

McMaster University
Department of Mechanical Engineering

Course Outline: ME 705, 2019
Advanced Finite Element Analysis

Instructor: ▪ Dr. Peidong Wu, JHE 339, x20092, peidong@mcmaster.ca

Content: Central to the course is to solve nonlinear problems in solid mechanics with finite element method. It starts with the kinematics of large deformations, together with relevant continuum mechanics. We then go on to describe implementations of plasticity models in to finite element software. Throughout the course, we describe the general, multiaxial form of the theory but uniquely, wherever possible, reduce the equations to their simplest, uniaxial form to develop understanding of the general theory and we hope physical insight. The course bridges the gap between senior undergraduate/graduate materials on engineering mechanics and existing advanced finite element software. It introduces a range of engineering applications, including assessment of damage and failure, prediction of deformation localization and necking.

Lecture Schedule: Wednesdays 2:00 PM – 5:00 PM, JHE 219
(Start on January 16, 2019)

Office Hours: I am available by appointment. You are also welcome to stop by my office to see if I am in and to determine whether I have a few minutes to meet with you.

Textbook: ▪ F. Dunne & N. Petrinic: "Introduction to Computational Plasticity"
(Oxford University Press; ISBN: 978-0-19-856826-1)

▪ Lecture Notes

References: ▪ Y.C. Fung: "A First Course In Continuum Mechanics"

▪ A.J.M. Spencer: "Continuum Mechanics"

Grading Scheme:

Project 1	40%
Project 2	60%

Assignments:

Several problem sets are planned for this course. The purpose of these assignments is to provide students with an opportunity to individually work out fundamentals related to the course material.

Project:

A project is intended to give students practical experience in applying theories or a commercial finite element package to analyze a problem relevant to their thesis topics.