San José State University
Department of Mechanical Engineering
ME 273 Finite Element Methods in Engineering
Section 01 (42086), Fall 2018

Course and Contact Information

Instructor: Dr. Eduardo Chan

Office Location: ENG 213

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Office Hours: TR 8:45pm – 9:15pm and by appointment

Class Days/Time: TR 6:00pm – 7:15pm

Classroom: ENG 403

Prerequisites: BSME or Instructor Consent

Course Web Page

Copies of the course materials such as the syllabus, major assignment handouts, etc. may be found on Canvas at https://sjsu.instructure.com. You need to be registered for the course to have access on Canvas. You are responsible for regularly checking for course handouts and assignments on Canvas (or other communication system as indicated by the instructor).

Course Description

Introduction to various finite element methods for developing stiffness equation. Truss, beam, 2-D, 3-D and axisymmetric elements. Applications using commercial FEA software packages.

Course Learning Objectives (CLO)

Upon successful completion of this course, students will be able to:

1. Describe the Finite Element Analysis (FEA) procedure.
2. Identify the application and characteristics of FEA elements such as bars, beams, planar elements, and common 3-D elements.
3. Develop the stiffness equation for common FEA elements, and assemble element stiffness equations in to a global equation.

4. Identify and apply suitable boundary conditions to a global structural equation, and reduce it to a solvable form.
5. Apply existing 3-D computer-aided design (CAD) skills to prepare models for finite element analysis.
6. Set up and solve 1-D, 2-D, and 3-D structural problems using commercial FEA tools.
7. Optimize engineering parts using FEA.
8. Interpret results obtained from FEA, not only in terms of conclusions, but also awareness of limitations.

Required Texts/Readings

Textbook

Finite Element Modeling and Simulation with ANSYS Workbench by X. Chen & Y. Liu. Published by CRC Press, 2014, ISBN 978-1-439-87384-7.

Optional Reference

Finite Element Simulation with ANSYS Workbench 17 by H. Lee.
Published by SDC Publications, ISBN 978-1-630-57088-0.

Classroom Protocol

The students are expected to attend class regularly and actively participate in classroom discussions. Please arrive on time so as not to distract other students, especially during computer lab sessions. Use of cell phones is prohibited in class or lab.

Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Refer to the current semester's Catalog Policies section at http://info.sjsu.edu/static/catalog/policies.html. Add/drop deadlines can be found on the current academic calendar web page located at http://www.sjsu.edu/academic_programs/calendars/academic_calendar/. The Late Drop Policy is available at http://www.sjsu.edu/aars/policies/latedrops/policy/**.** Students should be aware of the current deadlines and penalties for dropping classes.

Information about the latest changes and news is available at the Advising Hub at http://www.sjsu.edu/advising/.

Assignments and Grading Policy

The grading components of this course are listed as follows:

5% for In-Class Participation
20% for Homework Assignments
20% for Midterm Exam, Popped Quizzes
15% for Term Project (details to be announced in class)
40% for Final Exam

Submissions of homework assignments, labs and final term project reports should be done via Canvas. **Late or email submissions will not be accepted without a university-authorized excuse. The student must participate in all grading components to obtain a passing grade.**

Grades are assigned according to the following table:

Letter Grade	GPA Scale	Percent Scale	Borderline
	(4.30)	100.0	
	(4.15)	98.4	
A	4.00	96.8	
	3.85	95.2	A / A-
A-	3.70	93.6	
	3.50	91.4	A- / B+
B+	3.30	89.3	
	3.15	87.7	B+ / B
B	3.00	86.1	
	2.85	84.5	B / B-
B-	2.70	82.9	
	2.50	80.7	B- / C+
C+	2.30	78.6	
	2.15	78.0	C+ / C
C	2.00	75.4	
	1.85	73.8	C / C-
C-	1.70	72.1	
	1.50	70.0	

This percent scale sets a lowest adequate score at 70, which is the minimum threshold for a grade of “C-“.

University Policies

Academic integrity

Your commitment as a student to learning is evidenced by your enrollment at San Jose State University. The University's Academic Integrity policy, located at http://www.sjsu.edu/senate/docs/s16-15.pdf, requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The Student Conduct and Ethical Development website is available at http://www.sjsu.edu/studentconduct/.

Instances of academic dishonesty will not be tolerated. **Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade and sanctions by the University**. For this class, all assignments are to be completed by the individual student unless otherwise specified. If you would like to include your assignment or any material you have submitted, or plan to submit for another class, please note that SJSU's Academic Policy S07-2 requires approval of instructors.

Campus Policy in Compliance with the American Disabilities Act

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. Presidential Directive 97-03 requires that students with disabilities requesting accommodations must register with the Accessible Education Center (AEC) at http://www.sjsu.edu/aec to establish a record of their disability.

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Course Schedule

By default, most Tuesdays will focus on FEA theory and most Thursdays will focus on FEA applications. However, exceptions are possible and will be updated throughout the semester. The primary topics for each week are tabulated below, but there will be instances of topic overlap. The textbook chapters that are listed are approximate only, and more specific reading sections will be specified as the semester progresses.

Week	Date	Topics, Readings, Assignments, Deadlines
1	Aug 20 – Aug 24	Course Administration; Introduction
2	Aug 27 – Aug 31	Intro to FEA Procedure (Chapter 1)
3	Sep 3 – Sep 7	Stiffness Method & Spring Element (Chapter 1)
4	Sep 10 – Sep 14	Spring Element (Chapter 1), Trusses (Chapter 2)
5	Sep 17 – Sep 21	Trusses (Chapter 2)
6	Sep 24 – Sep 28	Trusses (Chapter 2), Beams (Chapter 3)
7	Oct 1 – Oct 5	Beams (Chapter 3)
8	Oct 8 – Oct 12	Beams (Chapter 3)
9	Oct 15 – Oct 19	Midterm Review & Midterm (Thursday, Oct 18)
10	Oct 22 – Oct 26	Introduction to 2D Elasticity (Chapter 4)
11	Oct 29 – Nov 2	Finite Elements for Plane Solids (Chapter 4)
12	Nov 5 – Nov 9	Finite Elements for Plane Solids (Chapters 4)
13	Nov 12 – Nov 16	Finite Element Modeling (Chapter 5)
14	Nov 19 – Nov 23	Finite Element Modeling (Chapter 5) **No Class on Nov 22 (Thanksgiving Day)**
15	Nov 26 – Nov 30	Design Sensitivity & Optimization (Chapter 11)
16	Dec 3 – Dec 7	Project Presentations; **Last Day of Class – Dec 10**
	Dec 13 (Thursday)	**Final Exam** 17:15 - 19:30 in ENG 403