



**JORDAN UNIVERSITY OF SCIENCE & TECHNOLOGY**  
**MECHANICAL ENGINEERING DEPARTMENT**  
**ME 593 Projects In Mechanical Design**  
**Semester**

**Catalog Data- 2013 :** 2 Credit hours (1 Lecture, 3 Laboratory Hours) Introduction to computer aided engineering environment. Solid modeling. Introduction to Finite Element Methods. Optimum Design. Computer applications in mechanical design.

**Text Book(s):** Instructor Handouts.

**References:**  
 1- "Mechanical Engineering Design" J.E.Shigley C.R.Miske, Mcgraw Hill Book Company.  
 2- Pro/ENGINEER® WILDFIRE INSTRUCTOR/ David S. Kelley, McGraw-Hill Co.  
 3 Pro/MECHANICA® Structure (Integrated Mode) by Roger Toogood.

**Instructor:** \_\_\_\_\_

**Class Schedule:** \_\_\_\_\_

**Office Hours:** \_\_\_\_\_

**Pre/Co-Requisites:** Me 421 Mechanical Design II

**Objectives\*:**

- Use Pro/ENGINEER® drawing commands to make professional drawings and understand the philosophy of three-dimensional modeling. (a,k)
- Introduce Pro/Mechanica® and Finite element analysis to the students.
- Allow the students to efficiently use Pro/Mechanica® to perform basic structural analysis.
- Allow the students to simulate basic thermal problems.

\* Letters (a-k) after course objectives reference CID Program Outcomes (as required by ABET).

**Topics Covered:**

Week	Subject
1	Pro/ENGINEER® revision, units, 2D sketching, diagnostics, extrude, revolve, polygon
2	PPT Intro., starting Pro/Mechanica (dependent), material, load, constraint, arrow direction, autoGEM, mesh, static analysis, results, cutting/capping surface, multi-pass, convergence, HTML report
3	Use of parameters/relations, sensitivity, optimization, review geometry, excluded elements
4	<b>Plane stress</b> , coordinate system, symmetry constraints, refine mesh, plane strain, surface region, pressure load
5	<b>2D axisymmetric</b> (solids, shells) centrifugal load, mesh refinement (detailed fillet modeling, edge distribution)
6	*Cyclic symmetry, cyclic constraints, 3D centrifugal force
7	<b>Shells:</b> midsurface, reentrant corners, review total load, review geometry, symmetry constrains (free rotation)
8	<b>Beams:</b> BACS, BSCS, truss (2D, 3D), beam release, prescribed support
9	Thermal (steady state), volume region, temp. distribution, thermal stress, MEC/T, measures, gravity load
10	<b>Assembly:</b> static assembly, explode, interface, load increment, contact pressure, shear in bolts, fasteners (bolt, screw), add annotation.
11	<b>Mechanism:</b> dynamic assembly (joints), zero position, mechanism analysis, motor, spring, force, gravity, friction, trajectory curve, transfer forces to mechanica.
12	Revision & Discussions,
13	Final Exam

**Computer Usage:** Pro/ENGINEER® Wildfire™ 5.0, Pro/Mechanica®

**Design** Yes

**Activities/Project(s):**

**Lab. Experiment(s):** None

**Scientific Visit(s):** None

**Evaluation:**

Classwork & Homework .....	<b>25 %</b>
Mid term Exam.....	<b>30 %</b>
Term Project.....	<b>05 %</b>
Final Exam .....	<b>40 %</b>

**Relationship of the Course to ME Outcomes:**

<enter √ in the appropriate filed at the 2<sup>nd</sup> column in the table >

ABET a – k	√	Level (L, M, H)	Mechanical Eng. Program Outcomes
<b>a</b>	√	<b>M</b>	a. Apply knowledge of mathematics, science, and engineering in practice.
<b>b</b>			b. Design and conduct experiments as well as analyze and interpret data.
<b>c</b>	√	<b>H</b>	c. Design a system, components, or process to meet desired needs.
<b>d</b>			d. Function on multidisciplinary teams.
<b>e</b>			e. Identify, formulate, and solve engineering problems.
<b>f</b>			f. Understanding of professional and ethical responsibility of an engineer.
<b>g</b>			g. Communicate effectively.
<b>h</b>			h. Broad education to understand the impact of engineering solutions in global and societal context.
<b>i</b>			i. Recognition of the need for, and possess the ability to engage in, lifelong learning.
<b>j</b>			j. Possess knowledge of contemporary issues.
<b>k</b>	√	<b>H</b>	k. Use the techniques, skills, and modern engineering tolls necessary for engineering practice.

**ABET Category:**

Engineering Science	0	Credits
Engineering Design	2	Credits

**Prepared By:** \_\_\_\_\_ **Date:** \_\_\_\_\_

- Rules and notes:**
- |   |   |
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| <ol style="list-style-type: none"> <li>1) Never come late to the classroom, you will disturb your mates and your instructor if you do so.</li> <li>2) Turn OFF your cell phones during the class.</li> <li>3) DO Not TALK during the class please, unless you have a question for me.</li> <li>4) No quizzes make-ups.</li> <li>5) Make up exams are not held without an official signed and approved excuse from the <b>Department Chairman</b>. Please understand that this is a university law and I have no control over it.</li> </ol> | <ol style="list-style-type: none"> <li>6) Office hours are the hours I dedicate for you to ask me. If you think they do not suit you, then we can still arrange for a time of our convenience by sending an e-mail to me (you should expect an approval from my side).</li> </ol> |
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