceptual and/or computational errors	Independently apply concepts of capacity, level of service, and safety to analyze the performance of a major traffic facility with no conceptual or computational errors	
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2.4b: Demonstrate ability to evaluate highway materials and design highways using appropriate tools

Design a highway system using concepts of geometric design and traffic engineering operations principles	Inability to apply concepts of materials selection, geometric design and traffic engineering operations principles to design a highway system	Apply concepts of materials selection, geometric design and traffic engineering operations principles to design a highway system with significant instructor assistance	Independently apply concepts of materials selection, geometric design and traffic engineering operations principles to design a highway system with few conceptual and/or computational errors	Independently apply concepts of materials selection, geometric design and traffic engineering operations principles to design a highway system with no conceptual or computational errors	
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2.4c: Demonstrate ability to perform engineering tasks including drawings, contracts, specifications, and cost estimates

Prepare engineering drawings including plans, profiles, and cross sectional elements related to a highway design	Inability to prepare suitable engineering drawings showing plans, profiles, and cross sectional elements of a proposed highway system	Prepare fair quality engineering drawings using computer aided design software including plans, profiles, and cross sectional elements of a proposed highway system	Prepare good quality, detailed engineering drawings using computer aided design software including plans, profiles, and cross sectional elements of a proposed highway system	Independently prepare high quality, detailed engineering drawings using computer aided design software including plans, profiles, and cross sectional elements of a proposed highway system	
Develop an engineering contract	Inability to identify and compile the necessary components of an engineering contract	Identify and compile the necessary components of an engineering contract with significant instructor assistance	Independently identify and compile the necessary components of an engineering contract with a few omissions	Independently identify and compile the necessary components of an engineering contract with no omissions	

Prepare engineering specifications related to the design of a highway system	Inability to compile a relevant set of engineering specifications	Compile a complete and relevant set of engineering specifications with significant assistance from instructor	Compile a complete and relevant set of engineering specifications with minor assistance from instructor	Independently compile a complete and relevant set of engineering specifications	
Prepare a preliminary cost estimate for an engineering design	Inability to prepare a preliminary cost estimate for a proposed structure or system using appropriate methods of engineering economics	Prepare a preliminary cost estimate for a proposed structure or system using appropriate methods of engineering economics with instructor assistance	Independently prepare a preliminary cost estimate for a proposed structure or system using appropriate methods of engineering economics with few conceptual and/or computational errors	Independently prepare a preliminary cost estimate for a proposed structure or system using appropriate methods of engineering economics with no conceptual or computational errors	
Total Points					
Outcome 2 Mean Score (Total/16)					

CIVIL ENGINEERING STUDENT OUTCOME ASSESSMENT RUBRIC

Outcome 3

Capacity for investigation and experimentation into physical (engineering) phenomena along with the ability to analyze and interpret engineering data in civil and environmental engineering applications. ABET Criterion 3 b, k

Scale 3.1: Experimental Design

	Not Acceptable < 60	Below Expectations 60-70	Meets Expectations 70-90	Exceeds Expectations >90	Score
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3.1a: Demonstrate understanding of the requirements and planning process for experimental design

Identify the physical phenomenon, experimental parameters, uncertainties, experimental methods suitable for the given case, reference to standard procedures, etc	Demonstrates either no, incomplete or incorrect knowledge, unable to identify the physical phenomenon	Has basic idea but in need of extreme supervision and steering in the right direction	Establishes ground work successfully, identifies the appropriate/proper and selects adequate and feasible, describes steps involved	Demonstrates comprehensive knowledge and proposes improvements	
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3.1b: Demonstrate proficiency in conducting experiments

Select appropriate equipment/measuring devices and methodology for conducting experiment	Demonstrates either no, incomplete or incorrect knowledge, unable to identify	Has basic idea but in need of extreme supervision and steering in the right direction	Establishes ground work successfully, identifies the appropriate/proper and selects adequate and feasible, describes steps involved	Demonstrates comprehensive knowledge and proposes improvements	
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Scale 3.2: Data Analysis and Presentation					
	Not Acceptable	Below Expectations	Meets Expectations	Exceeds Expectations	Score
	< 60	60-70	70-90	>90	
3.2a: Demonstrate proficiency in organization and manipulation of collected data using proper tools (e.g. software)					
Present experimental data; plots, tables, consideration of trends, statistical evaluation	Demonstrates either no, incomplete or incorrect knowledge, unable to identify	Has basic idea but in need of extreme supervision and steering in the right direction	Describes the methods of data analysis, able to identify necessary tools and potential errors as well as discrepancies, identifies trends and presents scientific/processed data in a coherent way	Demonstrates comprehensive knowledge in data analysis and presentation and requires no supervision	
3.2b: Demonstrate proficiency in interpretation and development of conclusions from data analysis using proper tools (e.g. software)					
Interprets results of data analysis and draws conclusions and makes connections to existing theory	Demonstrates either no, incomplete or incorrect knowledge of the basic theory, unable to identify and discuss coherently the experimental observations and results	Has basic knowledge of theory, but in need of extreme supervision and steering in the right direction	Able to generate scientific formulations and reports based on the experimental observations and results	Demonstrates comprehensive knowledge and requires no supervision, generates mathematical formulations and correct applications that proposes improvements to existing theory and methods	
Total Points					
Outcome 3 Mean Score (Total/4)					

