
Course: Advanced Topics in Biomechanics (AME 90974)
Control #: 25496

Meeting Time: Tuesday and Thursday 2:00 – 3:15
Meeting Place: DeBartolo 210

Instructor:

Glen L. Niebur
376 Fitzpatrick Hall
631-3327
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Office Hours: Mon. and Th. 3:15 – 5:00, by appointment, or when my door is open.

Other information: <http://bones.ame.nd.edu/ame974>

Prerequisites:

- Continuum Mechanics (or Elasticity or Plasticity or Advanced Mechanics of Solids or Permission of Instructor)

Objectives:

- To understand and apply continuum theories to biological materials.

Text: Course notes available at bookstore

Supplemental Texts

Gurtin, M.E.: *Tensor Calculus*
Taber, L.: *Nonlinear theory of elasticity : applications to biomechanics*
Mow, V and Huiskes, R: *Basic Orthopaedic Biomechanics*

Grading:

Homework	35%
Final Exam	30%
Final Project	35%

Examinations:

There will be one exam at the schedule final examination time

Topics

- I. Review of tensor calculus, continuum mechanics
- II. Thermomechanics
 1. Balance of energy
 2. Hyperelastic materials/Strain energy functions
The Green, Nahgdi, Rivlin Theorem
- III. Bone
 1. Irreversible processes

2. Damage mechanics

IV. Tendons and ligaments

1. Finite elasticity
Single Integral Finite Strain elasticity
2. Constrained materials
Incompressibility
Fiber reinforced models

V. Cartilage

1. Mixture theory
2. Biphasic theory
3. Triphasic theory
4. Fiber reinforced models

