Mechanical Engineering and Mechanics
MEM 492 Senior Design II

Winter 2007

Instructors: Dr. Mun Young Choi, x-6984, choi@drexel.edu
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Office Hours: Office consultation is available from M-F from 9 to 6 PM. Contact Ms. Kathie Donahue (x-1481) to schedule an appointment.

Teaching Asst: Mr. Jae Nam, jhn23@drexele.edu

Designation: Required

Catalog Description: Introduces the design process, including information retrieval, problem definition, proposal writing, patents, and design notebooks. Includes presentations on problem areas by experts from industry, government, and education

Prerequisites: MEM 230, MEM 238, MEM 355, and MEM 345

Textbook(s): Fundamentals of Engineering Design (ISBN 013046712)
By Barry Hyman, 2003
Design for Design for Six Sigma (ISBN 0071413766)
by Greg Brue and Robert G. Launsby, 2004

Grading Policy: Grade from Faculty Advisor: 70%
(includes grading of oral presentation delivered to faculty advisor)
Grade from SD Committee: 30%

A:90-100; B:80-89: C:70-79: D:60-69: F:0-59

Course Objectives: This course constitutes the first term of a three-term course sequence. It aims to train the students in identifying projects of relevance to the society, in planning and scheduling a solution, and in entrepreneurial activities that may result from the project.

1. Describe, understand, and implement the important elements of an engineering design process including:
    - Identifying the need
    - Problem definition
    - Searching for existing solutions
    - Defining constraints
    - Defining criteria
    - Developing alternative solutions
    - Providing detailed engineering analysis
    - Deciding on a final design
    - Specifying the requirements of the final design
2. Effectively communicate the ideas and processes involved in the final design through written and oral communication methods
3. Understand contemporary industry practices in the field of mechanical engineering

4. Acquire and analyze current and relevant information from a variety of literature sources
5. Understand the important role of ethics in the implementation of engineering projects
6. Develop experience and best practices in working in a team environment

Topics:

1. Effective Oral Presentations
2. Effective Written Reports
3. Safety Concerns in the Engineering Profession
4. Professionalism and Engineering Ethics
5. Contract Concerns in the Engineering Profession
6. Sustainable Engineering
7.

Class Schedule: 1 hours/week lecture (3 credits); 3 hours of meeting with team members and advisor per week

Contribution to Professional Component:

Relationship to Program Outcomes:

Outcomes a - k	Content	Explanation	Evidence
a. An ability to apply knowledge of math, science and engineering	**2**	This course requires students to draw from their knowledge of their previous courses that serve as pre-requisite courses including but not limited to heat transfer, thermodynamics, systems and control, mechanics, calculus, physics, chemistry, and biology	Design project pre-proposal evaluation, final written report evaluation, and final oral presentation evaluation
b. An ability to design and conduct experiments as well as to analyze and interpret data	**2**	As part of the design project, students are encouraged to develop design prototypes for testing. Students are also encouraged to develop simulations and models that are used in conjunction with the physical models to validate and further develop the models	Design project pre-proposal evaluation, final written report evaluation, and final oral presentation evaluation
c. An ability to design a system, component or process to meet desired needs	**2**	The assigned design problems are always required to meet societal or industrial needs.	Design project pre-proposal evaluation, final written report evaluation, and final oral presentation evaluation
d. An ability to function on multidisciplinary teams	**2**	Multi-disciplinary teams involving ME students with diverse concentration backgrounds are encouraged. Multi-disciplinary teams involving ME, EE, CE, MSE, CS, and Biomed students are encouaraged	Evaluation of design project pre-proposal
e. An ability to identify, formulate and solve engineering problems	**2**	The design project require students to identify, formulate and solve engineering problems.	Design project pre-proposal evaluation, final written report evaluation, and final oral presentation evaluation
f. An understanding of professional and ethical responsibility	**2**	The importance of ethics is emphasized of the engineer's overall responsibility.	Classroom discussion of ethical issues that arise in the implementation of engineering design. Evaluation of ethical

			conduct of the project in the oral presentation and in the final written report
g. An ability to communicate effectively	**2**	Written pre-proposal, written final report, and oral presentation are important components of this course	Design project pre-proposal evaluation, final written report evaluation, and final oral presentation evaluation
h. The broad education necessary to understand the impact of engineering solutions in a global/societal context	**2**	The impact of engineering design on the environmental (pollution, greenhouse effect, etc.) and societal (the use of advanced engineering technology such as mechanization, tissue engineering, biological research, etc) issues are discussed during classroom discussion.	Classroom discussion of environmental and societal issues that arise in the implementation of engineering design. Evaluation of environmental and societal issues for the project in the oral presentation and in the final written report
i. A recognition of the need for and an ability to engage in lifelong learning	**2**	The implementation of the design and analysis required for a successful project will reveal to the students that there are elements of their technical knowledge that requires further study. This is especially true for projects that involve a multi-disciplinary approach for solution	Design project pre-proposal evaluation, final written report evaluation, and final oral presentation evaluation
j. A knowledge of contemporary issues	**2**	Research of information on current technology, best practices, etc is a critical component in the *identifying the need, defining the problem, and searching for solution phases of the project*	Design project pre-proposal evaluation, final written report evaluation, and final oral presentation evaluation
k. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice	**2**	Team members are provided with a suite of software for analysis of heat transfer, fluid mechanics, systems, stress analysis, dynamic loading, etc. Students are also provided with an extensive suite of testing equipment	Design project pre-proposal evaluation, final written report evaluation, and final oral presentation evaluation

Prepared by: Dr. Mun Y. Choi and Dr. Wei Sun, September 2006