Finite Element Analysis and Applications
EML 5526
Class Periods: MWF 3rd Period (9:35-10:25am)
Location: NEB100
Academic Term: Fall 2025

Instructor:
Ashok V. Kumar
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Office Phone Number: 352-392-0816
Office Hours: MWF 10:30-11:30am

Teaching Assistant/Peer Mentor/Supervised Teaching Student:
Please contact through the Canvas website
TBD

Course Description
3 Credits - Fundamentals, including discrete system analysis, dynamic analysis of structures, steady state and transient heat transfer analysis, and incompressible fluids analysis. Modeling, analysis, and design using FEA software.

Course Pre-Requisites / Co-Requisites
EGM 3520 or equivalent.

Course Objectives
The objective of the course is to teach the fundamentals of finite element method with emphasize on the underlying theory and implementation issues as well as providing hands on experience using finite element software to model, analyze and design systems of relevance to mechanical engineers.

Textbook:
Introduction to Finite Element Analysis and Design
Authors: N.H. Kim, B.V. Sankar, and A.V. Kumar
Wiley, 2nd Edition
ISBN: 9781119078739

Recommended Reading Materials
a) "A first course in the Finite Element Method", Daryl L. Logan, Thomson Publishers.
b) "A first course in finite elements" by Fish and Belytschko, Wiley Publications.
c) "Finite Element Procedures in Engineering Analysis", by K. J. Bathe, Prentice-Hall.

Course Content
The outline of the course is as follows:
I. Background
II. Introduction and notations (2weeks)
    a. Discrete systems and direct stiffness method
    b. Solution of linear simultaneous equations
III. 1-D problems
    a. Heat conduction (2 weeks)
    b. Truss elements (2 week)
    c. Beam Elements (2 weeks)
IV. 2D problems
    a. Heat conduction (3 weeks)

b. Linear elasticity (2 weeks)
    i. Review of linear elasticity
    ii. 2D models (Plane stress, Plane strain, Axi-symmetric)
    iii. Linear and higher order 2D elements

V. 3D elements and modeling issues (2 weeks)
    a. 3D elements
    b. Mesh generation and element selection issues
    c. Plate and Shell elements

Attendance Policy, Class Expectations, and Make-Up Policy

You should attend all classes unless you are an EDGE or off-campus student. If you must miss a class for legitimate reasons such as medical or university work/sports, then you will be allowed to take any missed quiz or exam on a later date. Late assignments could receive a grade as low as 75% credit (depending on how late) if submitted within the time allowed for late submission by the e-learning system and will not be graded thereafter (if submitted by email or other means). Make up exams will be given only for students with medical reasons for missing the exam. Documentation in the form of a doctor's note must be provided for make-up exams and homework.

Excused absences must be consistent with university policies in the Graduate Catalog (https://catalog.ufl.edu/graduate/regulations) and require appropriate documentation. Additional information can be found here: https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Homework	100 each	35%
Exams	100 each	50%
Project	100	15%
		100%

Grading Policy

The following is given as an example only.

Percent	Grade	Grade Points
93.4 - 100	A	4.00
90.0 - 93.3	A-	3.67
86.7 - 89.9	B+	3.33
83.4 - 86.6	B	3.00
80.0 - 83.3	B-	2.67
76.7 - 79.9	C+	2.33
73.4 - 76.6	C	2.00
70.0 - 73.3	C-	1.67
66.7 - 69.9	D+	1.33
63.4 - 66.6	D	1.00
60.0 - 63.3	D-	0.67
0 - 59.9	E	0.00

Academic Policies & Resources

The university-wide student resources to academic policies and campus resources can be found at: https://go.ufl.edu/syllabuspolicies.

Commitment to a Positive Learning Environment

The Herbert Wertheim College of Engineering values varied perspectives and lived experiences within our community and is committed to supporting the University's core values.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:
• Your academic advisor or Graduate Coordinator • HWCOE Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu • Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, pld@ufl.edu