**University of Idaho**
**CE 546/ME549 – Finite Element Analysis**
**Spring Semester, 2020**

**Objective:** The objective of this class is three-fold:

1. To familiarize the student with the procedures for solving differential equations using the finite element method.
2. To enhance the knowledge on how to write finite element codes using available programming software.
3. To introduce some of the available commercial finite element software and solve several representative examples.

**Class hours:** MWF 9:30 am - 10:20 pm EP 203

**Instructor:** Dr. Gabriel Potirniche
324Q Engineering-Physics Building
(208) 885-4049 (tel.)
gabrielp@uidaho.edu

**Office hours:** Mon. 2:30 pm – 3:30 pm
Wed. 2:30 pm - 3:20 pm

**Webpage:** http://www.webpages.uidaho.edu/~gabrielp/ME549-CE546/ME549-CE546.html

**Textbook:** "A First Course in Finite Elements", Jacob Fish and Ted Belytschko, John Wiley & Sons, 2007, ISBN 978-0470035801

**Grading:**

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|---|---|
| Homework | 25% |
| Exams (2) | 30% |
| Projects | 20% |
| Final Exam (comprehensive) | 25% |

A: 90-100 B: 80-89 C: 70-79 D: 60-69 F: 0-59

**Homework:** No late homework allowed.

**Academic Dates and Deadlines:**

Wednesday, January 15, 2020 - Spring classes begin
Monday, January 20, 2020 - Martin Luther King, Jr. - UI closed
<u>Wednesday, January 29, 2020 - Deadline to drop or audit semester classes without W</u>
Monday, February 17, 2020 - Presidents' Day - UI closed
Monday, March 16-20, 2020 - Spring recess
Monday, March 30, 2020 - Fall academic advising begins
<u>Friday, April 3, 2020 - Deadline to withdraw or change semester classes to audit</u>
Monday, April 20, 2020 - Fall registration opens
Monday, May 11, 2020 - Spring final exams
<u>Final exam CE546/ME549 - Tuesday, May 12, 8:00 - 10:00 a.m.</u>

**Learning outcomes:**

1. **Introduction to programming.** A short programming introduction will be given, so that the students will be able to accomplish the course tasks. It is assumed that the student does not have any significant prior programming knowledge, however experience in programming is welcomed. The students will be allowed to use any

language (e.g., Matlab, MathCAD, Fortran, C++, Java, etc.) to complete the programming tasks.

2. **Programming and solving one-dimensional (1-D) engineering problems using the finite element method.** In this chapter students will learn how to:
    a) Formulate the strong and the weak forms of several engineering problems.
    b) Choose trial solutions and weight functions.
    c) Implement the procedures in a finite element code, solve the problem and perform post-processing of results.

3. **Programming and solving two-dimensional (2-D) problems**. The same outcomes as in the previous step will be achieved, but for the 2-D case, i.e.
    a) Strong and weak formulations.
    b) Trial solutions and weight functions.
    c) Finite element formulations.

    The 2-D methodology will be exemplified using a 2-D problem from the linear elasticity theory in metals.

4. **Applications using commercial finite element modeling.** A brief introduction on how to use a commercial finite element code will be given. Students will learn the steps needed in solving a problem by setting up the solution steps in the commercial finite element code ABAQUS. Examples will include problems from the linear theory of elasticity and heat transfer.

**Disability Support Services Reasonable Accommodations Statement:**

*Reasonable accommodations are available for students who have documented temporary or permanent disabilities. All accommodations must be approved through Disability Support Services located in the Idaho Commons Building, Room 306 in order to notify your instructor(s) as soon as possible regarding accommodation(s) needed for the course.*

- *885-6307*
- *email at <dss@uidaho.edu>*
- *website at <www.access.uidaho.edu>*

**University of Idaho Student Code of Conduct, Article II, Section 1:**

*Cheating on classroom or outside assignments, examinations, or tests is a violation of this code. Plagiarism, falsification of academic records, and the acquisition or use of test materials without faculty authorization are considered forms of academic dishonesty and, as such, are violations of this code. Because academic honesty and integrity are core values at a university, the faculty finds that even one incident of academic dishonesty seriously and critically endangers the essential operation of the university and may merit expulsion.*