Designation as a 'Required' or 'Elective' course
TYPE OF COURSE: Required for BSME and BSIE Majors

Course (catalog) description
COURSE DESCRIPTION: IE/ME 396 Senior Design I. 4 Hours. Systematic approach to the design process. Creative problem solving. Design methodology and engineering principles applied to open-ended design problems with inherent breadth and innovation.

PREREQUISITE(S): Senior standing with the department. Completion of core courses and consent of the instructor.

Textbook(s) and/or other required material
None.

Course objectives
COURSE OBJECTIVES: This course integrates the knowledge acquired in the various courses of the undergraduate curriculum to an open-ended design effort and applies the knowledge gained to the solution of a contemporary engineering problem. Students improve oral and written communication skills, gain familiarity with available technical literature, and experience the life cycle of a design project within a group environment. Many projects include practice in the use of computers and relevant support software while solving a design problem. Students work together as a team to accomplish common goals. Issues of professional ethics are also discussed.

Topics covered
MAJOR TOPICS: Hrs
1 Systematic approach to the design process; project management 4
2 Recognition/elicitation of customer needs 1
3 Translation of customer needs to functional specifications 1
4 Systematic aids to creativity 1
5 Student design projects: formation of teams, development of design needs and specifications, solution concept generation, analysis, concept selection, concept development including analysis and optimization, detail design, possible prototyping, design reviews, written formal reports 48
6 Engineering workplace issues: intellectual property, liability, ethics 2
7 Style and substance of reports and oral presentations 1
8 Presentations (in lieu of examinations) 2

Total 60
Class/laboratory schedule, number of sessions each week and duration of each session

CREDIT HOURS: 4 Hours

TYPE OF INSTRUCTION:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Contact Hours/Week</th>
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<tbody>
<tr>
<td>Lecture-Discussion</td>
<td>4</td>
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<tr>
<td>Laboratory</td>
<td>0</td>
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Contribution of course to meeting the professional component

This course is a capstone design course, and is intended to expose students to many of the aspects of working in a professional environment. Students work in teams on projects for industry or other clients. It includes open-ended design, teamwork, communication, and customer interaction. Analysis of the designed system is required, with application of whatever technical content from the entire curriculum is relevant to the team’s problem. Process documentation with approval mechanisms at significant gates is also required.

Relationship of course to program outcomes

As shown in the BSME Course Outcomes Matrix, this course contributes to:

a. Ability to apply knowledge of mathematics, science and engineering
b. Ability to design a system, component, or process to meet desired needs
c. Ability to function on multi-disciplinary teams
d. Ability to identify, formulate, and solve engineering problems
e. Understanding of professional and ethical responsibility
f. Ability to communicate effectively
g. Broad education necessary to understand the impact of engineering solutions in a global and societal context
h. Recognition of the need for, and ability to engage in life-long learning

Person who prepared this description and date of preparation

Michael J. Scott, Assistant Professor of Mechanical Engineering, January 28, 2002;
Revised by Constantine M. Megaridis, Professor of Mechanical Engineering, August 27, 2007.

Comments on outcomes

a. Projects require application of engineering analysis, both by hand and using computer software.
b. Project course with open-ended problems requiring creativity and new ideas.
c. Semester projects are performed in teams of three undergraduates.
d. Design projects require teams to determine which problems to analyze and solve.
e. Ethical considerations inherent in design decisions.
f. Teams give oral and written presentations at midterm and semester end.
g. Projects often deal with the environment, clean energy, and the like; life-cycle considerations in design.
h. Many projects have clients or technical advisors from industry; interacting with professional engineers further along in their careers, students learn first-hand the need to keep current.

The above outcomes are what students are expected to gain from completing this course.