ME 463
Engineering Design

Course Outcomes [Related ME Program Outcomes in brackets]

1. Reinforce the *philosophy* that engineering design problems are open-ended and multifaceted. [1, 2, 3, 5]
2. Exercise a *collaborative design methodology*. [2, 3, 4, 5, 6, 7]
3. Broaden skills in *leadership*, *teamwork*, *communication*, *project planning, innovation, design,* and *entrepreneurship.* [3, 5]
4. Experience the application of core course materials, engineering design methods, and testing to practical open-ended design problems. [1, 2, 6]
5. Reinforce a philosophy of *professional* and *ethical behavior*. [4]
6. Provide a *practical foundation* for knowledge acquisition and continued learning as needed in students' future careers. [7]

Problem Definition (1 wk)

1. Problem Statement
2. Competitive Product Study (Benchmarking)
3. Patent/Periodical Search
4. Problem Definition

Concept Generation and Evaluation (4 wks)

1. Concept Generation
2. Engineering Modeling of Concepts using Core Course Material
3. Preliminary Design Review

Product Design and Marketing (5 wks)

1. Selection Design
2. Bill of Materials
3. Assembly/Parts Drawings
4. Performance Analysis
5. Economic Analysis
6. Critical Design Review

Recent Design Projects

1. Mini Baja and Formula Vehicles
2. Motorized Street Luge
3. Eco-Car
4. Spinal Insert Tester
5. Automated Rope Climber
6. Ergonomically-Designed Baby Carrier
7. Autonomous Golf Ball Collector
8. Hospital Bed Innovations

Prototyping, Fabrication, and Testing (5wks)

1. Material and parts acquisition
2. Fabrication
3. Assembly
4. Testing
5. Final Design Review

COURSE NUMBER: ME 463

COURSE TITLE: Engineering Design

REQUIRED COURSE OR ELECTIVE COURSE: Required

TERMS OFFERED: Fall, Spring and Summer

TEXTBOOK/REQUIRED MATERIAL: None

PRE-REQUISITIES: ME 315 Heat and Mass Transfer, ME 354 Machine Design I & ME 35401 Machine Design Lab, ME 375 System Modeling and Analysis

COORDINATING FACULTY: G. Jensen

COURSE DESCRIPTION: Application of the design process to the design of various engineering components and systems. Mathematical modeling in design is emphasized. Design problems from all areas of mechanical engineering are considered.

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3. Broaden skills in *leadership*, *teamwork*, *communication*, *project planning, innovation, design,* and *entrepreneurship*. [3, 5]
4. Experience the application of core course materials, engineering design methods, and testing to practical open-ended design problems. [1, 2, 6]
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ASSESSMENTS TOOLS:

1. Design notebook.
2. Preliminary and critical design reviews.
3. Mid-semester peer evaluations.
4. Final design review and presentation.
5. Final peer evaluations.

NATURE OF DESIGN CONTENT: ME 463 is a true exposure to the multi-faceted and open-ended nature of design problems. Students experience design by doing. ME 463 is distinguished from ME 263 in that it requires the design concept to be fabricated and tested.

RELATED ME PROGRAM OUTCOMES:

1. Engineering fundamentals
2. Engineering design
3. Communication skills
4. Ethical/Prof. responsibilities
5. Teamwork skills
6. Experimental skills
7. Knowledge acquisition

PROFESSIONAL COMPONENT:
Engineering Design – 100%

COMPUTER USAGE: The computer is viewed as a design tool. Students are expected to use the computer for engineering analysis and design required for each project. The resources of the Engineering Computer Network, a host of stand-alone small computers, CAD and math packages, and the Purdue University Computing Center are available. Projects require some software development or the use of existing software. Extensive computer useage in prerequisite courses prepares the students for independent use of the computer systems in this course.

COURSE STRUCTURE/SCHEDULE:

Lecture - 3 days per week at 50 minutes

PREPARED BY: G. Jensen

REVISION DATE: January 31, 2019