GLY4400 Structural Geology and Tectonics

Syllabus Spring 2023

MWF Lecture 12:50 202 Williamson Hall

Textbooks:

http://psgt.earth.lsa.umich.edu

We will be using this eBook for the semester. The book may be free or there may be a $10 fee (through this link) that will give you access through the end of the semester.

The eBook is a reorganized and streamlined version of the following book (in case you want a hardcopy):

EARTH STRUCTURE: AN INTRODUCTION TO STRUCTURAL GEOLOGY AND TECTONICS
Author: Van der Pluijm & Marshak 2ND edition, ISBN: Publisher: W.W. NORTON & CO.

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Materials, including this syllabus, lecture/reading schedule, & assignments, will be available on E-learning in Canvas

Course objectives

Introduce you the variety of structures and rock fabrics formed at range of scales, temperature/depth conditions, and tectonic settings

Provide a qualitative and quantitative understanding of the forces and stresses responsible for the development of geologic structures

Provide the background necessary for the kinematic interpretation of structures and strain observed in rocks

Expand your knowledge gained about structures, strain, and stress to a larger scale and place it in framework of a range of plate tectonic settings

Further prepare you for summer fieldcamp.

Topics to be covered are grouped under the following main headings:

- Stress
- The Frictional Regime
  - Faulting & brittle deformation
- The Plastic Regime
  - Strain
  - Ductile-plastic strain
  - Rheology
  - Folding
  - Deformation fabrics (foliations, lineations, etc.)
- Plate Tectonics
- Deformation patterns in contractional, extensional, & strike-slip settings

Fieldtrip (required)
Five-day trip to the Appalachians
Tentative date: First week of April

Lab
The lab exercises have been designed with two goals in mind: (1) to provide hands-on experience and strengthen the concepts covered in lecture and (2) to extend the application of these concepts beyond what can be covered in class. I have prepared the lab schedule to synchronously cover the material discussed in lecture. Many of the labs will also have a component of material necessary for structural geology and field camp (e.g., maps, cross-sections, stereonets, rock samples, etc.).

Exams
Will consist of a variety of different types of questions, ranging from multiple choice, fill in the blank, short answer to calculations and half-page explanations. There will be three exams during the semester and a cumulative final exam during finals week. Material for exam will be covered in lecture. In some instances, however, I may assign specific reading topics for which you will be responsible. Any such instances will be clearly communicated.

Suggested approach for success
Being a 4000-level course, structural geology will include quite a few concepts, analyses, and calculations that may not be fully digested by sitting in lectures. Complete understanding of these topics will require reading the textbook and analyzing your notes as we go through the material. It is unlikely that success will be achieved by taking notes and studying one or two days before exams. Keep up on the material!

Course grading *grade breakdown*

45%	Three in-class exams during term (each 15%)
15%	Final Exam
30%	Lab assignments
10%	Field trip assignment