CIVIL ENGINEERING STUDENT OUTCOME ASSESSMENT RUBRIC

Outcome 4

Skills to communicate verbally, in writing, and through the use of engineering communication media; present outcomes of problem solving and design projects to groups of engineers and lay persons. ABET Criterion 3 g, k

Scale 4.1: Oral Reports

	Not Acceptable < 60	Below Expectations 60-70	Meets Expectations 70-90	Exceeds Expectations > 90	Score
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4.1a: Demonstrate proficiency in organization of content for oral presentation

Suitable Introduction	Unsuitable	Somewhat unsuitable, not focused	Suitable, appropriate	Superior performance; clear and precise	
Logical arrangement of topics and accuracy of the presentation	Unsuitable	Somewhat unsuitable, not focused	Suitable, appropriate	Superior performance; clear and precise	
Appropriate conclusions and recommendations	Unsuitable	Somewhat unsuitable, not focused	Suitable, appropriate	Superior performance; clear and precise	

4.1b: Demonstrate proficiency in use of visual aids

Appropriate choice (projection, overhead, handouts, etc.)	Not clear or readable	Difficulty reading	Clear and readable	Superior clarity and readability	
Effective use of software	Not clear or readable	Difficulty reading	Clear and readable	Superior clarity and readability	

4.1c: Demonstrate proficiency in presentation delivery and group synergism/dynamics (if applicable)

Voice volume, enunciation, speed, appearance	Not acceptable	Poor performance	Acceptable performance	Superior performance	
Even division of effort	One person clearly dominates or did not contribute	Apparent uneven distribution of effort	Even division of effort; all members speak on and answer questions on technical material	Even division and well-delegation to group members, each individual has knowledge of the entire presentation	

Interactions between team members, time management	No interaction	Limited knowledge of the project, disorganized presentation without proper transition	Acceptable performance	Consistent and complementary (back-up); each individual has a comprehensive knowledge of the topic	
4.1d: Demonstrate ability to effectively respond to questions					
Quality of Response	Unable to respond	Evasive, not complete	Acceptable response	Direct and comprehensive	
4.1e: Demonstrate ability to generate positive audience reaction					
Response	Overall poor performance	Somewhat poor	Acceptable performance	Well-received	
Scale 4.2: Written Reports					
	Not Acceptable < 60	Below Expectations 60-70	Meets Expectations 70-90	Exceeds Expectations > 90	Score
4.2a: Demonstrate proficiency in organization of content for written reports					
Work requested/ Abstract	Unsuitable	Somewhat unsuitable, not focused	Suitable, appropriate	Superior performance; clear and precise	
Introduction	Unsuitable	Somewhat unsuitable, not focused	Suitable, appropriate	Superior performance; clear and precise	
Theoretical development	Unsuitable	Somewhat unsuitable, not focused	Suitable, appropriate	Superior performance; clear and precise	
Results	Unsuitable	Somewhat unsuitable, not focused	Suitable, appropriate	Superior performance; clear and precise	
Conclusions and recommendations	Unsuitable	Somewhat unsuitable, not focused	Suitable, appropriate	Superior performance; clear and precise	
4.2b: Demonstrate proficiency in effective report mechanics					
Organization	Inappropriate sections of report	Some content is found in inappropriate section of report	Content appropriate to all sections of report	Organization enhances readability and/or understandability of report	
Aesthetics	Visually unacceptable	Visually poor	Appropriate	Superior	
Spelling/grammar	Too many errors to the extent that it is unreadable	Some errors	Minimum errors	Superior spelling and grammatical skills	
4.2c: Demonstrate effective use of software to prepare written report					

Appropriate choice	Not clear or readable	Difficulty reading	Clear and readable	Superior clarity and readability	
Effective use of software	Not clear or readable	Difficulty reading	Clear and readable	Superior clarity and readability	
Total Points					
Outcome 4 Mean Score (Total/20)					

CIVIL ENGINEERING STUDENT OUTCOME ASSESSMENT RUBRIC

Outcome 5

Understand the role civil engineering plays in our modern global society, that much is to be learned from the past and applied to the present, and that a responsible engineer is ethical and will continue to increase his/her knowledge throughout his/her lifetime. ABET Criterion 3 f, h, i, j

