

Structural Geology - Geology 204

Instructor - Dr. Arlo Weil 130 Park Science Building;
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Official office Hours – Monday and Friday 2 – 4pm.
Class meeting time – Mon., Wed., Fri. 11:00 a.m. to 12:00 a.m.; Class location–243 Park
Lab meeting time – 1:00 to 4:00 p.m.; Lab location – 243 Park

Course Web Page: <http://www.brynmawr.edu/geology/204/>

Required reading: *Structural Geology, Second Edition*, by Robert Twiss and Eldridge Moores

Grading:

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| • Three one-hour midterm exams | ~30% |
| • Field trip assignments/Homework exercises | ~20% |
| • Lab | ~40% |
| • One topical geology project | ~10% |
| Total | 100% |

Class Objective: Structural geology in its simplest form is the study of rock deformation in the Earth's lithosphere viewed from all scales – from the microscopic (atomic scale) to the macroscopic (continental scale). The understanding of how and why rocks deform is of fundamental importance in our overall understanding of how the Earth works. This class will focus on building a foundation of knowledge and understanding that will allow you, the student, to broaden your appreciation and understanding of the complexity of the Earth system and the links between geologic structures, at all scales, and plate tectonics.

The class will be a mixture of lectures, hands-on labs, homework, discussions and field trips. Each phase will hopefully be educational and enjoyable for all involved. Topics of focus will include stress and strain, deformation and rheology, kinematics, folding, faulting and brittle and ductile deformation mechanisms.

Lab: There will be a three-hour lab once a week (not including the final week of classes), which will provide a hands-on approach to learning structural geology. Focus will be visualizing three-dimensional problems, strain analysis, basic field methods, structural data analysis, and cross-section formation. A final lab project will be given at the end of the term. There is a take home lab final. Attendance is required for all labs.

Mandatory Lab equipment!!!!

- A nice pencil - preferably a fine mechanical pencil with hard lead
- A good eraser
- Colored pencils
- Ruler
- Protractor
- Compass - the kind for drawing circles
- Pad of Tracing Paper
- Graph Paper

Homework: Several short topical assignments will be handed out when appropriate. All assignments are required and are due the following week.

Rock of the Week: The rock of the week is an exercise aimed to get students to think about structural features before they hear about them in lecture or lab. Each week students describe a carefully chosen rock specimen that contains features to be presented and discussed in subsequent classes. The exercise is also intended to help students improve their descriptive analysis and their confidence in presenting observations and conclusions in public.

Project: A final research project is required on an aspect of structural geology that is of interest to **YOU**. Topics will be discussed as the term progresses. Each student will give a short presentation on their topic at the end of the term. A more detailed description of the project and its due date will be given out at a later time during the semester.

Field Trips: There will be at least one extended field trip during the course of the semester (Camping....YEAH!!!!!!). The trips will be scheduled according to the student's schedule. Field-based projects will accompany each trip. We will decide on the fieldtrip date sometime over the first two weeks of class.

Exams: Three midterm exams will be given. Test format will be multiple short answer and problem solving exercises.

Structural Geology –201 Calendar

Dates	Subject	Reading	Lab
Week 1 January 20 - 23	<ul style="list-style-type: none"> • Introduction and Review • Primary Structures 	<ul style="list-style-type: none"> • Chap 1 	Attitude measurements & geometry
Week 2 January 26 – 30	<ul style="list-style-type: none"> • Brittle Deformation • Veins and Joints 	<ul style="list-style-type: none"> • Chap 2 	Dipping Planes and Topography
Week 3 February 2 - 6	<ul style="list-style-type: none"> • Introduction to Faults • Normal Faults 	<ul style="list-style-type: none"> • Chap 3 • Chap 4 	Map Patterns – Faults and geologic boundaries
Week 4 February 9 - 13	<ul style="list-style-type: none"> • Thrust Faults • Strike Slip Faults 	<ul style="list-style-type: none"> • Chap 5 • Chap 6 	Map Patterns – folds and complex features
Week 5 February 16 - 20	<ul style="list-style-type: none"> • Stress 	<ul style="list-style-type: none"> • Chap 7 	Stereonet
Week 6 February 23 –27	<ul style="list-style-type: none"> • Fault Mechanics • Experimental versus Natural 	<ul style="list-style-type: none"> • Chap 8 • Chap 9 	Structural Data Analysis I
Week 7 March 2 – 6	<ul style="list-style-type: none"> • Strain 	<ul style="list-style-type: none"> • Chap 12 	Structural Data Analysis II
Week 8	SPRING VACATION		
Week 9 March 16 – 20	<ul style="list-style-type: none"> • Strain • Strain in Rocks 	<ul style="list-style-type: none"> • Chap 12 • Chap 15 	Fold Analysis
Week 10 March 23 – 27	<ul style="list-style-type: none"> • Fold Description • Kinematics of Folds 	<ul style="list-style-type: none"> • Chap 10 • Chap 13 	Strain
Week 11 March 30 – April 3	<ul style="list-style-type: none"> • Foliation and Lineations • Folia/Lineation Analysis 	<ul style="list-style-type: none"> • Chap 11 • Chap 14 	Strain II - Shear Zones
Week 12 April 6 - 10	<ul style="list-style-type: none"> • Rheology 	<ul style="list-style-type: none"> • Chap 16 	Cross-Section Balancing
Week 13 April 13 - 17	<ul style="list-style-type: none"> • Ductile Deformation 	<ul style="list-style-type: none"> • Chap 17 	Field Methods
Week 14 April 20 - 24	<ul style="list-style-type: none"> • Metamorphism 	<ul style="list-style-type: none"> • External Reading 	Final Lab Project
Week 15 April 27 – May 1	<ul style="list-style-type: none"> • Topical Investigation 	<ul style="list-style-type: none"> • External Reading 	No Lab
Week 16 May 4 – 16	EXAM WEEK		