Rubric for ABET KPI (Key Performance Indicators)

Outcome a: **An ability to apply knowledge of mathematics, science, and engineering**				
Criteria	**Low (1)**	**Needs Improvement (2)**	**Good (3)**	**Excellent (4)**
a1. Apply mathematics to solve engineering problems.	Fails to understand and apply proper linear algebra and differential calculus in solving engineering problems	Shows limited and less than adequate application of linear algebra and differential calculus in solving engineering problems	Demonstrates satisfactory application of linear algebra and differential calculus in solving engineering problems	Understands and applies proper and accurate linear algebra and differential calculus in solving engineering problems
a 2. Apply concepts and theories of science and engineering.	Fails to apply fundamental concepts and theories in solving science and engineering problems	Shows limited and less than adequate understanding of science theories and concepts in solving engineering problems	Demonstrates satisfactory application of proper concepts and theories of science in solving engineering problems	Understands and applies proper and accurate concepts and theories of science in solving engineering problems
a3. Convert science and engineering problems to solvable mathematical models.	Fails to transform science and engineering problems into solvable mathematical models	Shows limited and less than adequate transformation of science and engineering problems into solvable mathematical models	Demonstrates satisfactory transformation of science and engineering problems into solvable mathematical models	Understands and applies proper and accurate transformation of science and engineering problems into solvable mathematical models

Outcome b: **An ability to design and conduct experiments, as well as to analyze and interpret data**				
Criteria	**Low (1)**	**Needs Improvement (2)**	**Good (3)**	**Excellent (4)**
b1. Identify experiment objectives, theoretical concepts, and resources to be used.	Fails to identify experiment objectives, theoretical concepts, and resources to be used	Shows limited and less than adequate ability to identify experiment objectives, theoretical concepts, and resources to be used	Demonstrates satisfactory ability to identify experiment objectives, theoretical concepts, and resources to be used	Understands experimental objectives and applies proper and accurate theoretical concepts, and resources to be used
b2. Use lab equipment to conduct experiments.	Fails to use lab equipment to conduct experiments	Shows limited and less than adequate ability to use lab equipment to conduct experiments	Demonstrates satisfactory ability to use lab equipment to conduct experiments	Understands and applies proper use of lab equipment to conduct experiments
b3. Use data acquisition systems, hardware and software to collect, analyze and interpret data.	Fails to use data acquisition systems, hardware and software to collect, analyze and interpret data	Shows limited and less than adequate ability to use data acquisition systems, hardware and software to collect, analyze and interpret data	Demonstrates satisfactory ability to use data acquisition systems, hardware and software to collect, analyze and interpret data	Understands and applies proper and accurate use of data acquisition systems, hardware and software to collect, analyze and interpret data
b4. Write a professional technical report.	Fails to write a professional technical report	Shows limited and less than adequate ability to write a professional technical report	Demonstrates satisfactory ability to write a professional technical report	Understands and writes an accurate and professional technical report

Outcome c: **An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability**				
Criteria	**Low (1)**	**Needs Improvement (2)**	**Good(3)**	**Excellent (4)**
c1. Define design specifications and constraints.	Fails to define design specifications and constraints	Shows limited and less than adequate ability to define design specifications and constraints	Demonstrates satisfactory ability to define design specifications and constraints	Understands and defines proper and accurate design specifications and constraints
c2. Produce design alternatives.	Fails to produce design alternatives	Shows limited and less than adequate ability to produce design alternatives	Demonstrates satisfactory ability to produce design alternatives	Understands and produces proper and accurate design alternatives
c3. Utilize proven design methodologies and practices and available resources to achieve design intent.	Fails to utilize proven design methodologies and practices and available resources to achieve design intent	Shows limited and less than adequate ability utilize proven design methodologies and practices and available resources to achieve design intent	Demonstrates satisfactory ability to utilize proven design methodologies and practices and available resources to achieve design intent	Understands and utilize proper and accurate proven design methodologies and practices and available resources to achieve design intent
c4. Verify the component/system/process design against the design specifications and constraints.	Fails to verify the component/system/process design against the design specifications and constraints	Shows limited and less than adequate ability to verify the component/system/process design against the design specifications and constraints	Demonstrates satisfactory ability to verify the component/system/process design against the design specifications and constraints	Understands and verifies proper and accurate component/system/process design against the design specifications and constraints

