# Philadelphia University

**Faculty of Engineering & Technology**

Department of Electrical Engineering

First Semester 2024/2025

# Course Information

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| **Course Title:** | **Finite Element Method** (620302) |
| **Prerequisite:** | **Applied Engineering Mathematics** |
| **Credit Hours:** | 3 credit hours (16 weeks per semester, approximately 44 contact hours) |
| **Textbook:** | Dary L. Logann, first course in finite element method, 5th edition, Cengage Learning. |
| **References:** | ▪ David Hutton, fundamentals of finite element analysis, 1st edition, McGraw Hill.<br>▪ Rao, Singiresu S, The finite element method in engineering, 5th edition, Elsevier. |
| **Website:** | ***https://www.philadelphia.edu.jo/academics/mgogazeh/*** |
| **Course Description:** | Finite element method development and its applications in mechanical systems such as mechanics of solids, heat transfer and dynamical systems. |
| **Instructors:** | Dr. Mohammad gogazeh<br>**Email**: mgogazeh@philadelphia.edu.jo<br>**Office**: Engineering building, room E61208, ext: 2135 |
| **Course Coordinator:** | ----- |
| **Technology Requirements:** | • Personal computer, laptop, or mobile phone.<br>• Internet Connection.<br>• Access to Philadelphia University E-Learning Portal (MS Teams and Moodle) |
| **Learning Style:** | F2F |
| **Communication:** | • Announcement: the announcements will be posted in MS Teams or Moodle on a regular basis.<br>• Email.<br>• MS Teams or Moodle chats. |
| **Course Objectives:** | 1. Derive the element stiffness matrices for truss, beam and simple planar elements.<br>2. Understand discretization techniques<br>3. apply appropriate constraints and boundary conditions to finite element models |

| Course Learning Outcomes (CLO) and Relation to ABET Student Outcomes | | |
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| **CLOs** | **Outcomes** | **ABET PLOs** |
| **K1** | Basic sciences principles | 1 |
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| Grading Policy and Assessment Instruments | | | | | |
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| **Graded Item** | **Marks** | **Topic (s)** | **CLO(s)** | **Learning Portal** (Teams/ Moodle/ F2F/ Others) | **Week** |
| Assignment 1 | 10 | On a topic from materials of weeks 1-10 | **K1** | **Moodle** | 11 |
| Quiz 1 | 10 | On a topic from materials of weeks 1-4 | **K1** | **F2F** | 5 |
| Quiz 2 | 10 | On a topic from materials of weeks 9, 13 | **K1** | **F2F** | 12 |
| Mid Exam | 30% | Topics discussed from Week 1 to week 8 | **K1** | **F2F** | 8 |
| Final Exam | 40% | All the topics discussed in class room | **K1** | **F2F** | 16 |
| **Total Marks** | **100%** | | | | |
| **Notes:** | • Two written exams will be given.<br>• Copying homework is forbidden, any student caught copying the homework or any part of the homework will receive zero marks for that homework.<br>• Quizzes: 10-minute quizzes will be given to the students during the semester. These quizzes will cover material discussed during the previous lecture(s).<br>• Homework: Problem sets will be given to students. Homework should be solved individually and submitted before the due date.<br>• The final exam will cover all the class material. | | | | |

| Course Content: Learning Resources/ References/ Activities/ Assessment Methods | | | | | | | |
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| **Week** | **Lecture** | **Topic** | **CLOs** | **Learning Resources/ References/ Activities/ Assessment Method** | **Learning Style** (F2F, Synchronous, Asynchronous) | **Learning & Teaching Methods** | **Assessment Method** |
| **1** | **L1**<br>**L2** | Introduction to finite element | K1 | Resources: Text book, handouts and references.<br>Activities: oral discussion in classroom, solving problems on board by students | F2F | Lecture based instruction | Quiz 1 |
| **2** | **L1**<br>**L2** | Review of matrix operations | K1 | Resources: Text book, handouts and references<br>Activities: oral discussion in classroom, solving problems on board by students | F2F | Lecture based instruction | Quiz 1 |
| **3** | **L1**<br>**L2** | Stiffness displacement method | K1 | Resources: Text book, handouts and references<br>Activities: oral discussion in classroom, solving problems on board by students | F2F | Lecture based instruction | Quiz 1<br>+<br>Mid and final exams |
| **4** | **L1**<br>**L2** | Stiffness displacement method | K1 | Resources: Text book, handouts and references<br>Activities: oral discussion in classroom, solving problems on board by students | F2F | Lecture based instruction | Quiz 1<br>+<br>Mid and final exams |

