MEEN 4140 Finite Element Analysis

Fall 2025 (Aug 18th – Dec 12th)

Instructor: Dr. Yunwei Xu
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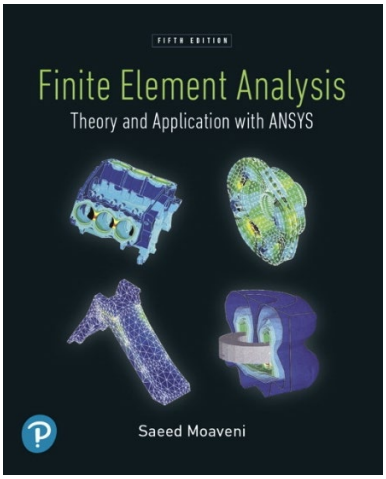
Class Schedule: T/Th 11:30 – 12:50 PM @ F185
Lab Schedule: F 10:00 – 12:50 PM @ F185
Office Hours: T/Th 2:30 – 3:30 PM or Make Appointment via Email

Required Textbook:

Finite Element Analysis – Theory and Application with ANSYS, 5th Edition.
Saeed Moaveni
Person-Prentice Hall, 2020



References:

1. J. N. Reddy, An Introduction to the Finite Element Method, Third Edition, McGraw-Hill, 2006
2. David V. Hutton, Fundamentals of Finite Element Analysis, First Edition, McGraw-Hill, 2004
3. Rudra Pratap, Getting started with MATLAB: a quick introduction for scientists and engineers. USA: Oxford University Press, 2010.

Course Description:

A numerical technique for finding approximate solutions to engineering solids and structural problems; The displacement method of finite element analysis using the iso-parametric formulation; Geometric modeling of solids and structures; Numerical coding with MATLAB for simple structural, fluid, and thermal analyses; Practice with commercial finite element software such as ANSYS.

Pre-requisites:
MATH 3410 (Diff. Eqn.), MEEN 2332 (Mech. of Matl.), MEEN 2302 (Dynamics)

Course Learning Outcomes (CLO):
Upon successful completion of this course, students will be able to:

1. Solve ordinary and partial differential equations using the Galerkin method
2. Develop the finite element equations to model engineering problems
3. Program finite element solutions using MATLAB to formulate and solve structural, fluid, and thermal problems using finite element techniques.
4. Use a commercial finite element code such as ANSYS to formulate and solve structural, fluid, and thermal problems.

Disability Policy:
All reasonable accommodation will be made to facilitate special needs. If special accommodations are required, the student must first meet with the staff of the Office of Disability Accommodation (ODA), (940) 565-4323. After meeting with that office, please contact me to discuss what accommodations will be necessary. For more information, see http://www.unt.edu/oda.

Homework/Quizzes:

1. **"Homework Day": THURSDAY.** The day new homework will be assigned (HW assignment will be posted in Canvas), and previous homework will be collected through Canvas.
2. Homework should be turned in before the deadline (11:30pm) through canvas. NO late homework will be collected, accepted, or graded. (Canvas window will be automatically closed)
3. Solutions to Homework Assignments will be available in Canvas after HW has been collected.
4. Having no textbook is not a valid excuse for not doing homework. It is student's responsibility to acquire textbook for his/her study.
5. All homework assignments should be turned in through Canvas. There will be a window/link in Canvas open for submitting HW.
6. Exceptions: refer to UNT Policies 06.039
   - An absence may be excused for the following reasons:
     religious holy day, including travel for that purpose;
     active military service, including travel for that purpose;
     participation in an official university function;
     illness or other extenuating circumstances;
     pregnancy and parenting under Title IX; and
     when the University is officially closed.
     Procedure: Please request accommodations/exceptions through UNT "Dean of Students Office"
7. Pop-up quizzes, consisting of one of the exact homework problems, in-class examples, or one very similar, will be randomly given in class. Grades from pop-up quizzes will be regarded as extra credits to your final grade.
8. There will be 4 quizzes. The lowest quiz grade will be dropped. Make-up quizzes are only allowed for documented University-excused absences and the instructor must be notified prior to the missed quiz.
9. **Quiz dates: 9/4, 9/23, 10/23, 11/18**

10. One final project will be assigned during the semester.

Format of Homework Policy:

1. Use engineering paper only **(noncompliance: 20 points off; cumulative)**.
2. Only solve one problem per page **(noncompliance: 10 points off; cumulative)**. You may extend that problem into another page but then should begin the next problem on a new page if you require more room. If more than one page is needed for a solution you should number each page and the first page should be marked with a "continued on next page" note on the bottom.
3. Done in pencil, no ink, if you do your homework on paper. **(noncompliance: 10 points off; cumulative)**
4. No cross outs, use an eraser. **(noncompliance: 10 points off; cumulative)**
5. Homework set number, name, date, course number, and page number(s) on the top of the page. **(noncompliance: 10 points off; cumulative)**
6. **Solution** – provide all the details so that anybody can easily follow your solutions and problem -solving approach. All intermediate values should be identified with the variable name and units (e.g., F1=50 N; Xc = 2.1 m). **(noncompliance: 10 points off; cumulative)**
7. **Answer** – the **Final Answer** at the end of the problem should be identified with the **variable name, include units, and inside a box.** Include an arrow (from the far-right side of the page) pointing to each final answer. **(noncompliance: 10 points off; cumulative)**
   Example:

Exams:

1. **Exam 1: 10/9**
2. **Exam 2: 12/4**
3. The exams may be open book.
4. Make-up homework, quizzes, exams and projects, will only be given for University-excused absences. The instructor must be notified about the absence prior to the due dates. Students must provide the Dean of Students, as well as the instructor with official and verifiable documentation related to the reason for absence. Once the absences have been verified, the decision to allow a student to make up course work is left to the discretion of the professor and/or the department (according to the UNT policy).

Grade Evaluation:

Homework:	10%
Quizzes (best 3 out of 4)	25%
Exam 1	15%
Exam 2	15%

Lab Assignments/Lab Attendance	8%+2%
Final project	25%

A – 90-100%
B – 80-89%
C – 70-79%
D – 60-69%
F - < 60%

There will be NO curve on the final grade. For example, 90% must be obtained in order to get an A; an 89.99 will be a B. Grades are based solely on your performance on the quizzes and exams. A student's perceived effort is not taken into account.

It should be noted that extra credit will not be given at the end of the semester for individual students. Please do not request extra work at the end of the semester to boost your grade – the answer will always be no. It would be unfair to the rest of the students in the class if select individuals were given a chance to earn more points. Quizzes and exams are made to be fair and allow everyone the opportunity to do well in the course if a student prepares for them appropriately.

Re-grades:
Any requests for exam or quiz re-grades must be made the day the quiz/exam is returned. Once class is over, re-grade requests will not be accepted. It should be noted that the entire quiz/exam will be re-graded. This may result in a score lower than what was originally assigned.

Academic Dishonesty/Cell Phone Policy:
Cell phone use will not be allowed during quizzes and exams. If a student is caught using a cell phone during a quiz or exam, a score of zero will be given for that assignment. There are no exceptions to this rule.

Students are expected to do their own work on quizzes, homework, and exams. If it is determined that a student is talking during an exam, copying off from other students' papers, sharing an equation sheet, turning in homework solutions from online sources, etc., a score of zero will be given for that assignment. There are no exceptions to this rule.
Students caught violating this policy two times will automatically be given an F in the course.
<u>All students caught cheating will be reported to Academic Integrity Office.</u>

Procedure on Quiz/Exam Days:
On quiz/exam days:

- Come prepared and ready to begin at the scheduled time. If you arrive late, your time will not be adjusted.
- <u>Seats will be randomly assigned by the instructor</u>
- All phones, tablets, other electronic devices must be placed in a bag
- All bags must be placed at the front or back of the room
- Students will only be allowed to bring in calculators and pencils for the exams. I will provide equation sheets, tables, and scratch paper.

