

## **20-MECH -621- Modeling and Simulation of Solids I Spring Quarter 2003**

- Instructor:** Dr. Dong Qian, Assistant Professor of Mechanical Engineering  
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<http://www.min.uc.edu/dqian> and <http://blackboard.uc.edu>
- Textbook:** Class notes will be given and no textbook required
- Class:** 2:00-3:15 TH, 649 Baldwin Hall
- Office Hours:** Dr. Qian: 1:00-3:00 Wed. or stop by, 406B Rhodes.
- Goals:** Constitutive modeling of solids and computational implementation
- Prerequisites:** Linear Algebra, Differential Equations, Strength of Materials and basics of finite element methods.
- Topics:**
1. Introduction to the notations, basic mechanism of material deformations, continuum mechanics and thermodynamic laws.
  2. Linear elasticity.
  3. General elastoplasticity, perfect plastic and strain hardening models.
  4. Damage mechanics.
  5. Nonlocal plasticity and damage theory
- Computer Usage:** Students will primarily use Matlab with the options to use C, C++, Fortran, etc. and write a simple FEM code.
- Grading:** 20% homework; 30% midterm exam; 50% final project.
- Homework:** Regular homework due 1 week after day assigned. Computer homework due 2 weeks after day assigned. Late submission will not be graded.
- Special Needs:** If you have any special needs related to your participation in this course, including identified visual impairment, hearing impairment, physical impairment, communication disorder, and/or specific learning disability that may influence your performance in this course, you should meet with the instructor to arrange for reasonable provisions to ensure an equitable opportunity to meet all the requirements of this course. At the discretion of the instructor, some accommodations may require prior approval by Disability Services.
- Policy on academic dishonesty:** Academic dishonesty is a serious matter and will be dealt with as provided for in the student code of conduct by University of Cincinnati.
- Suggested References:**
- Hill, R., 1950, The Mathematical theory of plasticity, London: Oxford University Press,  
Malvern, L.E., 1969, Introduction to the Mechanics of a Continuous Medium. Englewood Cliffs, NJ: Prentice-Hall, Inc.  
Desai, C.S., and Siriwardane, H.J., 1984, Constitutive Laws for Engineering Materials with Emphasis on Geologic Materials. Englewood Cliffs, NJ: Prentice Hall, Inc.  
Lubliner, J., 1998, Plasticity, Prentice Hall PTR.