Outcome d: **An ability to function on multidisciplinary teams**				
Criteria	**Low (1)**	**Needs Improvement (2)**	**Good (3)**	**Excellent (4)**
d1. Develop team work plans and allocate resources and tasks.	Fails to develop team work plans and allocate resources and tasks	Shows limited and less than adequate ability to develop team work plans and allocate resources and tasks	Demonstrates satisfactory ability to develop team work plans and allocate resources and tasks	Understands and applies proper and accurate team work plans and allocate resources and tasks
d2. Participate and function effectively in team work projects.	Fails to participate and function effectively in team work projects	Shows limited and less than adequate ability to participate and function effectively in team work projects	Demonstrates satisfactory ability to participate and function effectively in team work projects	Understands and participates properly and function effectively in team work projects
d3. Communicate effectively with team members.	Fails to communicate effectively with team members	Shows limited and less than adequate ability to communicate effectively with team members	Demonstrates satisfactory ability to communicate effectively with team members	Understands and communicates properly and effectively with team members

Outcome e: **An ability to identify, formulate, and solve engineering problems**				
Criteria	**Low (1)**	**Needs Improvement (2)**	**Good (3)**	**Excellent (4)**
e1. Identify the problems and applicable theories and concepts.	Fails to identify engineering problems and applicable theories and concepts	Shows limited and less than adequate understanding of engineering problems identification and applicable theories and concepts	Demonstrates satisfactory identification of the problems and applicable theories and concepts	Understands and applies proper and accurate identification of engineering problems and applicable theories and concepts
e2. Formulate the problem using appropriate objectives, assumptions and constraints.	Fails to formulate engineering problems using appropriate objectives, assumptions and constraints	Shows limited and less than adequate understanding of engineering problems formulation using appropriate objectives, assumptions and constraints	Demonstrates satisfactory engineering problems formulation using appropriate objectives, assumptions and constraints	Understands and applies appropriate and accurate engineering problems formulation using objectives, assumptions and constraints
e3. Solve and evaluate problem solutions and adopt the optimum solution.	Fails to solve, evaluate and optimize engineering problem solutions.	Shows limited and less than adequate understanding of how to solve, evaluate and optimize engineering problem solutions	Demonstrates satisfactory knowledge of how to solve, evaluate and optimize engineering problem solutions.	Understands and applies appropriate and accurate knowledge of how to solve, evaluate and optimize engineering problem solutions.

Outcome f: **An understanding of professional and ethical responsibility**				
Criteria	**Low (1)**	**Needs Improvement (2)**	**Good (3)**	**Excellent (4)**
f1.Understand and apply engineering professional and ethical standards in dealing with public safety and interest.	Fails to Demonstrate an understanding of engineering professional and ethical standards in dealing with public safety and interest	Shows limited and less than adequate understanding of engineering professional and ethical standards in dealing with public safety and interest	Demonstrates satisfactory an understanding of engineering professional and ethical standards in dealing with public safety and interest	Understands appropriately and accurately the engineering professional and ethical standards in dealing with public safety and interest
f2. Demonstrate commitment to social and economic guidelines and regulatory laws.	Fails to demonstrate commitment to social and economic guidelines and regulatory laws	Shows limited and less than adequate commitment to social and economic guidelines and regulatory laws	Demonstrates satisfactory commitment to social and economic guidelines and regulatory laws	Demonstrates appropriately and accurately commitment to social and economic guidelines and regulatory laws

Outcome g: **An ability to communicate effectively**				
Criteria	**Low (1)**	**Needs Improvement (2)**	**Good (3)**	**Excellent (4)**
g1. Communicate technical ideas in written technical reports.	Fails to communicate technical ideas in written technical reports	Shows limited and less than adequate ability to communicate technical ideas in written technical reports	Demonstrates satisfactory ability to communicate technical ideas in written technical reports	Understands and communicate properly and accurately technical ideas in written technical reports
g2. Use engineering graphs and drawings as means of technical communication.	Fails to use engineering graphs and drawings as means of technical communication	Shows limited and less than adequate ability to use engineering graphs and drawings as means of technical communication	Demonstrates satisfactory ability to use engineering graphs and drawings as means of technical communication	Understands and applies proper and accurate engineering graphs and drawings as means of technical communication
g3. Conduct effective oral technical presentations to target audiences.	Fails to conduct effective oral technical presentations to target audiences	Shows limited and less than adequate ability to conduct effective oral technical presentations to target audiences	Demonstrates satisfactory ability to conduct effective oral technical presentations to target audiences	Understands and conducts proper and accurate effective oral technical presentations to target audiences

