

## **MSE 4420: Capstone Engineering Design II (required)**

### **Catalog Description:** (3-1-6)

Prerequisites: MSE 4410 Engineering Capstone Design I

A team problem-solving approach is used to work on a project developed in cooperation with industry. Weekly communications, both oral and written, are required.

**Textbook:** K.T. Ulrich and S.D. Eppinger, *Product Design and Development*, McGraw-Hill, 2003 or 2008

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### **Topics Covered:**

1. Engineering design methodology
2. Technical communication
3. Decision making strategies
4. Experimental design
5. Data analysis

### **Course Outcomes:**

By the end of the course, the successful student will be able to:

1. Effectively communicate technical information in written and oral formats.
2. Collaborate with a team of peers to undertake a design project.
3. Recognize the professional and ethical responsibilities of a materials engineer.
4. Identify and formulate a materials engineering design problem.
5. Define and prioritize realistic constraints for a materials engineering design problem.
6. Critically analyze the results of processing and/or characterization experiments.
7. Apply integrated knowledge of the structure, properties, processing, and performance of materials to solve a design problem.

**Correlation between Course Outcomes and Student Outcomes:**

Course Outcomes	Student Outcomes										
	a	b	c	d	e	f	g	h	i	j	k
1. Effectively communicate technical information in written and oral formats.							X				X
2. Collaborate with a team of peers to undertake a design project.				X		X	X				
3. Recognize the professional and ethical responsibilities of a materials engineer.						X					
4. Identify and formulate a materials engineering design problem.			X		X						
5. Define and prioritize realistic constraints for a materials engineering problem			X								
6. Critically analyze the results of processing and/or characterization experiments.	X	X									X
7. Apply integrated knowledge of the structure, properties, processing, and performance of materials to solve a design problem.	X	X	X		X			X		X	
<b>Entire Course</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>2</b>
<b>0 = None or insignificant; 1 = Some; 2 = Moderate; 3 = Strong</b>											

**School of Materials Science and Engineering Student Outcomes:**

- a) an ability to apply knowledge of mathematics, science and engineering
- b) an ability to design and conduct experiments, as well as to analyze and interpret data
- 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
- d) an ability to function on multidisciplinary teams
- e) an ability to identify, formulate, and solve engineering problems
- f) an understanding of professional and ethical responsibility
- g) an ability to communicate effectively
- h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- i) a recognition of the need for, and an ability to engage in life-long learning
- j) a knowledge of contemporary issues
- k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice