Geodynamics of the Earth and Planetary Interiors
GEOL 546/L Syllabus
Spring 2017  LO Rm# 1221
Lecture: M/W 9:30-10:45 am
Lab: M/W 2:00 – 3:30 pm

Professor: Dr. Dayanthie Weeraratne
Email: dsw@csun.edu
Office hours: Mondays 1:00–3:00 pm
Office: Live Oak Hall Rm# 1203  ext. 2046
Class Webpage: Moodle

Required Text: Dynamic Earth, by Geoffrey Davies
Supplemental Text: Geodynamics by Turcotte and Schubert

Course Objectives: This course provides fundamental concepts necessary for understanding of the interior and surficial processes of the Earth and other planets through quantitative analysis of elastic plate flexure, heat flow, heat production, convection, geophysical fluid dynamics, gravity, surface stresses, and rheology and deformation of planetary materials. Geological areas of application include earthquakes, tectonic plate flexure, volcanic eruptions, magma plumbing, mountain building, mantle convection, Earth’s interior heat budget, core dynamo, upper mantle flow and deformation mechanisms: applications to observed anisotropy. Designed for senior-level undergraduate and beginning graduate students in geology and/or geophysics.

Figure to right: Numerical three dimensional model of convection in the Earth's mantle and core (Jeanloz et al., 2001). Here they test the hypothesis that iron-rich sediments float to the top of the outer core and create drag forces that throw off the Earth's wobble by a few millimeters over 18 years.

3D mantle flow around the edge of a subducting plate modeled for Costa Rica or Juan de Fuca subduction using CitcomCU (Magali Billen 2010, UC Davis)
GEOL 595-Laboratory

Lab Evaluation:

Week 1-10  
- 8 Labs (1-2 week duration), 20 pts each  

Week 11-14  Individual Project (last 4 weeks)
- Individual Project Title  
- Individual Project Proposal Outline (1 page)  
- Written Draft for peer review  
- Individual Project Presentation (15 minutes)  
- Individual Project Written Report (last 4 weeks)  
  Due: April 3  
  Due: April 10  
  Due: May 1  
  May 10  
  Due: May 10  
  TOTAL  

Points  
160  
5  
10  
15  
70  
260

Lab Project: You will be asked to pose a scientific question and use techniques learned in class such as numerical modeling, laboratory fluid dynamics, sandbox models, analytical calculation, or other medium as a geodynamic model to answer the posed question. This may involve building a physical model or building a numerical code to study this phenomena. I will help you designing your project as well as assist with materials and building techniques. A draft and final written report of your project describing the problem, your experimental techniques, and findings will be due on the last day of class. The report should be 5 pages of text, double or single spaced (not including pictures, images, or figures) with an additional page for references.

Academic Dishonesty: I will follow the University's policy on academic dishonesty described in the Schedule of Classes. Cheating will result in a zero grade for an exam any assignment and notification to the Dean of Students which can result in disciplinary action. It also defeats your ability to learn and grow. Spend the time to figure it out. You might enjoy it!

Please be respectful to those around you in class. Inappropriate behavior will not be tolerated. Please turn off all electronics before coming to class (it's only an hour!).

Some tips for how to succeed in this class:
1. Ask, ask, ask questions, if you do not understand something or just to participate.
2. “Wherever you go, there you are…” - Be present in the moment. You can minimize study time if you come to class and give your full attention.
3. Read ahead and write down your questions. You’ll enjoy it and be more engaged in the class.
4. Keep up with assignments and get them out of the way soon.
5. If you miss a lecture – read the material and get a copy of the notes.
6. If you don’t do well on the first exam ask for help right away, don’t put it off.
7. If you have questions or thoughts come by during office hours, we’re here for you.
8. If something interests you, explore it! Life is short!