STRUCTURAL GEOLOGY - GEOL 345

Instructor: Simon Kattenhorn
Spring Semester 2012: TR 9.30 a.m. - 10.45 a.m., Mines 306 / Lab: W 1.30 p.m. – 4.20 p.m., Mines 306

Course Summary

This course examines the fundamental concepts of deformation of the lithosphere. Due to the mobile nature of the Earth’s lithosphere, rocks are invariably deformed, showing evidence of the effects of large stresses at all scales, from submicroscopic to regional. A long geologic history on Earth has resulted in many regions showing the cumulative effects of multiple deformation events. It is therefore important to be able to distinguish different geologic structures, describe them fully, understand how they formed, and place them in the context of a broader geologic history. This course will provide you with a framework to integrate an understanding of structural geology into all aspects of geologic study.

Course Goals

The course will consist of lecture and laboratory components. The lectures will provide the theoretical foundation that will enable you to make the leap to application in the labs. The lectures will involve a topical progression in geologic structure analysis, beginning with rheology, then moving on to brittle deformation (joints and faults), ductile deformation (folding), deformation in different tectonic environments, the development of concepts of stress and Mohr circles, the state of stress in the lithosphere, the mechanics of brittle failure, and finally, salt tectonics. Application of the usefulness of these topics will be stressed throughout, such as the importance to the oil and gas industry. The labs will provide hands-on training in geologic map construction and structural analysis, aided by the use of Google Earth to augment 3D structure visualization.

Prerequisites

The prerequisites for this course are Geol 101 or 111 (Physical Geology), Phys 111 or 211 (General or Engineering Physics I), and Math 144 (Analytic Trigonometry) or equivalent math background.

Please see the instructor if you have any questions regarding these prerequisites.

Course Logistics

Instructor: Simon Kattenhorn (please call me Simon)
I am a Professor in the Dept. of Geological Sciences. My office is in McClure Building (directly opposite the Mines Building), Room 303B. McClure is wheelchair accessible from all entrances and has two elevators (NW and SW corners).

Office hours: Mondays from 3.00-4.30 p.m. or by appointment. The office hours shouldn’t be regarded as being exclusively a time to address difficulties you are having with the course. You can use it for general discussion, to collect or borrow materials, to clarify issues from class, or to talk about your love of structure!

Office phone: 5-5063 from on campus (else 885-5063). The best time to reach me is during the office hours. I have voice mail - if you would like me to call you back, clearly leave your name, telephone number and a convenient time to call you and I will attempt to return your call ASAP. Do not contact me on my cell phone regarding course-related questions. This includes texting.

Email: simkat@uidaho.edu (this is the most efficient way to get a hold of me).
Structural Geology – Spring 2012 Syllabus

Mailbox: if you wish to leave items in my mailbox, it is in the room directly opposite the Geological Sciences departmental office (Mines 322).

FAX: you can FAX materials to me at (208) 885-5724. Be sure to include my name on the FAX.

Course Website: http://www.uidaho.edu/~simkat/geol345.html
All electronic materials, including homework and relevant course information, will be provided here.

Required textbook: Haakon Fossen
Structural Geology - 1st Ed. (available in the UI bookstore)
Cambridge University Press, 2010

Required lab manual: Stephen M. Rowland, Ernest M. Duebendorfer, and Ilsa M. Schiefelbein
Structural Analysis and Synthesis - 3rd Ed. (available in the UI bookstore)
Blackwell, 2007

Handouts: a limited number may be provided.

Assignments and Examinations

1) You are required to attend all lectures and lab sessions. If you have 3 or more unexcused lecture absences by the end of week 5 (Feb. 9th), you will receive an immediate grade of F in the course. If you have a total of 6 or more unexcused lecture absences during the semester, you will receive a grade of F in the course.

2) Homework assignments will be distributed every 2-3 weeks throughout the semester and will be due 1 week later. All homework answers should be typed and stapled. Hand drawings are fine.

3) The lab grade will be integrated into your final grade for the class. You are required to read ahead from the lab manual so that you are fully prepared at the start of each lab. Many lab exercises will not be completed during the lab session, requiring you to complete them as homework. All labs must be handed in to the lab TAs (Matt Pendleton or Amy McMillin) no later than 5 pm on each Monday immediately following the lab session.

4) Your term project will involve reading a paper of your choosing published in the Journal of Structural Geology since January 2011 (having 10 or more published pages) and writing a 2-page summary about the main findings in the paper and how it relates to material learned in class. The project will be due on April 26th.

5) The midterm examination will be on Tuesday, February 28th in Mines 306 (during the regular class time).

6) The final examination will be on Thursday, May 10th from 8.00 – 9.30 a.m. in Mines 306.

Grading

Laboratory exercises: 40%
Homework exercises: 20% Includes term paper. Field trip report counts for ~40% of homework grade.
Midterm exam: 20%
Final exam: 20% The final exam will not be comprehensive.

Field Trip

There will be a mandatory field trip during the week of April 16th-21st. We will visit the Lake Mead region in Nevada. Field trip costs are included in the course lab fee. We will be camping during this field trip. Be prepared by obtaining any materials likely to be needed for the field, such as tents and hiking equipment. Daytime temperatures could be anywhere in the low 80s to low 100s with lots of direct sunshine. Nighttime lows should be in the mid-50s to low-60s. More specific information will be provided closer to the time.