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| **5** | **L1**<br>**L2** | Truss equations | K1 | Resources: Text book, handouts and references<br>Activities: oral discussion in classroom, solving problems on board by students | F2F | Lecture based instruction | Mid and final exams |
| **6** | **L1**<br>**L2** | Truss equations | K1 | Resources: Text book, handouts and references<br>Activities: oral discussion in classroom, solving problems on board by students | F2F | Lecture based instruction | Mid and final exams |
| **7** | **L1**<br>**L2** | Truss equations | K1 | Resources: Text book, handouts and references<br>Activities: oral discussion in classroom, solving problems on board by students | F2F | Lecture based instruction | Mid and final exams |
| **8** | **L1**<br>**L2** | Beam equations | K1 | Resources: Text book, handouts and references<br>Activities: oral discussion in classroom, solving problems on board by students | F2F | Lecture based instruction | Mid and final exams |
| **9** | **L1**<br>**L2** | Beam equations | K1 | Resources: Text book, handouts and references<br>Activities: oral discussion in classroom, solving problems on board by students | F2F | Lecture based instruction | Quiz 2 + Final exam |
| **10** | **L1**<br>**L2** | Frame and grid equations | K1 | Resources: Text book, handouts and references<br>Activities: oral discussion in classroom, solving problems on board by students | F2F | Lecture based instruction | Quiz 2 + Final exam |
| **11** | **L1**<br>**L2** | Frame and grid equations | K1 | Resources: Text book, handouts and references<br>Activities: oral discussion in classroom, solving problems on board by students | F2F | Lecture based instruction | Quiz 2 + Final exam |
| **12** | **L1**<br>**L2** | Structural dynamics and modal analysis | K1 | Resources: Text book, handouts and references<br>Activities: oral discussion in classroom, solving problems on board by students | F2F | Lecture based instruction | Quiz 2 + Final exam |
| **13** | **L1**<br>**L2** | Structural dynamics and modal analysis | K1 | Resources: Text book, handouts and references<br>Activities: oral discussion in classroom, solving problems on board by students | F2F | Lecture based instruction | Quiz 2 + Final exam |
| **14** | **L1**<br>**L2** | Heat and mass transfer | K1 | Resources: Text book, handouts and references<br>Activities: oral discussion in classroom, solving problems on board by students | F2F | Lecture based instruction | Final exam |
| **15** | **L1**<br>**L2** | Heat and mass transfer | K1 | Resources: Text book, handouts and references<br>Activities: oral discussion in classroom, solving problems on board by students | F2F | Lecture based instruction | Final exam |
| **16** | **L1**<br>**L2** | Review, and final exam | K1 | Resources: Text book, handouts and references<br>Activities: oral discussion in classroom, solving problems on board by students | F2F | Lecture based instruction | Final exam |

**Notes:**
For Blended and F2F Courses: L1 & L2 each 1 hour.
For Online Course: L1 and L2 each 1.5 hours.

| Credit Hours Distribution Report | |
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| **Learning Style** | **Credit Hours** |
| F2F | 48 |
| Synchronous | 0 |
| Asynchronous | 0 |
| **Total** | 48 |

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| **Academic Honesty/ Student Conduct** | ○ As a student at Philadelphia University, you are expected to follow the university regulations and guidelines for academic honesty/student conduct found in student handbook.<br>○ This means that you should not cheat, plagiarize and let another student use your account in LMS learning portals. |
| **Attendance Policy** | Absence from classes and/or tutorials shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse, acceptable to and approved by the Dean of the relevant college/faculty, shall not be allowed to take the final examination and shall receive a mark of zero for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course. |

October 2023