

ME 2110 Creative Decisions and Design (Required)

Catalog Description: ME 2110 Creative Decisions and Design (2-3-3)
Prerequisites: ME 1770 Introduction to Engineering Graphics and Visualization
Corequisites: COE 2001 Statics
To learn fundamental techniques for creating, analyzing, synthesizing, and implementing design solutions to open-ended problems with flexibility, adaptability, and creativity through team and individual efforts.

Textbook: William Singhose and Jeff Donnell, *Introductory Mechanical Design Tools*, 1st Edition, Lulu, 2012.

Topics Covered:

1. Phases of design.
2. Customer needs and market analysis – Quality Function Deployment (QFD).
3. Design assessment and evaluation.
4. Basic system fabrication techniques.
5. Basic electronics and pneumatics.
6. Design documentation and project reporting.
7. Management and planning tools.
8. Problem definition and specification, functional requirements.
9. Conceptual design.
10. Design for manufacturing, assembly, maintenance, and the environment.
11. Design case studies.
12. Intellectual property issues.

Course Outcomes:

Outcome 1: To enable students to learn how to formulate and address open-ended design problems, including problem definitions and specifications and the identification of functional requirements.

- 1.1 Students will demonstrate their ability to formulate functional requirements for open-ended design problems.
- 1.2 Students will learn to formulate specifications for a design problem based on functional requirements, customer needs, and physical reality.

Outcome 2: To provide students with a systematic approach to design based on a variety of design methods that permit the consideration and incorporation of a broad spectrum of design options.

- 2.1 Students will demonstrate their ability to consider multiple design alternatives and identify the best possible choice based on the design specifications.
- 2.2 Students will learn to use a broad spectrum of design tools to implement a number of methodologies used in conceptual design evaluation.

Outcome 3: To enable students to learn to consider a variety of issues such as manufacturing, maintenance, quality, environmental issues, and related aspects while designing.

- 3.1 Students will learn to consider a variety of issues that are critical to the successful implementation of a design.

Outcome 4: To enhance a student’s ability to communicate at personal and technical levels, in both oral and written fashions.

- 4.1 Students will give oral presentations relating to work accomplished in their design studio sections pertaining to both the mini-projects and the major project.
- 4.2 Students will provide written reports (including final and interim reports) detailing their design developments in their studio sections.

Outcome 5: To provide students with a hands-on experience permitting them to realize basic design concepts in a studio environment.

- 5.1 Students will demonstrate the ability to fabricate various mechanical systems in their studio sections. The systems they fabricate will be of their own design to meet specific functional requirements.
- 5.2 Students will learn that specifications may be difficult to achieve with an actual system despite the fact that the specifications are theoretically possible.

Outcome 6: To enable students to work in self-managed teams.

- 6.1 Students will demonstrate the ability to work in teams by developing and implementing designs as well as documenting the designs in written and oral reports.

Outcome 7: To provide students with the opportunity to demonstrate basic concepts in mechanical systems via the implementation of their designs.

- 7.1 Students will demonstrate a variety of mechanical system concepts and theories by designing small-scale mechanical systems based on fundamental principles, and subsequently fabricating these systems in their studio.

Correlation between Course Outcomes and Student Outcomes:

ME 2110											
	Mechanical Engineering Student Outcomes										
Course Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Outcome 1.1	X		X		X	X		X			X
Course Outcome 1.2	X		X		X	X		X			X
Course Outcome 2.1	X		X		X	X		X			X
Course Outcome 2.2	X		X		X			X			X
Course Outcome 3.1			X		X	X		X			
Course Outcome 4.1							X	X			X
Course Outcome 4.2							X	X			X
Course Outcome 5.1			X		X			X	X		X
Course Outcome 5.2		X	X		X			X	X		X
Course Outcome 6.1	X	X	X	X	X	X	X	X	X		X
Course Outcome 7.1	X	X	X	X	X	X		X			X

GWV School of Mechanical Engineering Student Outcomes:

- (a) an ability to apply knowledge of mathematics, science and engineering
- (b) an ability to design and conduct experiments, as well as to analyze and interpret data

- (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- (d) an ability to function on multidisciplinary 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, economic, environmental, and societal context
- (i) a recognition of the need for, and an ability to engage in life-long learning
- (j) a knowledge of contemporary issues
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

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