UTTyler ENGINEERING

Department of Mechanical Engineering
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MENG 4326 – Finite Element Analysis
Course Syllabus

Semester / Year	Spring 2026
Catalog Description	A required introductory course providing undergraduate engineering students with fundamentals of finite element (FE) concepts, analysis, and applications in real-world problems. A software package will be selected for use a learning support tool, which also provides students with a marketable skill. The course includes a project as a major component.
Prerequisites	MENG 3401 – Thermodynamics, MENG 3309 Mechanical Systems Design (pre-requisite or co-requisite)
Section Number	001
Instructor Name	Dr. Chung Hyun Goh
Contact Information	Email: cgoh@uttyler.edu Phone: 903-566-6125 Office: RBN 3007
Class Type / Instruction Mode / Location	Face-to-face / Lecture / RBN 3040
Class Time	Tu/Th 8:00 AM – 9:20 AM
Office Hours	W 10:30 AM – 11:30 AM, Tu/Th 10:00 AM – 11:00 AM or by appointment
No. of Credits	3 credits (Lecture)
Required Textbook & Resources	• Finite Element Analysis: Theory and Application with ANSYS – Saeed Moaveni • Students taking courses in Mechanical Engineering (ME) are expected to have a laptop at their disposal. For more details, refer to the Student Laptop Policy at the Department of Mechanical Engineering https://uttyler.smartcatalogiq.com/en/2022-2023/Catalog/College-of-Engineering
Optional References	• Finite Element Simulations with ANSYS Workbench 24: Theory, Applications, Case Studies – Huei-Huang Lee • Analysis of Machine Elements Using SolidWorks Simulation 24 – S.S. Nudehi and J.R. Steffen • SolidWorks Simulation 2024: A Power Guide for Beginners and Intermediate Users, CADArtifex, J. Willis, and S. Dogra
Additional Rules and Requirements	Since the mechanical engineering program is designed to prepare students for professional practice, all submitted work (e.g., homework, lab reports, projects, presentations) is expected to meet professional standards. Work that does not reflect professional quality may be subject to grade reductions, even if professionalism is not explicitly listed in the grading rubric. AI tools are allowed to support students' learning and productivity, provided that their use aligns with academic integrity standards. When required, students must disclose their use of AI.
Evaluation Method	Midterm Exam 25% Final Project (Report, Presentation) 30%

<table>
<tr><td></td><td>Homework (Projects and SW Assignments) 20%, Quizzes 15%,
Course Participation 10% (Attendance, submission, etc.)</td></tr>
<tr><td>Grading Policy / Scale</td><td>Letter grades, scale:
A: 90 – 100; B: 80 – 89; C: 70 – 79; D: 60 – 69; F: < 60</td></tr>
<tr><td>Important Events / Dates</td><td>Census date: 01/26/2026
First drop for non-payment: 02/04/2026
Exam date: Mid-term (March 05, 2026), Final Exam (April 28, 2026, Replaced by Project presentations)
Last date to withdraw from one or more 15-week courses: 03/30/2026</td></tr>
<tr><td>Attendance / Makeup policy / other rules</td><td>Regular attendance is imperative if you want to do well in this course. Therefore, regular attendance is highly recommended. In case you have to miss a class, it is your responsibility to keep up with the class work and be informed of all announcements made in the class on HomeWorks, tests etc. No makeup exams will be authorized without providing an official document showing that your absence is in line with university rules.</td></tr>
<tr><td>Course Learning Objectives / ABET & PEOs Relation</td><td>By the end of this course, students will be able to:
1. Demonstrate an understanding of the fundamental concepts and general steps of the finite element analysis (FEA). (SO1)
2. Apply science and math concepts using FEA tools to identify, formulate and solve engineering problems. (SO1)
3. Apply FEA techniques to engineering design with broader considerations. (SO2)
4. Select and integrate FEA for the appropriate part in the design process to support and justify design decisions with broader considerations. (SO2)</td></tr>
<tr><td>Tentative Topics / Course Plans</td><td>The table below provides a summary of major modules and key assessments. A detailed meeting-by-meeting schedule is included in this syllabus as Appendix A: Course Outline (starting at p. 3). The schedule is tentative and subject to change.
<table>
<tr><th>Week</th><th>Topics (summary)</th><th>Key items</th></tr>
<tr><td>Week 1-2</td><td>Course introduction; FEM basics; matrix algebra; trusses; axial members, beams, and frames (Ch 1-4)</td><td></td></tr>
<tr><td>Week 3</td><td>Project overview; axial beams and frames (Ch 4)</td><td>Quiz 1</td></tr>
<tr><td>Week 4-5</td><td>1-D elements and analysis of 1-D problems (Ch 5-6)</td><td>Quiz 2</td></tr>
<tr><td>Week 6-7</td><td>2-D elements; 2-D heat transfer problems (Ch 7 & 9)</td><td>Quiz 3</td></tr>
<tr><td>Week 8</td><td>Midterm review and midterm exam (Ch 1-7, Ch 9)</td><td>Mar 5</td></tr>
<tr><td>Week 9-10</td><td>2-D solid mechanics; progress report; dynamic problems (Ch 10-11)</td><td>Progress report/ presentation</td></tr>
<tr><td>Week 11</td><td>Software tutorials: SolidWorks Simulation; Ansys Workbench and 3-D FE simulations</td><td>SW Tutorials 1-2</td></tr>
<tr><td>Week 12-13</td><td>Fluid mechanics; fatigue and drop test; topology and design optimization; (Ch 12 and case studies)</td><td>Quiz 4 (Ch 10-12)</td></tr>
<tr><td>Week 14</td><td>Design optimization; Senior Design Expo (no class); final project presentations and report due</td><td>Final report (Apr 28)</td></tr>
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<tr><td>University Policies</td><td>https://www.uttyler.edu/offices/academic-affairs/files/syllabus-information-rev122025.pdf</td></tr>
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Note:
The instructor reserves the right to modify the syllabus at any time during the semester to accommodate unforeseen circumstances, enhance the learning experience, or ensure the course objectives are met. Any changes will be communicated promptly to all students.

