

Course Syllabus
GEOL 460/560, Fall 2005

Course Title: Crustal Deformation (3 credits)
Meeting Time: MW, 2-3:20 pm
CRN: 16711/16712
Required Prereqs: GEOL 315, MATH 253
Recommended Prereq: MATH 341

Instructor: Prof. David Schmidt
Email: das@uoregon.edu
Office: 210C Cascade Hall
OH: Wednesday, 3:30-4:30 pm; or by appt.
Course Website: Logon to Blackboard

Course Description: Crustal Deformation is the study of active geophysical processes that occur within the earth's lithosphere. These endogenous processes redistribute stress in the crust resulting in an elastic or visco-elastic response that is observed as a deformation signal at the earth's surface. Various modeling techniques are then used to infer the mechanics of a source process or the bulk properties of the lithosphere based on the deformation. This course will introduce the physical processes leading to the deformation of the crust, as well as the instrumentation and data processing techniques used to resolve source parameters. Topics include the deformation surrounding active faults, poro-elasticity, visco-elasticity, volcanic inflation, and land subsidence. The various sources of geodetic data used to observe crustal deformation will also be introduced including InSAR, GPS, survey techniques, and strainmeters.

Course Format: Class meetings will consist of a combination of lecture and discussion.

Required Reading: There is no textbook for this course. Instead, we will be reading excerpts from various books and review papers. A course packet is available in the bookstore and additional readings are posted on the course website for students to print. Students are expected to complete the assigned reading prior to class so that they can participate in the discussions.

Homework: Problem sets will be assigned weekly and will be self-paced (i.e., no explicit due date). Answers will be posted on the course website. Homework will not be graded, but you will receive credit for those fully completed assignments that are turned in prior to the last day of class. It will be the student's responsibility to seek guidance from other students or the instructor to complete the assignments. Group study is encouraged, but each student must turn in their own work.

Final Grade Assignments:

Participation	5%
Homework	20%
1 st Midterm	25%
2 nd Midterm	25%
Final Exam	25%

Final grades will be based on a curve, with undergraduate and graduate students graded on different scales. However, given the small size of the class, students who score >90% will be guaranteed at least an A-, students who score >80% will be guaranteed at least a B-, and students who score >70% will be guaranteed at least a C-.

Co-registration with GEOL 461/561: (optional) Students who wish to explore the field of crustal deformation in greater depth can also enroll in GEOL 461/561 (1 unit). Each student will work on an individual research project that will conclude with an oral presentation and written report.

Course Schedule:

	Monday	Wednesday
Week 1	Course Introduction	Stress and Strain, Rheology <i>Reading: Stüwe, pp 195-217 (C)</i>
Week 2	Continental Deformation <i>Reading: Stüwe, pp 218-229 (C); Bourne (B)</i>	Deformation from Faults <i>Reading: Tralli, pp 35-63 (C)</i>
Week 3	Deformation from Faults <i>Reading: Thatcher, pp 191-212</i>	Deformation from Volcanoes <i>Reading: Dzurisin, pp 1-26 (B)</i>
Week 4	Deformation from Hydrology <i>Reading: TBA</i>	Midterm
Week 5	Data Sources: GPS & Leveling <i>Reading: Hagar, pp 351-382 (C)</i>	Data Sources: InSAR & Strainmeters <i>Reading: Bürgmann, pp 169-209 (B)</i>
Week 6	Modeling: FEM, BEM <i>Reading: Stüwe, pp 1-13 (C)</i>	Inverse Methods <i>Reading: Menke, pp 1-20 (C)</i>
Week 7	Inverse Methods: Linear Inverse Theory <i>Reading: Menke, pp 35-60 (C)</i>	Inverse Methods <i>Reading: TBA</i>
Week 8	Catch-up/Review <i>Reading: TBA</i>	Midterm
Week 9 (Thanksgiving)	Case Studies <i>Reading: McCaffrey (B), Hilley (B)</i>	Case Studies <i>Reading: Peltzer (B), Jonsson (B)</i>
Week 10	Presentations from GEOL 461/561	Wrap-up
Finals Week	Final Exam: Monday @ 3:15 pm, 202 Cascade	

C=course packet; B=Blackboard; Course schedule subject to change. See course website for updates.