Outcome h: **The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context**				
Criteria	**Low (1)**	**Needs Improvement (2)**	**Good (3)**	**Excellent (4)**
h1. Utilize prints and online periodicals and resources to stay current with research and development in mechanical engineering	Fails to utilize prints and online periodicals and resources to stay current with research and development in mechanical engineering	Shows limited and less than adequate ability to utilize prints and online periodicals and resources to stay current with research and development in mechanical engineering	Demonstrates satisfactory ability to Utilize prints and online periodicals and resources to stay current with research and development in mechanical engineering	Understands and applies proper and accurate ability to utilize prints and online periodicals and resources to stay current with research and development in mechanical engineering
h2. Recognize the impact engineering solutions have on the global environment, economy and society	Fails to recognize the impact engineering solutions have on the global environment, economy and society	Shows limited and less than adequate ability to recognize the impact engineering solutions have on the global environment, economy and society	Demonstrates satisfactory ability to recognize the impact engineering solutions have on the global environment, economy and society	Understands and applies proper and accurate ability to recognize the impact engineering solutions have on the global environment, economy and society

Outcome i: **A recognition of the need for and an ability to engage in life-long learning**				
Criteria	**Low (1)**	**Needs Improvement (2)**	**Good (3)**	**Excellent (4)**
i1. A recognition of the need for, and an ability to engage in life-long learning.ment and continued education	Fails to demonstrate the ability to stay up to date and broaden knowledge and skills on the current trends of the Civil Engineering discipline through professional development and continued education	Shows limited and less than adequate ability to stay up to date and broaden knowledge and skills on the current trends of the Civil Engineering discipline through professional development and continued education	Demonstrate the ability to stay up to date and broaden knowledge and skills on the current trends of the Civil Engineering discipline through professional development and continued education	Demonstrate the ability to stay up to date and broaden knowledge and skills on the current trends of the Civil Engineering discipline through professional development and continued education

Outcome j: **A knowledge of contemporary issues**				
Criteria	**Low (1)**	**Needs Improvement (2)**	**Good (3)**	**Excellent (4)**
j1. Recognize contemporary local, national, regional and global issues in the civil engineering discipline.	Fails to demonstrate the ability to recognize contemporary local, national, regional and global issues in the civil engineering discipline professional development and continued professional development and continued education	Shows limited and less than adequate ability to recognize contemporary local, national, regional and global issues in the civil engineering discipline professional development and continued through professional development and continued education	Demonstrates satisfactory the ability to recognize contemporary local, national, regional and global issues in the civil engineering discipline professional development and continued professional development and continued education	Understands and demonstrate proper and accurate ability to stay up to date and broaden knowledge and skills on the current trends of the civil engineering discipline through professional development and continued education

Outcome k: **An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.**				
Criteria	**Low (1)**	**Needs Improvement (2)**	**Good (3)**	**Excellent (4)**
k1. Demonstrate the proper use of engineering software (MS.Office, MS.Project, Matlab and ETABS, SAP 2000, and GEOSLOPE) and tools in engineering practice.	Fails to demonstrate the proper use of engineering software and tools in engineering practice	Shows limited and less than adequate ability to demonstrate the proper use of engineering software and tools in engineering practice	Demonstrates satisfactory ability to use engineering software and tools in engineering practice	Understands and applies appropriate and accurate use of engineering software and tools in engineering practice
k2. Use appropriate techniques and skills to obtain engineering solutions in civil engineering courses.	Fails to use appropriate techniques and skills to obtain engineering solutions in select junior and senior level courses.	Shows limited and less than adequate ability to use appropriate techniques and skills to obtain engineering solutions in select junior and senior level courses.	Demonstrates satisfactory ability to use appropriate techniques and skills to obtain engineering solutions in select junior and senior level courses.	Understands and applies appropriate and accurate techniques and skills to obtain engineering solutions in select junior and senior level courses.