

Syllabus

Technical Elective – Computer Aided Engineering (CAE)

Fall Semester 2022

Lecture Times: Mon. 1:50~4:25 pm **Instructor:** Dr. Jin Xu
Classroom: 4-212 **Office:** 4-219
Office Hours: T&W 11 am~12 pm **Email:** jin.xu@scupi.cn

Catalog Description:

This 3-credit design-oriented course covers fundamental concepts of finite element analysis (FEA) and computer implementation. Topics include solutions of thermos-fluids and solid mechanics engineering problems of moderate complexity. The goal is for students to develop a proper protocol while applying CAE software to engineering design. Pre-requisites: *Statics and Mechanics of Materials 1* **AND** *2* (ENGR 0135 **AND** ENGR 0145).

Course Outcomes:

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

- Grasp the theoretical foundation of FEA *via* general discrete systems and direct formulations of stiffness matrix;
- Grasp the approximate nature of FEA, and the effects of element choices and shape functions;
- Demonstrate a working knowledge of all phases of a typical FEA;
- Apply ANSYS and *SolidWorks* to structural analyses problems and properly impose loading and constraint before determining material failure and identify critical regions.

Reference Book:

Tirupathi R. Chandrupatla, *Introduction to Finite Elements in Engineering*.

Course Policies:

Regular class attendance is expected. Each student is responsible for both in-class activities and homework assignments. In general, no late in-class activities or make-up exams will be given. Exceptions will be made for a valid excuse consistent with University Policy. If you cannot attend an exam or meet a due date, you must contact the instructor *prior to* the exam or due date.

Integrity and Academic Expectations:

“Violations of academic integrity include, but are not limited to, cheating, plagiarism, or misrepresentation in oral or written form. Such violations will be dealt with severely, in accordance with University policy. Plagiarism means representing someone else’s idea or writing as if it were your own. If you use someone else’s ideas or writing, be sure the source is clearly designated.” It is expected that students adhere to the academic integrity policy that is presented in the Student’s Honor Code of Conduct / Student Handbook.

Grading Policy:

Midterm = 20%, Final = 20%, In-Class Activity (mostly simulation labs) = 20%, Homework = 20%, and Project = 20%. Grades will *not* be curved, and the official SCU grading scale will be used when determining your final letter grade (based on the numerical grade).

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Students with Disabilities:

If you have special needs because of a learning, physical, or other disability, please contact the instructor in advance so accommodations will be provided in a timely manner.

Tentative Course Schedule:

Week	Topics
1	No Class for Inclement Weather
2	Fundamentals of CAE
3	Direct Approach
4	Truss Analysis
5	Beam Analysis
6	Frame Analysis
7	Truss /Beam Analysis
8	Truss /Beam Analysis
9	Midterm
10	3D Solid Analysis
11	Meshing
12	Boundary Conditions
13	Dynamic Analysis
14	Convergence Study
15	Fluid Simulation
16	Fluid Simulation
17	Thermal Analysis
18	Final Exam
19	End of Semester