

# Syllabus for

## MECH 6323: Micromechanics

### Spring 2017

#### Overview

The objective of this class is to cover some of the basic theory in classic homogenization and eigenstrain micro stress analysis. This class will cover both analytical and computational approaches.

#### Course Information

Instructor: Dr. Jack Chessa

Email: [jfchessa@utep.edu](mailto:jfchessa@utep.edu)

Office Hours: W 1:30-4:00 pm, email, IM, blackboard or by appointment.

Office: A118

Required Textbook: None

Reference Textbook(s): "Micromechanics of Defects in Solids", 2<sup>nd</sup> edition, Toshio Mura; "Micromechanics: Overall Properties of Heterogeneous Materials", 2<sup>nd</sup> edition, Sia Nemat-Nasser and Muneo Hori.

Prerequisites: MECH 5302

Meeting Times: T,Th 1:30 – 2:50 pm, UGLC 336

#### Topics

The following topics will be covered in this class:

- Review of vector and tensor calculus
- Review of basic elasticity and continuum mechanics
- Green's functions and Fourier transform
- Material isotropy
- Representative Volume Element (RVE) and averaging
- Eigenstrain, Eigenstress and inclusions
- Eshelby solution for inclusions
- General Eigenstrain theory
- Self-consistent schemes
- Mori-Tanaka method
- Variational bounds
- Voigt, Ruess and Hashin-Shtrikman variational bounds
- Application to composite material homogenization
- Computational homogenization methods
- Introduction to multiscale finite element methods

- Micromechanical damage theory

## Course Policies

*Grading:* The grade in this class will be based on homework only.

*Homework:* The homework assignments will be given in class at the point when the sufficient material has been covered. The homework will have an initial due date. Assignments will be graded after that initial due date and returned with an initial grade. You may resubmit homeworks to improve your grade, but I will not accept resubmitted homework in the last two weeks of the semester.

All homework must be neat and relevant. I will not grade assignments that are not neatly done or not germane to the assignment.

*Academic Dishonesty:* If any academic dishonesty is suspected, the student will be referred to the Office of Student Life. This includes copying during an exam, receiving outside help, etc. If you are unsure about what constitutes academic dishonesty please consult the following site:

<http://studentaffairs.utep.edu/Default.aspx?tabid=4386>

*Students with Special Needs:* Students with disabilities or special needs, including both permanent disabilities (including: learning disabilities, Attention Deficit Disorder, visual, mobility and hearing impairments, psychological disabilities, and chronic systemic disorders) as well as some temporary medical conditions (e.g. a broken arm), are encouraged to see the UTEP Disabled Student Services Office (DSSO) located at Union East Room 106 or contact them at (915) 747-5148 or at [dss@utep.edu](mailto:dss@utep.edu).