

Finite Element Analysis and Design

EML 4507

Fall 2022

Section 3323, 8th Period, MWF

Basic information

Catalog information: Credits: 3; Stress-strain analysis and design of machine elements; finite element analysis.

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Office hours: TBD

Textbook: “Introduction to Finite Element Analysis and Design” by Nam-Ho Kim, Bhavani V. Sankar, and Ashok V. Kumar, 2nd Edition, Wiley

Course description: Fundamentals of finite element analysis including, discrete system analysis, steady state heat transfer analysis, static analysis of structures. Modeling, analysis and design using FEA software. The objective of the course is to teach the fundamentals of finite element method with emphasize on the underlying theory, assumption, and modeling issues as well as providing hands-on experience using finite element software to model, analyze and design systems of mechanical and aerospace engineers.

Course content:

1. Mathematical Preliminaries
2. Uniaxial bar and Truss Finite Element
3. Finite Element Analysis of Beams and Frames
4. Finite Elements for Heat Transfer Problems
5. Review of Solid Mechanics
6. Finite elements for plane solids
7. Isoparametric Finite elements
8. Finite Element Analysis Procedures and Modeling

Program Objectives and Outcomes: Program objectives supported by this course include educating students to

1. Comprehend quantitative and analytical methods
2. Understand and perform engineering analysis of machine systems
3. Apply mathematics, science, and engineering to design
4. Communicate ideas graphically and in writing
5. Recognize the need for, and engage in lifelong learning

Course Assignment

Homework: There will be 10 homeworks. Students are required to submit homeworks on Canvas. Homework problems may require using commercial finite element software. Among assigned homeworks, two lowest-graded (or unsubmitted) homeworks will not be used in calculating the final grade. Late homework will not be accepted under any circumstances.

Projects: There will be 2 Abaqus projects. Students are required to submit project reports on Canvas.

Exams: There will be 3 exams. Tentative Exam Schedule: Exam1: September 23, Exam2: October 24, Exam3: December 2. All 3 exams will be at night from 7:00 to 9:00. We will use Honorlock for proctoring. All exams equally contribute to the grade and there will be no final exam.

Grading: Homeworks (10%) Exams (75%) Projects (15%).

Other course information

Finite element analysis software: Many homeworks and projects will be carried out using commercial finite element software Abaqus. Students are expected to download and install the software on their personal computer. The software can be downloaded from <http://academy.3ds.com/simulia/freese>

Grading Scale: The final grade will be calculated by the following table.

Table 1. Grading Table. $\%GE = \text{Percent Grade Earned}$.

Percentage Range	Grade Point
$93.33 \leq \%GE < 100.00 \implies A$	4.00
$90.00 \leq \%GE < 93.33 \implies A-$	3.67
$86.67 \leq \%GE < 90.00 \implies B+$	3.33
$83.33 \leq \%GE < 86.67 \implies B$	3.00
$80.00 \leq \%GE < 83.33 \implies B-$	2.67
$76.67 \leq \%GE < 80.00 \implies C+$	2.33
$73.33 \leq \%GE < 76.67 \implies C$	2.00
$70.00 \leq \%GE < 73.33 \implies C-$	1.67
$66.67 \leq \%GE < 70.00 \implies D+$	1.33
$63.33 \leq \%GE < 66.67 \implies D$	1.00
$60.00 \leq \%GE < 63.33 \implies D-$	0.67
$00.00 \leq \%GE < 60.00 \implies E$	0.00

Grade Corrections: Corrections of grades should be submitted to instructor within 5 business days of the grade posting in writing with a concise statement of why you believe there has been an error. Note that the instructor has the final determination in the grade assigned. If a grade change is determined, it may result in a lower or higher grade.

Academic honesty: All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a student at the University of Florida and to be honest in all work submitted and exams taken in this class and all others.

Accommodation for Students with Disabilities: Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluation: Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu/evals>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>.

Health and Wellness

- U Matter, We Care: If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.

- Counseling and Wellness Center: <http://www.counseling.ufl.edu/cwc>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.
- Sexual Assault Recovery Services (SARS), Student Health Care Center, 392-1161.
- University Police Department at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

Software Use: All faculty, staff and student of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy: There are federal laws protecting your privacy regarding grades earned in courses and on individual assignments. For more information, please see: <http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>