

**Outcome 1: An ability to identify, formulate, and solve engineering problems
Performance Indicator Scoring Rubrics**

Course: _____

Semester taught: _____

Type of Student Work Used for Assessment
(e.g., Homework #4, Exam #2 problem 3, final project): _____

Number of students in course: _____

Number of students sampled: _____

Scale Element	Rating									
	0	Needs Improvement	1	2	Meets Expectations	3	4	Exceeds Expectations	5	N/A
Problem identification and problem solving strategies		Has trouble identifying key aspects of problem (knowns, unknowns, key question, physical principles) Little or no organized approach to setting up or solving problem Does not sketch or diagram, define assumptions, etc.			Identifies the problem and key principles; Develops framework for problem solving; but strategies are incomplete; student does not follow strategies in solution.			Identifies problem and key principles; Formulates and applies strategies for solving problems (such as heuristics) for all or most of work; when does, strategies are complete and correct; translates words to a diagram		
Solution synthesis and integration of previous knowledge		Uses class and/or text examples to guide problem solving; does not generate new approaches creatively; is limited in collecting needed data or resources to solve problem if appropriate			Departs to a limited extent from class or text examples in developing problem solutions, integrates some previous knowledge, but not for complete problem solution; uses some outside resources and/or data to solve problem, if appropriate			Demonstrates creative synthesis of solution; when appropriate, takes new information and effectively integrates it with previous knowledge to solve problems; knows when outside resources/data are needed and uses them		
Use of tools as aides to problem solving		Uses tools only when instructed to do so; uses the tool(s) incorrectly or uses wrong tool			Has limited ability to apply tools for problem solving. Uses tools awkwardly or inefficiently, and does not recognize the best tool for the purpose			Uses tools efficiently and correctly for problem solution; able to gain proficiency with new tools as required.		

<p>Integration of problem elements</p>		<p>Requires step-by-step instructions to integrate problem elements to achieve solution; is unable to see pathway to solution and interrelation of problem elements without guidance.</p>			<p>Partially sees connections between problem elements; Occasionally or for parts of the problem demonstrates understanding of how various pieces of the problem relate to each other and the whole</p>			<p>Demonstrates understanding of how various pieces of the problem relate to each other and the whole; effectively integrates parts correctly to solve the problem(s)</p>		
<p>Problem solution</p>		<p>Unable to generate solution or generates solution that is flawed in concept or in computation; solution is not checked for correctness or consistency</p>			<p>Generates solution that is correct in part, (e.g., numerically correct and is missing units); solution is not always checked</p>			<p>Generates correct solutions; checks solution upon completion; interprets solution appropriately</p>		