

King Fahd University of Petroleum & Minerals
MECHANICAL ENGINEERING DEPARTMENT

ME 218: Introduction to Mechanical Engineering Design

Catalogue Description: (1-1-2)

Mechanical engineering design process. Open-ended problem solving. Teamwork. Team-based design projects. Estimation, modeling and basic science principles related to project. Manufacturing, assembly and testing. Communication skills in design, Ethical issues in design.

Status in Curriculum (Required or Elective): Required (offered Fall & Spring)

Prerequisites: Phys102, ME 210

Co-requisites: None

Prerequisites by Topics:

- Friction, Potential & Kinetic Energy, Projectile Motion, impact (Phys102)
- 2-D and 3-D drawing, animation (ME210)

Textbook: No Textbook; Course notes and Power Point Presentations.

References:

- 1) **Engineering Design: A Project Based Introduction**, Clive L. Dym & P. Little, John Wiley, 2009.
- 2) **Exploring Engineering: An introduction for Freshmen to Engineering and to the Design Process**, Kosky P. et al., Elsevier Inc. 2006.
- 3) **Engineering Design**, G. E. Dieter, 3rd Ed. McGraw-Hill, 2000.
- 4) **Fundamentals of Engineering Design**, B. Hyman, 2nd Ed. Prentice Hall, 2003.

Coordinator: Dr. Nesar Merah, Professor of Mechanical Engineering

Goals:

The purpose of this course is to teach the students:

1. The basics of design process in Mechanical Engineering
2. Idea generation and creativity
3. The use of evaluation techniques and critical thinking to take decisions.
4. To appreciate the dynamics of a design team and experience teamwork
5. Basic manufacturing processes and the use of simple machine tools.
6. Construction, testing and debugging of simple prototypes.
7. Communication skills in design

Course Outline (Lecture Topics):

Topics	Lectures	Labs
Introduction to mechanical engineering design	1/2	
Teamwork, efficient meetings, conflict solving	1/2	1
Customer needs, specifications	1	1
Brainstorming (Idea Generation)	1	2
Decomposition and product architecture		1
Conceptual design: concept generation and selection of the best alternative	2	1
Project Related Basic Science and Engineering	1	1
Modeling and estimation	1	1
design of experiments for testing	1	1
Manufacturing processes	1	1
Construction, debugging and testing of modules	1	2
Assembly, system testing and competition details	1	1
Communication Skills	1	
Engineering ethics and liability	1	

Final presentation and Competition	1	1
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Design Activities/Projects:

The course is project-based with hands-on experience.

Computer Usage:

Students are required to use SOLIDWORKS to produce design drawings and to simulate projectile motion using Excel.

Laboratory:

3 hours/week hands-on activities. Students work in teams to design, model, manufacture and test mechanical system

Assessment Tools:

Quizzes	Innovation in Prototype Design
Class activities & assignments	Presentation (oral/Poster)
Teamwork	Competition
Application of design process to project	Design Notebook

Course Learning Outcomes:

1. Apply engineering design process to design mechanical systems
2. Understand customer needs and translate them into engineering design concepts
3. Analyze and evaluate alternative designs and select most appropriate ones
4. Produce quality sketches, drawings and physical models of their concepts
5. Operate simple machine tools to produce models and prototypes
6. Construct, test and debug mechanical systems
7. Participate in and lead efficient engineering design teams & meetings
8. Maintain a detailed and informative design notebook
9. Communicate engineering designs

Course Learning Outcomes mapped to Student Outcomes:

Student Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course-to-Student outcome mapping	1,2,3,4	6	1,2,3,5	7	1,2,5	1	4,9	1			4,5,6
Emphasis*	M	M	M	S	L	L	S	L			M

* L: Little/None M: Moderate S: Strong

Status of Continuous Improvement review of this Course:

Date reviewed: -----
Prepared by: Dr. Nesar Merah

Reviewed by: Design Dynamics Group
Date prepared: November 1, 2014