Earthquake Source Physics (CERI 7270/8270)
TR 9:40-11:05, CERI house 3 conference room
http://www.ceri.memphis.edu/people/egdaub/ceri7270.html

Instructor: Eric Daub, egdaub@memphis.edu, x4830, office in house 3. You are welcome to come by any time I am there to get help, *except* right before class.

Description: This course focuses how to represent earthquakes deformations and ground motions quantitatively. Topics to be covered include kinematic descriptions of earthquakes on extended faults (1st half) and dynamic models for earthquake slip (2nd half), including treatments of elasticity, friction laws, and numerical methods. This course assumes some knowledge of partial differential equations and proficiency in writing computer programs to solve problems numerically in a language of your choosing (MATLAB and/or Python is fine). Additionally, the final project requires the use of the UM HPC facility, so you will need to be comfortable submitting jobs and retrieving data from the computer cluster.

Textbook: *Earthquake and Volcano Deformation*, Paul Segall, Princeton University Press, 2010. We will be covering chapters 1-3 and 11-12, plus supplementing the text with additional discussion of earthquake dynamics and numerical methods in lectures. You do not need to purchase the book (I have the library copy in my office that is available if you want to copy the relevant pages), though it is a valuable resource to have if you wish to do research in this area.

Evaluation: Bi-weekly homework 50%, midterm 20%, final project 20%, class participation 10%. Homework will be assigned every two weeks and is due every second Friday. You are encouraged to work with other members of the class on homework assignments, but all write-ups, plots, and computer codes must be your own. All computer codes handed in with homework assignments or your final project must be commented. There will be a take-home/oral midterm in place of class on March 2.

Final Project: There is no final exam for this class. Instead, all students will conduct a final numerical modeling project on earthquake mechanics by running one of the SCEC Rupture Code Verification Group benchmark problems (the exact problems will be assigned in late March). These problems require use of the UM HPC (or some other computer cluster) to run in a reasonable amount of time, so you are encouraged to make yourself familiar with the HPC environment before the end of the semester. All students will make a short 15 minute presentation with their results to the entire class. Ph.D. students will also be required to do a 30 minute oral exam with the instructor to discuss their results.

Schedule (Subject to Change)	
1/17/17	1/19/17
Intro	Continuum Mechanics
1/24/17	1/26/17
Continuum Mechanics	Continuum Mechanics
1/31/17	2/2/17
Continuum Mechanics	Dislocation Models
2/7/17	2/9/17
Dislocation Models	Dislocation Models
2/14/17	2/16/17
Dislocation Models	Dipping Faults
2/21/17	2/23/17
Dipping Faults	Dipping Faults
2/28/17	3/2/16
Dipping Faults	No Class (Midterm)
3/7/17	3/9/17
Spring Break	
3/14/17	3/16/17
Wave Equation	Wave Equation
3/21/17	3/23/17
Wave Equation	Wave Equation
3/28/17	3/30/17
Wave Equation	Dynamic Rupture
4/4/17	4/6/17
Dynamic Rupture	Dynamic Rupture
4/11/17	4/13/17
Dynamic Rupture	Dynamic Rupture
4/18/16	4/20/17
Seismic Cycle	Seismic Cycle
4/25/17	Week of 5/1/17
Seismic Cycle	Final Presentations