

ME 26300

INTRODUCTION TO MECHANICAL ENGINEERING DESIGN, INNOVATION, AND ENTREPRENEURSHIP

Course Outcomes [Related ME Program Outcomes in brackets]

1. Instill the philosophy that real engineering design problems are open-ended and multifaceted. [A5, A6]
2. Teach a systemic design methodology. [A5, A6, C2]
3. Provide guidance in applying engineering principles to open-ended problems. [A1, A2, A5, A6]
4. Develop the ability to mathematically model and analyze engineering systems. [A2, A4]
5. Sharpen skills in leadership, teamwork, communication, project planning, innovation, design and entrepreneurship. [A5, B1, B2, B3, B5, C1, C2, C3, C4]
6. Instill a philosophy of professional and ethical behavior. [B3]
7. Provide a foundation for the rest of the mechanical engineering curriculum and future careers. [B5]

**Phase I: Problem
Definition (4.5 wks)**

1. Problem Statement
2. Customer Survey
3. Competitive Product Study (Benchmarking)
4. Market Analysis
5. Patent/Periodical Search
6. Quality Function Deployment (HOQ)
7. Problem Definition
8. Design Review

**Phase II: Concept
Generation and Evaluation
(4.5 wks)**

1. Functional Decomposition
2. Brainstorming
3. Preliminary Concept Evaluations: Feasibility Judgment, Technology Readiness Assessment, Decision Matrix
4. Concept Selection
5. Engineering Modeling of Concepts
6. Comparison with Benchmarks
7. Design Review

**Phase III: Product Design
(6 wks)**

1. Selection Design
2. Bill of Materials
3. Assembly/Parts CAD Modeling
4. Manufacturing Processes
5. Performance Analyses
6. Assembly Analysis
7. Economic Analysis
8. Final Design Presentation

Example Projects

1. Personal Transportation Systems
2. Assistive Devices in Multi-Level Apartments
3. Personal Exercise Machines
4. Personal Power Generation
5. Roof Rack Loading Devices
6. Hitch/Receiver Mounting Accessories

1. COURSE NUMBER AND NAME: ME 26300 Introduction to Mechanical Engineering Design, Innovation and Entrepreneurship

2. CREDITS AND CONTACT HOURS: 3 credits

- a. Lecture - 2 days per week at 50 minutes for 15 weeks
- b. Lab – 2 days per week at 110 and 50 minutes for 15 weeks

3. COURSE COORDINATOR OR INSTRUCTOR:

D. C. Anderson

4. TEXTBOOK:

The Mechanical Design Process, D. G. Ullman, Fourth Edition, McGraw-Hill, 2010.

Other Supplemental Material: Purchased notes packet

5. SPECIFIC COURSE INFORMATION:

a. Catalog Description: The product design process. Development of product design specifications using customer inputs, benchmarking, product/ market research and patent review. Concept generation and evaluation using brainstorming, functional decomposition, modeling and decision matrices. Detailed product design including assembly, economic analysis, CAD, and bill of materials. Oral and written design reviews. Key skills developed include leadership, teamwork, communication, project planning, innovation, design, and entrepreneurship. Typically offered Fall Spring.

b. Prerequisites – ME 20000 Thermo. I, ME 27000 Basic Mech. I or CE27100; COM 11400 or COM C1100; ENGL 10600 or ENGL 10800; ENGR 12600 or ENGR 10600 or ENGR 12600 or ENGR 10600 or ENGR 12100; CGT 16300

Concurrent Prerequisites – MA 26200 – Linear Algebra and Differential Equations, ME 29000 – Global Engineering Professional Seminar

c. Status: Required

6. SPECIFIC GOALS FOR THE COURSE

a. Course Outcomes:

[Related ME Program Outcomes in brackets]

- 1. Instill the *philosophy* that real engineering design problems are open-ended and multifaceted. [A5, A6]
- 2. Teach a *systematic design methodology*. [A5, A6, C2]
- 3. Provide *guidance* in applying engineering principles to open-ended problems. [A1, A2, A5, A6]
- 4. Develop the ability to *mathematically model* and *analyze* engineering systems. [A2, A4]
- 5. Foster key skills in *leadership, teamwork, communication, project planning, innovation, design* and *entrepreneurship*. [A6, B1, B2, B3, B5, C1, C2, C3, C4]
- 6. Instill a philosophy of *professional* and *ethical behavior*. [B3]
- 7. Provide a *foundation* for the rest of the mechanical engineering curriculum and future careers. [B5]

b. Related ME Program Outcomes:

[Related ABET Outcomes Listed in Brackets]

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| A1. Engineering Fundamentals; | B3. Prof/Ethical Responsibility; |
| A2. Analytical Skills; | B4. Contemporary Issues; |
| A3. Experimental Skills; | B5. Life-Long Learning; |
| A4. Modern Engr Tools; | C1. Leadership, |
| A5. Design Skills; | C2. Global Engineering Skills; |
| A6. Impact of Engr Solns; | C3. Innovation; |
| B1. Communication Skills; | C4. Entrepreneurship |
| B2. Teamwork Skills | |

7. LIST OF TOPICS: See following page.

PREPARED BY: D. C. Anderson

REVISION DATE: June 20, 2012