

## The IME Portfolio

Students enrolled in Rensselaer's Bachelor of Science program in Industrial and Management Engineering are required to submit a professional portfolio to the DSES Undergraduate Advisory Committee prior to graduation. Normally, this will be included as part of the requirements for *DSES-4210 Design and Analysis of Supply Chains*. Most students in this course will be seniors in their final semester. However, if a student takes this course ahead of schedule, i.e., as a junior, he/she is still be required to submit the portfolio as part of the course requirements. Although the portfolio is not a graded deliverable in the course, students cannot receive a grade in the course until the portfolio has been submitted. Materials from the last two to three years of study should be retained by IME students in preparation for submitting the portfolio. The purpose of this document is to provide specifications for preparing the IME portfolio.

### What is the Purpose of the Portfolio?

The materials for the portfolio should document that you have achieved the eleven educational outcomes associated with the IME undergraduate program. These outcomes are:

1. An ability to apply knowledge of mathematics, science and engineering.
2. An ability to design and conduct experiments, as well as to analyze and interpret data.
3. 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.
4. An ability to function on multi-disciplinary teams.
5. An ability to identify, formulate and solve engineering problems.
6. An understanding of professional and ethical responsibility.
7. An ability to communicate effectively.
8. That you have attained the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
9. That you recognize the need for, and have an ability to engage in life-long learning.
10. That you have knowledge of contemporary issues.
11. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

Packaged in a single binder, the portfolio should contain an introduction section and eleven additional sections corresponding to the educational outcomes listed above. The DSES department distributes a standard binder to all IME majors that should be used in assembling the portfolio. The binder should also include dividers separating the introduction and the eleven sections corresponding to the educational outcomes. Students can pick up their binders in the DSES min office in CII 5015.

### What type of material goes in the portfolio?

**Input materials used in each of the eleven outcomes sections must be drawn from work completed within a subset of the courses listed under that outcome. You must also write a brief paragraph for each outcome section justifying how the selected exhibits of your work**

**demonstrate that the outcome has been attained.** In most cases, exhibits will include items such as project reports, labs, exams and other significant course assignments. It's worth mentioning that the same report, exam or other deliverable can serve multiple objectives. For example, to show the "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", (outcome 3), you might keep a copy of your senior design project. Part of the same report might also be used as evidence to show the "ability of the student to perform effectively on a multi-disciplinary team", (outcome 4).

You are encouraged to supplement the exhibits for any given outcome from work done outside of the associated courses such as co-op assignments and extracurricular activities *but the majority of exhibits under a given outcome must be drawn from work completed in the courses associated with that outcome.* Generally, you should try and use the materials that most clearly demonstrate that you've achieved the highest benchmark of performance under a given outcome as described in the appendix of this document. If an exhibit was the product of a team effort, please provide a brief description of your role and your contribution to the project. Remember, your portfolio must demonstrate that you personally have achieved the corresponding educational outcome.

### **What are the criteria for demonstrating that exhibits of student work in the portfolio demonstrate outcome attainment?**

Different criteria are associated with each outcome. Outcome attainment is scored on one of three levels; high, medium or low. A description of each level of performance under each of the outcomes is provided in the appendix of this document. In the justification statement at the beginning of each outcome section, students should explain how the work they have chosen to exhibit meets the stated performance criteria for the corresponding outcome. In general, the guideline for the eleven sections of the portfolio is to add the best examples of your work that demonstrate your capabilities as an Industrial and Management Engineer relative to a given outcome. You should try and keep all major course deliverables from your years at Rensselaer to allow you to select from the widest possible range of inputs as you assemble the portfolio.

### **How should the portfolio be organized?**

The introduction section of your portfolio should include:

- An updated one page statement of career objectives and plans following graduation to the extent you know them.
- An up-to-date resume.
- A current transcript (an unofficial transcript is acceptable).
- The completed senior survey for your graduation year (see the appendix).