- Students will not be allowed to leave the room during exams and quizzes. Exams/quizzes will be collected and considered finished if a student leaves the room.
- Using ANY unauthorized/unapproved materials during the exam is prohibited and considered as cheating.
- Exchanging (either borrowing or giving) ANYTHING without the approval from the proctor, including but not limited to, calculators/scratch papers/formula sheets/ thermodynamics tables/writing tools during the exam between/among students is prohibited and considered as cheating.
- Using cell PHONE for WHATEVER purpose during the exam is prohibited and considered as cheating.
- Using Internet through any device during the exam is prohibited and considered as cheating.
- Peeking, talking or discussing (either by oral/written/sign language) between/among students during the exam is prohibited and considered as cheating.
- Using any type of earpiece/earbuds/earphone/Bluetooth/Stereo Headset (except with doctor's prescription/notes) during the exam is prohibited and considered as cheating.
- Using any type of smart glasses (except with doctor's prescription/notes) during the exam is prohibited and considered as cheating.
- Using any type of smart watches during the exam is prohibited and considered as cheating.
- Cheating will result in SCORE ZERO in the exam
- Cheating will be reported to the Department, College and University
- There will be NO make-up exam. Exceptions: medical emergence (student and important ones), transportation/traffic emergency; religious holidays/duty, jury duty and military duty. Documentary evidence must be submitted.
- Makeup exam should be scheduled within one week after the regular exam date.

Professionalism:
One of the goals of this course is to teach students about professionalism, including the standards and expected behavior of your chosen profession. With this in mind, students are expected to demonstrate a behavior consistent with the conduct of an individual practicing in the engineering profession. Students are expected to: (1) come prepared for class; (2) respect faculty and peers; (3) demonstrate responsibility and accountability for your own actions; (4) sensitivity and appreciation for diverse cultures, backgrounds, and life experiences; (5) offer and accepts constructive criticism in a productive manner; (6) demonstrate an attitude that fosters professional behavior among peers and faculty; (7) be punctual to class meetings; (8) maintain a good work ethic and integrity; and (9) recognize the classroom as a professional workplace.

MEEN department Program Educational Objectives
The educational objectives of the Mechanical & Energy Engineering program are to produce graduates who will:

- Graduates are successfully employed in mechanical and/or energy engineering positions and other related fields.

- Graduates engage in lifelong learning demonstrated by advanced education, professional development activities and/or other career-appropriate options.
- Graduates are prepared to successfully demonstrate technical and leadership competence through ethical conduct, teaming, communication, and/or problem-solving skills learned in our program.

Classroom Inclusivity Statement:
I consider this classroom to be a place where you will be treated with respect, and I welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, ability – and other visible and nonvisible differences. All members of this class are expected to contribute to a respectful, welcoming and inclusive environment for every other member of the class.

Use of Solutions Manuals/online resources like Chegg:
It is common knowledge that solutions manuals to all widely-used textbooks are available online. I realize that students like to utilize these resources but please use them in the correct way. Simply copying what is in the solutions manual is not beneficial to you, in fact, it is detrimental to your grade. To use these resources properly you should attempt all problems on your own. If you get stuck, work on it some more. You should only go to the provided solutions once you have obtained a solution of your own. You can then check your work and find your mistakes. Once you have found the mistakes, you should figure out why you made those errors and then learn how to fix them. Your goal in doing the practice problems is to learn how to apply the material learned in class to a variety of problems. The only way to do this is to work through problems on your own.

Calculators:
All students will need their own calculator on quiz/exam days. You will not be allowed to share a calculator with another student under any circumstance. Graphing calculator will not be allowed during quizzes and exams. Only NCEES-approved calculators can be used (http://ncees.org/exams/calculator/)

Acceptable calculator are:

- **Casio:** All fx-115 and fx-991 models (Any Casio calculator must have "fx-115" or "fx-991" in its model name.)
- **Hewlett Packard:** The HP 33s and HP 35s models, but no others
- **Texas Instruments:** All TI-30X and TI-36X models (Any Texas Instruments calculator must have "TI-30X" or "TI-36X" in its model name.)

Important event: (class will be canceled)

UNT Official Academic Calendar: Fall 2025

Date	Event
Aug 18, 2025	First Class Day (Monday)
Sep 1, 2025	Labor Day (Monday)
Nov 24 - 30, 2025	Thanksgiving Break (no classes)
Dec 3 - 4, 2025	Pre-finals Days
Dec 4, 2025	Last Class Day
Dec 5, 2025	Reading Day (no classes)
Dec 6 - 12, 2025	Final Exams