ME 553
Product and Process Design

Course Outcomes [Related ME Program Outcomes in brackets]

1. Understand the fundamentals *product design processes*. [1]
2. Understand the frameworks for *creative ideation and front end of design*. [1]
3. Understand the fundamentals *value-based opportunity identification*. [1]
4. Understand the principles of *opportunity development*. [1]
5. Understand the frameworks for *innovation through design.* [1]
6. Enhance *problem-solving* and *communication* skills through design projects. [1, 2, 3, 5, 6]

Product Opportunity Identification (5 weeks)

- Product Development Process
- Design Thinking
- Exploring the Design Spaces
- Product Planning Methods
- Value Engineering and Value Analysis

Opportunity Understanding (5 weeks)

- Market Research Techniques
- Value Mapping
- Visual Thinking
- Creative Techniques
- Question Asking

Business Model Innovation (5 weeks)

- Innovation and Creativity
- Product Platforms Architectures
- Business Model Design
- Sustainability and Circular Design
- Internet of Things (IoT)
- Prototyping Techniques

Integrative Project

Design and develop a product opportunity into a low fidelity prototype and business model. Industry projects or design driven research will be used to develop a Value Opportunity and understanding into a low-fidelity prototype. Business value proposition and model will be developed concurrently.

COURSE NUMBER: ME 553

COURSE TITLE: Product and Process Design

REQUIRED COURSE OR ELECTIVE COURSE: Elective

TERMS OFFERED: Spring

TEXTBOOK/REQUIRED MATERIAL:
Title: Product Design and Development - 6th Edition
Authors: Karl Ulrich & Steven Eppinger
ISBN-13: 978-0078029066
ISBN-10: 0078029066

PRE-REQUISITIES:

COORDINATING FACULTY:

COURSE DESCRIPTION: This course enables students to identify product opportunities along with the value it offers, the design process to further understand the opportunity, and ultimately learning to the development and design through the innovation process.

COURSE OUTCOMES [Related ME Program Outcomes in brackets]:

1. Understand the fundamentals *product design processes*. [1, 2, 7]
2. Understand the frameworks for *creative ideation and front end of design*. [1, 2]
3. Understand the fundamentals *value-based opportunity identification*. [1, 2, 7]
4. Understand the principles of *opportunity development*. [1, 2, 6, 7]
5. Understand the frameworks for *innovation through design.* [1, 2, 3, 5, 6]
6. Enhance *problem-solving* and *communication* skills through design projects. [1, 2, 3, 4, 5, 6]

ASSESSMENTS TOOLS:

1. Homework assignments.
2. Thought questions
3. Quizzes.
4. A final project report and presentation

NATURE OF DESIGN CONTENT: The iterative and creative nature of the design process is framed in the lectures and exercises. The project captures all key aspects so the students experience the full design cycle towards a low-fidelity prototype.

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:

1. Engineering Topics: Engineering Science – 1 credit (40%)
   Engineering Design – 2 credits (60%)

COMPUTER USAGE: All the lab activities require computers.

COURSE STRUCTURE/SCHEDULE:

1. Lecture – 2 lectures per week – 75min duration each

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