**Each of the remaining eleven outcomes sections should preface the selected set of exhibits with a brief paragraph of how the exhibited work meets the corresponding performance criteria.** You should also state which courses you are drawing your materials from and be sure that they are listed and an acceptable source for that outcome. The courses which can serve as source materials for each outcome are listed below:

Outcome 1: Mathematics and Science

DSES-4140, DSES-4230, DSES-4250, DSES-4610, DSES-4620, DSES-4961 (Optimization Algorithms and Applications), DSES-4963 (OR Methods), DSES-4810, ENGR-2600

Outcome 2: Design and Conduct Experiments and Analyze Data

DSES-4140, DSES-4200, DSES-4230, DSES-4290, ENGR-2600

Outcome 3: Design a System, Component or Process Within Realistic Constraints

DSES-2210, DSES-4200, DSES-4210, DSES-4240, DSES-4250, DSES-4260, DSES-4270, DSES-4280, ENGR-4760

Outcome 4: Function on Multidisciplinary Teams

DSES-4270, ENGR-1010, ENGR-2050, ENGR-4010

Outcome 5: Identify, Formulate and Solve Engineering Problems

DSES-2210, DSES-4200, DSES-4210, DSES-4230, DSES-4240, DSES-4250, DSES-4290, DSES-4610, DSES-4620, DSES-4963 (OR Methods), DSES-4810

Outcome 6: Understanding of Professional and Ethical Responsibility

DSES-4140, DSES-4200, DSES-4260, DSES-4270, ENGR-1010, ENGR-2050, ENGR-4010

Outcome 7: Ability to Communicate Effectively

DSES-4270, DSES-4963 (OR Methods), ENGR-1010, ENGR-2050, ENGR-4010

Outcome 8: Broadly Educated, Understands the Global Impact of Engineering Solutions

PD II, DSES-4140, DSES-4270, DSES-4280, DSES-4290, DSES-4610, DSES-4620, DSES-4963 (OR Methods), ENGR-2600, ENGR-4760

Outcome 9: Recognizes the Need for and has the Ability for Life Long Learning

DSES-4250, DSES-4270, DSES-4530, DSES-4810, ENGR-2050

Outcome 10: Knowledge of Contemporary Issues

DSES-2210, DSES-4210, DSES-4270, ENGR-2050

Outcome 11: Ability to Use Techniques, Skills and Tools of Modern Engineering Practice

CSCI-1100, CSCI-1190, DSES-4140, DSES-4290, DSES-4530, DSES-4810, ENGR-2600

## **Appendix 1: Copy of the IME Senior Survey**

# IME Senior Survey

for the

## Industrial and Management Engineering Undergraduate Program

### Part 1 - General Engineering Requirements

Please assign a rating from 1-5 that most clearly indicates your views on the topics listed by circling the appropriate number where the rating scale is:

1	2	3	4	5
Not Applicable	Strongly Disagree	Disagree	Agree	Strongly Agree
<b>N/A</b>	<b>SD</b>	<b>D</b>	<b>A</b>	<b>SA</b>

General Engineering Requirements:

	N/A	SD	D	A	SA
1. Classes were valuable in the learning experience	1	2	3	4	5
2. Class size was adequate for effective learning	1	2	3	4	5
3. Amount of work was reasonable	1	2	3	4	5
4. Tests were generally fair	1	2	3	4	5
5. Class level of difficulty was reasonable	1	2	3	4	5
6. Course objectives were stated and followed	1	2	3	4	5
7. Teachers were actively helpful and approachable	1	2	3	4	5
8. Helpful TAs aided in the learning experience	1	2	3	4	5

Rate the contribution of each listed course to the preparation of an Industrial and Management Engineer by circling the appropriate number where the rating scale is:

	1 Did Not Take N/A		2 Not Useful NU		3 Useful U		4 Very Useful VU		5 Most Useful MU	
	N/A	NU	U	VU	MU					
9. Introduction to Engineering Analysis	1	2	3	4	5					
10. Mathematics I and Mathematics II	1	2	3	4	5					
11. Physics I and Physics II	1	2	3	4	5					
12. Chemistry	1	2	3	4	5					
13. Engineering Graphics and CAD	1	2	3	4	5					
14. Modeling and Analysis of Uncertainty	1	2	3	4	5					
15. Introduction to Differential Equations	1	2	3	4	5					
16. C Programming	1	2	3	4	5					
17. Introduction to Engineering Design	1	2	3	4	5					
19. Dynamic Systems	1	2	3	4	5					
20. Thermal Engineering	1	2	3	4	5					
21. Laboratory Intro. to Embedded Control	1	2	3	4	5					

**Part 2 - Industrial and Management Engineering Requirements**

Please assign a rating from 1-5 that most clearly indicates your views on the topics listed by circling the appropriate number where the rating scale is:

	1 Not Applicable <b>N/A</b>	2 Strongly Disagree <b>SD</b>	3 Disagree <b>D</b>	4 Agree <b>A</b>	5 Strongly Agree <b>SA</b>	
Industrial and Management Engineering Requirements:						
		N/A	SD	D	A	SA
22. Classes were valuable in the learning experience	1	2	3	4	5	
23. Class size was reasonable for effective learning	1	2	3	4	5	
24. Amount of work was reasonable	1	2	3	4	5	
25. Tests were generally fair	1	2	3	4	5	
26. Class level of difficulty was reasonable	1	2	3	4	5	
27. Course objectives were stated and followed	1	2	3	4	5	
28. Teachers were actively helpful and approachable	1	2	3	4	5	
29. Helpful TAs aided in the learning experience	1	2	3	4	5	

Rate the contribution of each listed course to the preparation of and Industrial and Management Engineer by circling the appropriate number where the rating scale is:

	1 Did Not Take <b>N/A</b>	2 Not Useful <b>NU</b>	3 Useful <b>U</b>	4 Very Useful <b>VU</b>	5 Most Useful <b>MU</b>
	N/A	NU	U	VU	MU
30. Production and Opns. Management	1	2	3	4	5
31. Statistical Analysis	1	2	3	4	5
32. Operations Research Methods	1	2	3	4	5
33. Engineering Economics	1	2	3	4	5
34. Engineering Project Management	1	2	3	4	5
35. Facilities Design & Industrial Logistics	1	2	3	4	5
36. Quality Control	1	2	3	4	5
37. Management Information Systems	1	2	3	4	5
38. Design and Analysis of Work Systems	1	2	3	4	5
39. Industrial Safety and Hygiene	1	2	3	4	5
40. Supply Chain	1	2	3	4	5
41. Discrete Event Simulation	1	2	3	4	5

**Part 3 - Detailed Questions on The Capstone Design Experience**

Questions About Your Capstone Design Experience (DSES-4270 – IME Design):

	None	Some	Much	Very Much
42. To what degree did this course help develop team skills?	1	2	3	4
43. To what degree did this course help develop design skills?	1	2	3	4
44. To what degree did this course help develop written communication skills?	1	2	3	4
45. To what degree did this course help develop oral communication skills?	1	2	3	4
46. To what degree did this course help develop problem solving skills?	1	2	3	4

List below any changes you would like to see in the way the capstone design course is taught:

**Part 4 - Academic Advising**

Please assign a rating from 1-5 that most clearly indicates your views on the topics listed by circling the appropriate number where the rating scale is:

	1 Not Applicable N/A	2 Strongly Disagree SD	3 Disagree D	4 Agree A	5 Strongly Agree SA	
My Academic advising/advisor was...		N/A	SD	D	A	SA
47. A valuable part of my Rensselaer experience		1	2	3	4	5
48. Available with sufficient office hours		1	2	3	4	5
49. Respectful of my career goals & decisions		1	2	3	4	5
50. Honest in explaining the impact of my decisions		1	2	3	4	5
51. Knowledgeable of graduation requirements		1	2	3	4	5

List below two things you would like to change about the advising process:

**Part 5 - Impact of the Industrial and Management Engineering Curriculum**

Please assign a rating from 1-5 that most clearly indicates your views on the topics listed by circling the appropriate number where the rating scale is:

1	2	3	4	5
Strongly Disagree SD	Disagree D	Neutral N	Agree A	Strongly Agree SA

As a result of my education in industrial and management engineering, I have gained the ability to...

