

ME 404/504 Computational Mechanics, Spring 2012

Instructor: Dr. Juan. C. Heinrich, heinrich@unm.edu
Office hours: T 2:00-3:00, W 9:00-10:00 or by appointment
Schedule, lecture: T-R 11:00-12:15, ME 220

Prerequisites:

Students are expected to have taken a first course in *Numerical Methods in Engineering*. In addition, students are expected to be proficient in programming using either C++, FORTRAN or MATLAB (other languages may be acceptable too, check with the instructor). Students are also expected to have a basic background in *Partial Differential Equations* as well as an engineering background in *Fluid Flow and Heat Transfer*.

Textbooks/required:

Intermediate Finite Element Method: Fluid Flow and Heat Transfer Applications, J. C. Heinrich and D. W. Pepper. Taylor and Francis 1999

Course topics:

1. Mathematical background, weighted residuals and Galerkin formulation.
2. Fundamental finite element concepts
3. High order finite elements
4. Numerical Integration
5. Non-linear problems
6. Time dependent problems
7. Convective transport
8. Viscous incompressible fluid flow
9. Further applications

Course Objectives:

This course and complementary CE 502 are complementary. CE-502 concentrates in solid mechanics and design. ME 504 looks at the extension of finite element methods to fluids, heat transfer and the solution of differential equations and field problems in general.

Assessment Tools:

1. Homework 30%
2. Midterm 35%, Thursday March 20
3. Final 35%, Tuesday May 8