Scale 5.1: Professional and Ethical Responsibility

	Not Acceptable	Below Expectations	Meets Expectations	Exceeds Expectations	Score
	< 60	60-70	70-90	> 90	

5.1a: Demonstrate understanding of role and impact of engineering solutions in a global society

Identify both potential benefits and adverse impacts of engineered systems on society and the environment	Inability to identify potential environmental benefits and adverse impacts associated with engineered systems	Identify potential environmental benefits and adverse impacts associated with engineered systems with significant instructor assistance	Independently identify potential environmental benefits and adverse impacts associated with engineered systems with a few omissions	Independently identify both potential environmental benefits and adverse impacts associated with engineered systems with no omissions	
Develop and evaluate alternative designs of civil infrastructure systems to minimize adverse environmental and societal impacts	Inability to develop and evaluate alternative designs of civil infrastructure systems to minimize adverse environmental and societal impacts	Develop and evaluate alternative designs of civil infrastructure systems to minimize adverse environmental and societal impacts in a group of students with significant instructor assistance	Appropriately develop and evaluate alternative designs of civil infrastructure systems to minimize adverse environmental and societal impacts in a group of students with some assistance from the instructor	Appropriately develop and evaluate alternative designs of civil infrastructure systems to minimize adverse environmental and societal impacts independently with no assistance from the instructor	

5.1b: Demonstrate understanding of ethical responsibility					
Identify and respond to significant ethical aspects related to the design or construction of an engineered system	Inability to identify and respond to significant ethical aspects related to the design or construction of an engineered system	Identify and respond to significant ethical aspects related to the design or construction of an engineered system in a group of students with significant assistance from the instructor	Appropriately identify and respond to significant ethical aspects related to the design or construction of an engineered system in a group of students with some assistance from the instructor	Appropriately identify and respond to significant ethical aspects related to the design or construction of an engineered system independently with no assistance from the instructor	
Does not exclude or skew knowledge that is pertinent even when it impacts the individual's value system.	Either unable to determine whether new knowledge has an impact on the individual's value system or takes no steps to reconcile differences.	Determines whether new knowledge has an impact on the individual's value system and takes steps to reconcile differences with little bias	Determines whether new knowledge has an impact on the individual's value system and takes steps to reconcile differences with little bias	Determines whether new knowledge has an impact on the individual's value system and takes steps to reconcile differences without bias	
5.1c: Demonstrates proficiency in leadership and activism					
Demonstrate leadership skills in classroom setting	Does not participate in class discussions/activities and does not interact with fellow students	Participates infrequently in class discussions/activities and rarely engages fellow students in positive behaviors relative to the engineering profession	Participates to a moderate degree in class discussions/activities and sometimes engages fellow students in positive behaviors relative to the engineering profession	Participates to a high degree in class discussions/activities and often engages fellow students in positive behaviors relative to the engineering profession	
Demonstrate leadership skills through student membership in professional societies	Is not a member of a professional engineering society		Is a member of a professional engineering society	Participates as an active member in a professional engineering society	

Attend public meetings related to impacts of proposed infrastructure systems	Express no interest in public hearings or meetings related to impacts of proposed infrastructure systems	Express no interest in public hearings or meetings related to impacts of proposed infrastructure systems	Actively participate in at least one public hearing or meeting related to impacts of proposed infrastructure systems prior to graduation	Actively participate in two or more public hearings or meetings related to impacts of proposed infrastructure systems prior to graduation	
Scale 5.2: Life-long Learning					
	Not Acceptable < 60	Below Expectations 60-70	Meets Expectations 70-90	Exceeds Expectations >90	Score
5.2a: Demonstrate awareness of and the ability to engage in life-long learning					
Pass the Fundamentals of Engineering (FE) exam	Unable to pass the FE exam after more than two attempts	Unable to pass the FE exam prior to graduation	Pass the FE exam prior to graduation after two attempts	Pass the FE exam prior to graduation after one attempt	
Express a desire to complete requirements for licensure as a professional engineering	Express no interest in becoming a licensed civil or environmental engineer		Express sincere interest in becoming a licensed civil or environmental engineer		
Participate in extra-curricular professional activities as an undergraduate: • Engineering internship • Undergraduate research programs • Attend a CEE professional conference • Design competitions	Does not participate in extra-curricular professional activities prior to graduation	Participates in extra-curricular professional activities one time prior to graduation	Participates in extra-curricular professional activities successfully two times prior to graduation	Participates in extra-curricular professional activities with a high degree of success three or more times prior to graduation	
Total Points					
Outcome 5 Mean Score (Total/10)					