	SD	D	N	A	SA
52. Ability to apply knowledge of mathematics and science	1	2	3	4	5
53. Ability to design and conduct experiments and analyze data	1	2	3	4	5
54. Design products, services, facilities, processes and/or systems	1	2	3	4	5
55. Ability to function on multidisciplinary teams	1	2	3	4	5
56. Identify, model, analyze and solve real life problems	1	2	3	4	5
57. Understand professional and ethical responsibility	1	2	3	4	5
58. Develop strong written and oral communication skills	1	2	3	4	5
59. Become an informed and broadly educated citizen	1	2	3	4	5
60. Recognition of the need and ability for lifelong learning	1	2	3	4	5
61. Gained knowledge of contemporary issues	1	2	3	4	5
62. Ability to use techniques, skills and modern engineering tools	1	2	3	4	5
63. Do you plan to pursue an advanced degree sometime in the future? (circle one)				Yes	No
64. Did you join an IME relevant professional society prior to graduation?				Yes	No
65. Did one of the H&SS courses you took significantly influence your world view				Yes	No

**List any other important skills you developed through your undergraduate education:**

**Part 6 - Summary Comments**

Please add any other positive or negative comments about your experiences in the industrial and management engineering undergraduate program on this page:

## **Appendix 2: Performance Criteria by Educational Outcome for the IME Portfolio\***

\*These criteria are adapted from templates originally distributed through the website of the Department of Civil and Environmental Engineering at the University of Delaware:

[http://www.ce.udel.edu/ABET/Current%20Documentation/ABET\\_scoring\\_rubrics\\_index.html](http://www.ce.udel.edu/ABET/Current%20Documentation/ABET_scoring_rubrics_index.html)

## **Outcome 1. An ability to apply knowledge of mathematics, science and engineering.**

### **High Performance characterized by:**

- Combines mathematical and/or scientific principles to formulate models of systems relevant to industrial and management engineering
- Applies concepts of integral and differential calculus and/or linear algebra to solve industrial and management engineering problems
- Shows appropriate engineering interpretation of mathematical and scientific terms
- Translates academic theory into engineering applications and accepts limitations of mathematical models of physical reality
- Executes calculations correctly
- Correctly analyzes data sets using statistical concepts

### **Medium Performance characterized by:**

- Chooses a mathematical model or scientific principle that applies to an engineering problem, but has trouble in model development
- Shows nearly complete understanding of applications of calculus and/or linear algebra in problem-solving
- Most mathematical terms are interpreted correctly
- Some gaps in understanding the application of theory to the problem and expects theory to predict reality
- Minor errors in calculations
- Minor errors in statistical analysis of data

### **Low Performance characterized by:**

- Does not understand the connection between mathematical models and systems in industrial and management engineering
- Does not understand the application of calculus and linear algebra in solving industrial and management engineering problems
- Mathematical terms are interpreted incorrectly or not at all
- Does not appear to grasp the connection between theory and the problem
- Calculations not performed or performed incorrectly
- No application of statistics to analysis of data

## **Outcome 2. An ability to design and conduct experiments, as well as to analyze and interpret data.**

### **High Performance characterized by:**

- Formulates an experimental plan of data gathering to attain a stated objective (develop correlation, test a model, ascertain performance of equipment, etc.)
- Carefully documents data collected
- Develops and implements logical experimental procedures
- Analyzes and interprets data carefully using appropriate theory; if required, translates theory into practice or applies to process model(s)
- Is aware of measurement error and is able to account for it statistically
- Seeks information for experiment(s) from multiple sources

