**The Hashemite University**
**Faculty of Engineering**
**Course Syllabus**
**Department of Mechanical Engineering**

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|---|---|---|---|
| **Course Title:** | Finite Element Analysis | **Course Number:** | 110402531 |
| **Designation:** | Compulsory | **Prerequisite(s):** | 110402303 |
| **Instructor:** | Dr. Mahmoud Rababah | **Instructor's e-mail:** | m_rababah@hu.edu.jo |
| **Office Hours:** | 10:00 – 11:00: Sun. ~ Thu. | | |

**Course Description (catalog):** Stiffness matrices, spring elements, truss elements, Beam elements, method of weighted residuals, interpolation function for general element formulation, and applications in solid mechanics.

**Textbook(s) and/or Other Supplementary Materials:**
Fundamental of finite element analysis" by David V. Hutton, first edition, McGraw-Hill, 2004.

**References:**
1- Finite element modeling for stress analysis, Robert D cook, Wiley, 1995.
2- CATIA V5 FEA tutorials, N. Zamani, schroff development corp, 2009.

**Major Topics Covered:**

| Topic | # Weeks | # Contact hours* |
|---|---|---|
| Basic concepts of the finite element methods | 1 | 3 |
| Stiffness matrices spring and bar elements | 1 | 3 |
| Truss structures, the direct stiffness method. | 2 | 6 |
| Flexure Element. | 2 | 6 |
| Method of weighted residuals. | 2 | 6 |
| Interpolation functions for general element formulation. | 3 | 9 |
| Applications in solid mechanics. | 2 | 6 |
| FEA using software programs | 2 | 6 |
| **Total** | **15** | **45** |

## Specific Outcomes of Instruction (Course Learning Outcomes):

After completing the Finite Element Design course, the student will:

1. Understand the basic concept of the finite element method. (**a**)
2. Use the interpolation functions for general element formulation (**a**, **e**)
3. Design a certain structure with optimal weight to withstand a specific load (**c, k**)
4. Understand the basics regarding the finite element programming (**i**)

**Student Outcomes (SO) Addressed by the Course:**

| # | Outcome Description | Contribution |
|---|---|---|
| | **General Engineering Student Outcomes** | |
| (a) | an ability to apply knowledge of mathematics, science, and engineering | H |
| (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 | M |
| (d) | an ability to function on multidisciplinary teams | |
| (e) | an ability to identify, formulate, and solve engineering problems | M |
| (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 | M |
| (j) | a knowledge of contemporary issues | |
| (k) | an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. | M |
| **H**=High, **M**= Medium, **L**=Low | | |

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| **Grading Plan:** | First Exam | 20 Points | **Sun./12/11/2017 [ 14:30 ~ 16:00]** |
| | Second Exam | 20 Points | **Sun./17/12/2017 [ 14:30 ~ 16:00]** |
| | Project | 20 Points | **Due 27/12/2017** |
| | Final exam | 40 Points | To be announced |

**Prepared by:** Dr. Mahmoud Rababah **Date:** 18th Sept. 2017