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

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 three homework assignments covering both theory and implementation:

Assignment 1: One-Dimensional Finite Element Analysis
Assigned: 01-29, Due: 02-19 (Start of Class)
Assignment 2: Finite Element Analysis of Steady Heat Conduction
Assigned: 3-11, Due: 04-08 (Start of Class)
Assignment 3: Primal Finite Element Analysis of Plane Strain Linear Elastostatics
Assigned: 04-08, Due: 04-22 (Start of Class)

Concept Quizzes:

There will be five concept quizzes throughout the semester:

Quiz 1: Strong, Weak, Minimization, and Variational Forms
Released: 01-31, Due: 02-05
Quiz 2: One-Dimensional Finite Element Analysis
Released: 02-07, Due: 02-12
Quiz 3: One-Dimensional Finite Element Implementation
Released: 02-21, Due: 02-26
Quiz 4: Finite Element Analysis of Steady Heat Conduction
Released: 03-20, Due: 04-01
Quiz 5: Mixed Finite Element Analysis of Plane Strain Linear Elastostatics
Released: 04-24, Due: 04-29

The quizzes are intended to help students identify, practice, and comprehend important finite element concepts. The quizzes will be

Midterm Exam:

There will be a midterm exam on March 18, 2024. This midterm exam will test material associated with "Finite Element Analysis of a One-Dimensional Model Problem". It will also test material associated with Homework Assignment 1, Concept Quizzes 1-3, and the Mini-Project.

The midterm exam will consist of a closed-book conceptual portion and an open-book applied portion. The conceptual portion will test a student's understanding of basic finite element concepts, while the applied portion will test a student's understanding of applied finite element concepts. Students will have seventy five minutes to complete the midterm exam. Online students will have 24 hours to take the exam from the start of the in-person exam, and their exam must be proctored.

Collaboration on the midterm exam will not be tolerated. Students who are caught in these activities will receive an "F" for the course and reported to the Dean's office for further punitive action. Students are free to ask the instructor any clarification questions.

Final Exam:

There will be a final exam on May 5, 2024. The final exam will test all material associated with the course. In particular, it will test material associated with Homework Assignments 1-3, Concept Quizzes 1-5, the Mini-Project, and the Midterm Exam. However, the final exam will emphasize material covered after "Finite Element Analysis of a One-Dimensional Model Problem".

Like the midterm exam, the final exam will consist of a closed-book conceptual portion and an open-book applied portion. Students will have two and a half hours to complete the final exam. Online students will have 24 hours to take the exam from the start of the in-person exam, and their exam must be proctored.

MATLAB, Gmsh, and Paraview:

The homework assignments and mini-project will make heavy use of MATLAB, Gmsh, and Paraview. Each of these software packages is available for Windows, MacOS, and Linux. CU Boulder has a campus site license for MATLAB. To download MATLAB, visit:

https://oit.colorado.edu/software-hardware/software-downloads-and

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. Slack is the instructor's preferred means of communication, and he will make every effort to respond to Slack messages within 24 hours.

Late Assignment and Missed Exam Policy:

Generally speaking, late assignment submissions will not be accepted, and there will be no make-up quizzes or exams. That being said, please contact the instructor if you are unable to submit an assignment or take a quiz or exam due to illness, technical issues, or other challenging extenuating circumstances. Reasonable accommodations will be made where appropriate provided you contact the instructor before the assignment due date or quiz or exam date.

Classroom Behavior:

Students and faculty are responsible for maintaining an appropriate learning environment in all instructional settings, whether in person, remote, or online. Failure to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation, or political philosophy.

For more information, see the classroom behavior policy, the Student Code of Conduct, and the Office of Institutional Equity and Compliance.

Preferred Student Names and Pronouns:

CU Boulder recognizes that students' legal information doesn't always align with how they identify. Students may update their preferred names and pronouns via the student portal; those preferred names and pronouns are listed on instructors' class rosters. In the absence of such updates, the name that appears on the class roster is the student's legal name.

Honor Code:

All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the Honor Code. Violations of the Honor Code may include but are not limited to: plagiarism (including use of paper writing services or technology [such as essay bots]), cheating, fabrication, lying, bribery, threat, unauthorized access to academic materials, clicker fraud, submitting the same or similar work in more than one course without permission from all course instructors involved, and aiding academic dishonesty.

All incidents of academic misconduct will be reported to Student Conduct & Conflict Resolution: honor@colorado.edu, 303-492-5550. Students found responsible for violating the Honor Code will be assigned resolution outcomes from the Student Conduct & Conflict Resolution as well as be subject to academic sanctions from the faculty member. Visit Honor Code for more information on the academic integrity policy.

Sexual Misconduct, Discrimination, Harassment and/or Related Retaliation:

CU Boulder is committed to fostering an inclusive and welcoming learning, working, and living environment. University policy prohibits protected-class discrimination and harassment, sexual misconduct (harassment, exploitation, and assault), intimate partner violence (dating or domestic violence), stalking, and related retaliation by or against members of our community on- and off-campus. These behaviors harm individuals and our community. The Office of Institutional Equity and Compliance (OIEC) addresses these concerns, and individuals who have been subjected to misconduct can contact OIEC at 303-492-2127 or email cureport@colorado.edu. Information about

that individuals impacted receive outreach from OIEC about resolution options and support resources. To learn more about reporting and support for a variety of concerns, visit the Don't Ignore It page.

Religious Holidays:

B) . C61%C-3>/D%45E6>451%F)/63?D%?-%C4-0>+5%45)1-*)G35%)//- . . -+)?>-*1%F-4%1?6+5*?1%H;-8%G5/)615%-F% 453>:>-61%-G3>:)?>-*18%;)05%/-*F3>/?1%H>?;%1/;5+635+%5I) . 18%)11>:* . 5*?1%-4%45E6>45+%)??5*+)*/52% J35)15%/- . . 6*>/)?5%?;5%*55+%F-4%)%453>:>-61%)//- . . -+)?>-*%>*%)%?> . 53D% .)**542

K55%?;5%/) . C61%C-3>/D%45:)4+>*:%453>:>-61%-G1540)*/51%F-4%F633%+5?)>312%

Prepared by: John Evans Date: January 9, 2024