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Appendix A: Course Outline (Meeting-by-Meeting Schedule)

This appendix provides the detailed meeting schedule for the semester. The schedule is tentative and subject to change.

Mtg	Day	Date	Topic	Reading	Remarks
1	Tu	1/13	Introduction to the course and FEM / Ansys, etc.	-	
2	Th	1/15	Chap 1 - Introduction / Chap 2 - Matrix Algebra	1.1 - 1.7	
3	Tu	1/20	Chap 3 - Trusses	3.1 - 3.4	
4	Th	1/22	Chap 4 - Axial Members, Beams, and Frames 1	4.2- 4.5	
5	Tu	1/27	Project Overview (Ideation, Guidelines, etc.)		Quiz #1
6	Th	1/29	Chap 4 - Axial Members, Beams, and Frames 2	4.1	
7	Tu	2/03	Chap 5 - 1-D Elements 1	5.1 - 5.3	
8	Th	2/05	Chap 5 - 1-D Elements 2	5.4 - 5.6	
9	Tu	2/10	Chap 6 - Analysis of 1-D Problems 1	6.1	
10	Th	2/12	Chap 6 - Analysis of 1-D Problems 2	6.1	Quiz #2
11	Tu	2/17	Chap 7 - 2-D Elements 1	7.1 - 7.4	
12	Th	2/19	Chap 7 - 2-D Elements 2	7.4 - 7.7	
13	Tu	2/24	Chap 9 - Analysis of 2-D Heat Transfer Problems 1	9.1 - 9.3	
14	Th	2/26	Chap 9 - Analysis of 2-D Heat Transfer Problems 2	9.3 - 9.4	Quiz #3
15	Tu	3/03	Review Session for the Mid-term Exam		
16	Th	3/05	Mid-term Exam - Chapters 1 - 7 & 9		
17	Tu	3/17	Ch10- Analysis of 2-D Solid Mechanics Problems 1	10.1 - 10.2	
18	Th	3/19	Ch10- Analysis of 2-D Solid Mechanics Problems 2	10.2 - 10.5	
19	Tu	3/24	Progress Report and Presentation (10 minutes per team)		
20	Th	3/26	Chap 11 - Dynamic Problems	11.1 - 11.5	
21	Tu	3/31	Finite Element Analysis using SolidWorks Simulation	TBD	SW Tutorial 1
22	Th	4/02	Introduction to Ansys Workbench and 3D FE Simulations	TBD	SW Tutorial 2
23	Tu	4/07	Chap 12 - Analysis of Fluid Mechanics Problems	12.1 - 12.3	
24	Th	4/09	Fatigue and Drop Test Analysis using SolidWorks Simulation	TBD	SW Tutorial 3
25	Tu	4/14	Topology Optimization using Ansys and SolidWorks	TBD	SW Tutorial 4
26	Th	4/16	Quiz #4 (200 pts): Chapters 10 - 12		
27	Tu	4/21	Design Optimization using Ansys and SolidWorks	TBD	SW Tutorial 5
28	Th	4/23	Senior Design Expo (No Class)		
Final Week	Tu	4/28	Final Project Presentation (8:00 am to 10:00 am on April 28th), Final Report Due (11:59 pm on 4/28)		

Note: Reading assignments should be completed before class on the day they are assigned. The final project report is due by 11:59 PM on April 28 (subject to change).