Zarqa University
Faculty of Engineering Technology
Mechanical Engineering Department

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<tr><td rowspan="5">Course Information</td><td colspan="3">0905506 Finite Element Theory</td></tr>
<tr><td>3 Credits</td><td>Elective</td><td>Spring 2015</td></tr>
<tr><td colspan="3">Prerequisites by Course: 0905361 Mechanical Vibrations</td></tr>
<tr><td colspan="3">Co-requisites by Course: -</td></tr>
<tr><td colspan="3">Prerequisites for: -</td></tr>
<tr><td></td><td colspan="3">Schedule: Lecture, 11:00-12:00, STTh, L123</td></tr>
<tr><td>Instructor</td><td colspan="3">Prof. Dr.-Ing. Mohammed Abu-Hilal</td></tr>
<tr><td>Contact Information</td><td colspan="3">mabuhilal@zu.edu.jo, Office L321, Phone: 05-3821100-2098</td></tr>
<tr><td>Office hours</td><td colspan="3">10:00-11:00+12:00-13:00, STTh; or by appointment</td></tr>
<tr><td>Textbook</td><td colspan="3">T. R. Chandrupatla and A. D. Belegundu, Introduction to Finite Elements in Engineering, Second edition, Prentice-Hall, 1998</td></tr>
<tr><td>References and Resources</td><td colspan="3">1. M. A. Bhatti, Fundamental Finite Element Theory and Applications, John Wiley, 2005.
2. D. L. Logan, A Fist Course in the Finite Element Method, Third Edition, Thomson Learning, 2002</td></tr>
<tr><td rowspan="6">Evaluation Criteria</td><td>Activity</td><td colspan="2">Percent (%)</td></tr>
<tr><td>Lab</td><td colspan="2">20</td></tr>
<tr><td>Project</td><td colspan="2">10</td></tr>
<tr><td>First Exam</td><td colspan="2">15</td></tr>
<tr><td>Second Exam</td><td colspan="2">15</td></tr>
<tr><td>Final Exam</td><td colspan="2">40</td></tr>
<tr><td>Course Description</td><td colspan="3">Fundamental concepts of finite elements; one- and two-dimensional axial and flexural and elements. Derivation and assemblage of element stiffness and equivalent load matrices; numerical solutions and calculations of displacements, stresses and reactions, dynamic consideration (eigenfrequencies, eigenvectors), ME applications.</td></tr>
<tr><td rowspan="2">Intended Learning Outcomes</td><td>Course Outcome</td><td colspan="2">[%]</td></tr>
<tr><td>At the end of this course students should be able to;
1. Understand the fundamentals of finite element analysis concepts
2. Calculate stresses and deflections for 1-dimensional elements including trusses
3. Calculate mechanical and thermal deflections and stresses for beams at different loading conditions.
4. Solve plane stress and plane strain problems.
5. Calculate the eigenvalues and eigenvectors for rods and beams
6. Use a finite element analysis software to solve mechanical engineering problems (ABACUS, Algor, ANSYS,…)</td><td colspan="2">5%
25%
20%
15%
15%
20%</td></tr>
<tr><td>Relationships to Program Outcomes</td><td colspan="3">a Ability to apply knowledge of mathematics, science, and engineering (H)
c Ability to design a physical system, component, or process in either thermal or mechanical fields to meet desired needs within</td></tr>
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<tr><td></td><td colspan="3">realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability (L)
d Ability to function on multidisciplinary teams (H)
e Ability to identify, formulate, and solve mechanical engineering problems (H)
k Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice (L)
i Recognition of the need for, and an ability to engage in life-long learning (M)</td></tr>
<tr><td rowspan="4">Contribution to the Professional Components</td><td colspan="2">Mathematics and Basic Sciences</td><td>-</td></tr>
<tr><td rowspan="2">Engineering Topics</td><td>Engineering Sciences</td><td>90%</td></tr>
<tr><td>Engineering Design</td><td>10%</td></tr>
<tr><td colspan="2">General Education</td><td>-</td></tr>
<tr><td rowspan="8">Course Outline</td><td colspan="2">Subject</td><td>Hours</td></tr>
<tr><td colspan="2">Introduction</td><td>3</td></tr>
<tr><td colspan="2">One-Dimensional Problems
Exam I (up to end of week 5)</td><td>12</td></tr>
<tr><td colspan="2">Trusses</td><td>6</td></tr>
<tr><td colspan="2">Beams and Frames</td><td>6</td></tr>
<tr><td colspan="2">Vibrations of Rods and Beams
Exam II (up to end of week 11)</td><td>6</td></tr>
<tr><td colspan="2">Two-Dimensional Problems</td><td>9</td></tr>
<tr><td colspan="2">Review, Final Exam</td><td>3</td></tr>
<tr><td>Policies:</td><td colspan="3">Attendance
Attendance will be checked each class. Students are expected to attend each lecture. University regulations will be strictly followed for students exceeding the maximum number of absences.

Homework
- Homework assignment are due at the beginning of class the day they are due.
- No late homework will be accepted unless prior arrangement have been made with the instructor
- No make-up allowed on homework.
- You can consult each other regarding homework solution s however each assignment must be your own solution. Verbatim or duplicates assignments will be regarded as cheating.

Class participation and behavior
- Classroom participation is a part of learning; it is only by asking questions and talking through ideas that you can come to fully understand the material
- Please do not engage in behavior which detracts from the ability of other students to learn. Such behaviors include arriving at class late, speaking or whispering while the instructor and students are discussing ideas or asking questions, reading messages newspapers in class, cell-phones ringing, etc.</td></tr>
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Week	Date	Sec	Topic	Homework	Due date
1	22/02/2015				
2	01/03/2015				
3	08/03/2015				
4	15/03/2015				
5	22/03/2015				
6	29/03/2015				
7	05/04/2015		**Exam I (up to end of week 5)**		
8	12/04/2015				
9	19/04/2015				
10	26/04/2015				
11	03/05/2015				
12	10/05/2015		**Exam II (up to end of week 11)**		
13	17/05/2015				
14	24/05/2015				
15	31/05/2015				
16	07/06/2015		Reviw, Final Exam		