THE UNIVERSITY OF COLORADO BOULDER

ASEN 5007: Introduction to Finite Element Methods
Fall 2022

SYLLABUS

Instructor:	Associate Professor John Evans E-mail Address: john.a.evans@colorado.edu
Teaching Assistant:	DeAnna Gilchrist E-mail Address: !"#$$#%&" ' "( ) *+(+,#!+%"!-.
Lecture:	Time: Tuesday/Thursday, 10:00 – 11:15 am Location: AERO 114
Office Hours:	John Evans:

Topics:

1. History of Finite Element Analysis
2. Finite Element Analysis of a One-Dimensional Model Problem
3. Finite Element Analysis of Two-Dimensional Steady Heat Conduction
4. Primal Finite Element Analysis of Plane Strain Linear Elastostatics
5. Mixed Finite Element Analysis of Plane Strain Linear Elastostatics
6. Finite Element Analysis of Plane Strain Linear Elastodynamics

Class Format:

The class meets twice a week for an hour and fifteen minutes of formal lecture and discussion.

Grading:

> 15% Homework Assignments
> 15% Concept Quizzes
> 20% Mini-Project
> 20% Midterm Exam
> 30% Final Exam

Grades will be posted to the class website on Canvas.

Homework Assignments:

There will be four homework assignments covering both theory and implementation:

> Assignment 1: One-Dimensional Finite Element Analysis
>   Assigned: 08-30, Due: 09-20
> Assignment 2: Finite Element Analysis of Steady Heat Conduction
>   Assigned: 10-11, Due: 11-01
> Assignment 3: Primal Finite Element Analysis of Plane Strain Linear Elastostatics
>   Assigned: 11-01, Due: 11-15
> Assignment 4: Mixed Finite Element Analysis of Plane Strain Linear Elastostatics
>   Assigned: 11-15, Due: 12-06

Homework assignments are to be turned in through the course website by the start of class on their due date. Students should make an effort to turn in assignments that are organized,

Concept Quizzes:

There will be five concept quizzes throughout the semester:

> Quiz 1: Strong, Weak, Minimization, and Variational Forms
> > Released: 09-01, Due: 09-06
>
> Quiz 2: One-Dimensional Finite Element Analysis
> > Released: 09-08, Due: 09-13
>
> Quiz 3: One-Dimensional Finite Element Implementation
> > Released: 09-22, Due: 09-27
>
> Quiz 4: Finite Element Analysis of Steady Heat Conduction
> > Released: 10-20, Due: 10-25
>
> Quiz 5: Mixed Finite Element Analysis of Plane Strain Linear Elastostatics
> > Released: 11-17, Due: 11-29

The quizzes are intended to help students identify, practice, and comprehend important finite element concepts. The quizzes will be administered as Canvas quizzes, and each quiz will be released on a Thursday immediately following lecture and due by the start of the following lecture. Students will have fifteen minutes to complete each quiz, and students will be able to take the quizzes as many times as they like before they are due.

Mini-Project:

Students will use MATLAB to implement a finite element method for a one-dimensional model problem in the first half of the semester:

> Mini-Project: Computer Implementation of a One-Dimensional Finite Element Code
> > Assigned: 09-20, Due: 10-11 (Start of Class)

In this mini-project, students will not only create a MATLAB code to solve the given model problem using a finite element method, they will also create a MATLAB post-processing scheme to visualize the resulting solution field and construct a suitable verification test to confirm their code works as intended.

The mini-project is to be turned in through the course website by the start of class on its due date. Submissions should be organized and professional looking. Code should be commented. A readme should be included indicating how to run a student's code. The mini-project will be graded on both a completion basis and a correctness basis.

Collaboration is permitted on the mini-project. This means students may discuss the means and methods for solving problems and even compare answers, but students are not free to copy someone else's code. MOSS (Measure Of Software Similarity) will be used to detect potential cases of plagiarism. Students who are caught copying code (or providing their code to another) will receive an "F" for the course and reported to the Dean's office for further punitive action.

Slack:

A Slack channel has been created to foster communication. Students will receive an e-mail invitation to join this channel. Students can use Slack to ask questions regarding lecture material, homework assignments, concept quizzes, the mini-project, and the midterm and final exams.

academic environment. Information on requesting accommodations is located on the [Disability Services website](#). Contact Disability Services at 303-492-8671 or dsinfo@colorado.edu for further assistance. If you have a temporary medical condition, see [Temporary Medical Conditions](#) on the Disability Services website.

Classroom Behavior:

Both students and faculty are responsible for maintaining an appropriate learning environment in all instructional settings, whether in person, remote or online.

Please know that faculty and graduate instructors have a responsibility to inform OIEC when they are made aware of any issues related to these policies regardless of when or where they occurred to ensure that individuals impacted receive information about their rights, support resources, and resolution options. To learn more about reporting and support options for a variety of concerns, visit [Don't Ignore It](.).

Religious Holidays:

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Prepared by: John Evans   Date: August 20, 2022