### **Medium performance characterized by:**

- Develops a simplistic experimental plan of data gathering, does not recognize entire scope of study (e.g. not all parameters affecting the results are investigated)
- Data collected are not all documented, units are missing, or some measurements are not recorded  
Experimental procedures most often followed, but occasional oversight leads to loss of experimental efficiency and/or loss of data
- Is aware of measurement error but does not account for it statistically or does so at a minimal level
- Seeks information for experiment(s) from a few sources - mainly from the textbook or the instructor

### **Low performance characterized by:**

- No systematic plan of data gathering; experimental data collection is disorganized, even random, and incomplete
- Data are poorly documented
- Makes no attempt to relate data to theory
- Is unaware of measurement error
- Seeks no extra information for experiments other than what is provided by instructor

**Outcome 3. 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.**

**High performance characterized by:**

- Develops a design strategy, including a plan of attack, decomposition of work into subtasks, development of a timetable
- Suggests new approaches and improves on what has been done before
- Develops several potential solutions and finds optimum
- Understands how areas interrelate and demonstrates ability to integrate prior knowledge into a new problem  
Thinks holistically: sees the whole as well as the parts
- Uses computer tools and engineering resources effectively
- Supports design procedure with documentation and references
- Develops a solution that includes economic, safety, environmental and other realistic constraints
- Applies engineering and/or scientific principles correctly to design practical processes
- Recognizes practical significance of design outcome/answer

**Medium performance characterized by:**

- Uses a design strategy with guidance
- Can follow a previous example competently
- Can develop and compare multiple solutions to a problem, but does not usually arrive at the best result; conducts optimization but neglects one or two key aspects
- Does not think holistically: does not see the integration of the pieces clearly
- Minimal or incorrect use of computer tools and engineering resources
- Design is done, but procedures and equations are not documented or referenced
- Includes only minor or cursory consideration of economic, safety, and environmental constraints
- Applies engineering and/or scientific principles incompletely or incorrectly to design a practical process
- Gives an answer, but does not check its practicality

**Low performance characterized by:**

- No design strategy; haphazard approach
- Cannot design processes or products without significant amounts of help
- Only focuses on one solution to a problem; no optimization attempted
- Unable to relate prior knowledge to the design problem
- Has no concept of the process as a sum of its parts
- No use of computer tools and engineering resources
- Design is done incompletely without the proper equations and without references
- No consideration of economics, safety, and environment
- No application of engineering and/or scientific principles
- Design is incomplete, no answer is given

## **Outcome 4. An ability to function on multi-disciplinary teams.**

### **High performance characterized by:**

- Cooperates with others outside of the discipline and interacts synergistically
- Demonstrates the ability to assume a designated role in the group
- Values and exploits alternative perspectives and participation among all team members
- Has knowledge of technical skills, issues and approaches germane to disciplines outside of industrial and management engineering

### **Medium performance characterized by:**

- Demonstrates an ability to contribute effectively when not in the position to lead
- Manages to work with others outside of the discipline
- Demonstrates an ability to persuade others to adopt his/her ideas or accepts the ideas of others
- Demonstrates some knowledge of other disciplines

### **Low performance characterized by:**

- Demonstrates little ability to contribute effectively in a multidisciplinary, diverse team setting
- Does not demonstrate an ability to work with others outside of the discipline
- Cannot persuade others to adopt his/her ideas or accept the ideas of others
- Has no knowledge of disciplines outside of industrial and management engineering

## **Outcome 5. An ability to identify, formulate and solve engineering problems.**

### **High performance characterized by:**

- Demonstrates creative synthesis of a solution and creates new alternatives by combining knowledge and information
- Can relate theoretical concepts to practical problem solving
- Can predict and defend problem outcomes
- Uses appropriate resources to locate information needed to solve problems
- Takes new information and effectively integrates it with previous knowledge
- Demonstrates understanding of how various pieces of the problem relate to each other and the whole
- Formulates strategies for solving problems
- The answer is correct and properly labeled
- The solution is correct and checked in other ways when it can be; the interpretation is appropriate and makes sense

