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
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:
   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 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. Providence 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]

7. LIST OF TOPICS: See following page.

PREPARED BY: D. C. Anderson
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