ABET Course Description

IND E 494
Design in the Manufacturing Firm

Catalog Course Description: Engineering design in manufacturing firms is presented. Topics include design methodology, concurrent engineering, and project management. Focus on the relationship between product design and manufacturing (design for production and assembly).

GOALS

Students who take this course will be able to participate in and understand the workings of design and development projects at engineering companies. They will also be able to analyze the interaction between manufacturing process concerns and design decisions.

COURSE OBJECTIVES

Each student should:

1. understand the role of engineering design
   explain the relationship between design and economic activity
   describe the role of design on new products and new processes
   characterize the interaction between organizational structure and design and manufacturing decisions

2. understand the role of manufacturing processes on engineering design decisions
   describe the main manufacturing steps in a variety of common manufacturing processes (assembly, machining and metals manufacturing, plastics manufacturing, electronics manufacturing)
   identify design features that make each of these manufacturing process both harder and easier
   assess design and manufacturing features on real products

3. understand the role of the engineering profession and design decisions on a range of topics
   explain the role of ethics on engineering behavior
   describe the influence on liability and safety concerns on design decisions
   explain the function and role of patents and intellectual property issues
   evaluate environmental effects of design decisions

4. be able to structure and implement a design process
   identify customer needs
   establish target design specifications based on customer needs
   generate design conceptual alternatives
   evaluate design alternatives

PROGRAM OBJECTIVES THIS COURSE SATISFIES

1. Graduates will be capable in mathematics, sciences, engineering fundamentals, and the use of computers.
2. Graduates will have a broad knowledge of the various modern industrial engineering methods and tools associated with manufacturing systems, operations research, quality engineering, and human factors.
3. Graduates will have the ability to apply engineering design methods to represent, integrate and solve problems, including the ability to recognize problem context and integrate knowledge and skills from appropriate sources.
4. Graduates will have the ability to communicate effectively.
5. Graduates should possess the following professional characteristics: leadership, ethics, the ability to work with others, and an appreciation for other disciplines.
6. Graduates will have an understanding of the integrated, broad nature of the IE discipline with an appreciation of the depth of the field and an ability to find information, when needed.
**ABET LEARNING OUTCOMES (a-l) THIS COURSE SATISFIES**

a. an ability to apply knowledge of mathematics, science and engineering  
b. an ability to design a system, component, or process to meet desired needs  
d. ability to function on multi-disciplinary 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 and societal context  
k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice  
l. an understanding of the integrated, interdisciplinary nature of the discipline.

**ASSESSMENT**

1. exams  
2. homework  
3. laboratories  
4. oral and written project report

**CONTRIBUTION TO PROFESSIONAL COMPONENT**

This course is part of the engineering topics area, and includes aspects of both engineering science and design.