### **Medium performance characterized by:**

- Demonstrates solution with integration of diverse concepts or derivation of useful relationships involving ideas covered in course concepts; however, no alternative solutions are generated
- Connects theoretical concepts to practical problem-solving when prompted
- Occasionally predicts and defends problem outcomes
- Uses limited resources to solve problems
- Must be assisted in integrating previous knowledge and new information
- Is missing some of the pieces of the whole problem
- Has some strategies for problem-solving, but does not apply them consistently
- The answer is nearly correct, but properly labeled (within reasonable and logical range of the correct answer-it's in the "ballpark")
- The solution is correct, but not checked in other ways

### **Low performance characterized by:**

- Demonstrates solutions implementing simple applications of one formula or equation with close analogies to class/lecture problems
- Does not see the connection between theory and practical problem solving
- Is unable to predict or defend problem outcomes
- Uses no resources to solve problems
- Has no concept of how previous knowledge and new information relate
- Does not realize when major components of the problem are missing
- Has no coherent strategies for problem solving
- The answer is incorrect and not checked for its reasonableness
- No attempt at checking the obviously incorrect solution--no commentary

## **Outcome 6. An understanding of professional and ethical responsibility.**

### **High performance characterized by:**

- Student exhibits knowledge of a professional Code of Ethics
- Participates in class exercises on ethics and professionalism
- Takes personal responsibility for his/her actions
- Evaluates and judges a situation in practice or as a case study, using facts and a professional code of ethics
- Uses personal value system to support actions, but understands the role of professional ethical standards for corporate decisions

### **Medium performance characterized by:**

- Student is aware of the existence of a professional Code of Ethics and other bases for ethical behavior
- Does not take the discussion of ethics that seriously but is willing to accept its existence
- Does not model ethical behavior among peers and faculty
- Doesn't recognize the need to take personal responsibility for his/her actions
- Evaluates and judges a situation in practice or as a case study using personal understanding of the situation, possibly applying a personal value system
- Uses a personal value system to support actions, but confuses personal ethics with professional ethics

### **Low performance characterized by:**

- Student is not aware of any codes for ethical behavior
- Evaluates and judges a situation in practice or as a case study using a biased perspective without objectivity
- Uses personal value system to support actions to the exclusion of all other ethical standards

## **Outcome 7. An ability to communicate effectively**

### **High performance characterized by:**

- Articulates ideas clearly and concisely
- Organizes written materials in a logical sequence to enhance the reader's comprehension (paragraphs, subheading, etc.)
- Uses graphs, tables, diagrams and/or other visuals to support points-to explain, interpret, and assess information
- Written work is presented neatly and professionally
- Grammar and spelling are correct
- Figures are all in proper format
- Uses good professional writing style
- Conforms to the prescribed format (if any)

### **Medium performance characterized by:**

- Articulates ideas, but writing is somewhat disjointed, superfluous or difficult to follow
- Materials are generally organized well, but paragraphs combine multiple thoughts or sections and sub-sections are not identified clearly
- Uses graphs, tables, and diagrams, but only in a few instances are they applied to support, explain or interpret information
- Work is not neatly presented throughout
- One or two spelling/grammar errors per page
- Figures are present but are flawed-axes mislabeled, no data points, etc.
- Style is informal or inappropriate jargon is used, improper voice, tense...
- The prescribed format is only followed in some portions of the paper

### **Low performance characterized by:**

- Text rambles, points made are only understood with repeated reading, and key points are not organized
- Little or no structure or organization; no subheadings or proper paragraph structure used
- Graphs, tables or diagrams are used, but no reference is made to them
- Work is not presented neatly
- Spelling/grammar errors present throughout more than 1/3 of the paper
- No figures or graphics are used at all
- The writing style is inappropriate for the audience and for the assignment
- The prescribed format is not followed

**Outcome 8. That you have attained the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.**

**High performance characterized by:**

- Shows familiarity with current trends in the industrial and management engineering discipline
- Respects the historical aspects of engineering solutions and their impacts
- Shows familiarity with the content of periodicals that are relevant to understanding the global and societal impact of engineering
- Has a personal perspective on the importance (or lack thereof) of engineering in today's world

**Medium performance characterized by:**

- Demonstrates awareness of current events in society
- Is aware of historical aspects of engineering solutions, but is not influenced by them
- Demonstrates awareness of the existence of technical periodicals - knows where to look to find them
- Is interested in engineering because of what the discipline offers him/her personally

**Low performance characterized by:**

- Shows little awareness of current events
- Is unaware of the historical effect of engineering solutions
- Is not familiar with any technical periodicals
- Isn't sure why he/she is studying engineering

**Outcome 9. That you recognize the need for, and have an ability to engage in life-long learning.**

**High performance characterized by:**

- Demonstrates ability to learn independently
- Goes beyond what is required in completing an assignment and brings information from outside sources into assignments
- Learns from mistakes and practices continuous improvement
- Demonstrates capability to think for one's self
- Demonstrates responsibility for creating one's own learning opportunities
- Is able to understand, interpret, and apply learned materials and concepts in a format different from that taught in class (e.g. different nomenclature, understands equations from different textbooks)
- Participates and takes a leadership role in professional and technical societies available to the student body

**Medium performance characterized by:**

- Requires guidance as to expected outcome of task or project
- Completes only what is required
- Sometimes is able to avoid repeating the same mistakes
- Seldom brings information from outside sources to assignments
- Has some trouble using materials and concepts that are in a different format from that taught in class
- Occasionally participates in the activities of local professional and technical societies

**Low performance characterized by:**

- Requires detailed or step-by-step instructions to complete a task
- Has trouble completing even the minimum required tasks
- Is unable to recognize own shortcomings or deficiencies
- Assumes that all learning takes place within the confines of the class
- Shows little or no interest in outside learning resources
- Cannot use materials outside of what is explained in class
- Does not show any interest in professional and/or technical societies

## **Outcome 10. That you have knowledge of contemporary issues.**

### **High performance characterized by:**

- Demonstrates strong knowledge of current events in the engineering discipline and in society
- Has a good perspective on current career opportunities
- Able to discuss in-depth major political issues at national, state and local levels
  - Can summarize essence of several issues; take and defend a position on them
  - Is able to evaluate political solutions, or scenarios using a series of different measures - e.g., economic, quality of life; number of individuals affected; political ramifications; etc.

### **Medium performance characterized by:**

- Demonstrates some knowledge of current events
- Has a somewhat narrow perspective on current career opportunities
- Able to comment on major political issues, but is not familiar enough with them to defend a position on them
  - Can summarize the facts of the issues
  - Can only comment on possible alternative political solutions, or scenarios using a few different measures - e.g., economic, quality of life; number of individuals affected; political ramifications; etc.

### **Low performance characterized by:**

- Demonstrates little knowledge about issues and events in the world
- Has not undertaken a thoughtful career assessment
- Provides no commentary on political solutions or awareness of world and local happenings

**Outcome 11. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.**

**High performance characterized by:**

- Uses computer-based and other resources effectively in assignments/projects
- Seeks information on problems from multiple resources
- Is able to interpret and understand information from a variety of resources
- Maintains current, state-of-the-art abilities in computer use
- Is able to learn and implement process simulation software
- Understand the organization and use of the library

**Medium performance characterized by:**

- Uses computer-based and other resources adequately in assignments/projects
- Seeks information on problems from at least one or two resources
- Is mostly able to interpret and understand information from a variety of resources
- Maintains a functional set of abilities in computer use
- Is able to build rudimentary simulation models
- Able to utilize library resources

**Low performance characterized by:**

- Inadequate use of computer-based and other resources in assignments/projects
- Fails to seek information on problems from multiple resources
- Unable to interpret and understand information from a variety of resources
- Poor or inadequate abilities in computer use
- Unable to use simulation software
- Does not demonstrate understanding of the organization and use of the library