

STRUCTURAL GEOLOGY

GEO 428 --- Fall, 2012

INSTRUCTOR: Mark Cloos

OFFICE: 6,112 JGB (Geology) Building
PHONE: 471-4170

OFFICE HOURS: MWF 10:00-11:00 or whenever door is open

LECTURE SECTION: MWF 9:00-10:00, Room 2.218, JGB (Geology) Building

LAB SECTIONS:

27500 M	2:00-5:00	Room 3.204, JGB (Geology) Building
27505 T	2:00-5:00	" "
27510 W	2:00-5:00	" "
27515 Th	2:00-5:00	" "
27520 F	2:00-5:00	" "
27525 W	5:00-8:00	" "

TEXT: None required but *Structural Geology* is suggested
Robert J. Twiss and Eldridge M. Moores, 2nd Edition, 2007
W. H. Freeman and Company, New York

PREREQUISITES: For students pursuing the Bachelor of Science in Geological Sciences, GEO 420K with a grade of at least C, PHY 301 and PHY 101L or PHY 303K and PHY 103M with a grade of at least C in each, and credit with a grade of at least C or registration for M 408C or M 408K (or 308K). For students pursuing the Bachelor of Arts in Geological Sciences, GEO 420K with a grade of at least C, three semester hours of mathematics other than M 301, M 316K, or M 316L, PHY 302K or PHY 303K with a grade of at least C. For others, consent of instructor.

GRADE:	Two (2) exams (100 points each)	200 points
	Lab exercises	150 points
	TOTAL	350 points

The first two exams are scheduled during regular class time and there will be 50 minutes to complete them. The third exam is of the same length, but the full three hours of the "final" exam period is available to complete the test. The lowest exam grade of the three tests will be dropped.

There are NO makeup tests for missed exams or quizzes in labs except for official functions of the University of Texas. Sorry.

FIELD TRIP: To be determined

LECTURE AND LAB EQUIPMENT:

Ruler	Protractor	Compass	Graph paper
Colored Pencils	Eraser	Unlined white paper	Tracing paper
Calculator capable of sines and cosines			
Wulf (Equal Area) Stereographic Net (provided)			

"The core values of The University of Texas at Austin are learning, discovery, freedom, leadership, individual opportunity, and responsibility. Each member of the university is expected to uphold these values through integrity, honesty, trust, fairness, and respect toward peers and community."

LECTURE SCHEDULE
STRUCTURAL GEOLOGY

GEO 428 --- Fall, 2012

Lecture MWF, 9:00-10:00, GEO 2.218

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Week	Topic	Suggested Reading [Twiss and Moores, 2007]
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Aug. 29-31	Introduction Primary structures	Chap. 1
Sept. 3-7	Force and stress Stress tensor	Chap. 7
Sept. 10-14	Mohr circle derivation Stress on a fault Stress in the Earth	Chap. 3
Sept. 17-21	Strain and deformation Strain history, strain in folds	Chap. 10, 11, 12
Sept. 24-28	Simple shear/pure shear Rheology Experimental rock deformation EXAM #1	Chap. 16
Oct. 2-5	P-T-fluid pressure, strain rate Brittle vs. ductile	
Oct. 8-12	Flow laws, preferred orientations Deformation mechanisms	Chap. 17
Oct. 15-19	Deformation mechanism maps From soft sediment to metamorphic rock	
Oct. 22-26	Faulting, squeeze box experiments Mohr-Coulomb theory of fracture Fluid pressure and faulting	Chap. 8, 9
Oct. 29-Nov. 2	Hydraulic fracturing	

Nov. 5-9	EXAM #2 What is the lithosphere? Earthquakes	
Nov. 12-16	Thrust faulting Normal faulting Strike-slip faulting	Chap. 5 Chap. 4 Chap. 7
Nov. 19-21	Salt tectonics – Gulf of Mexico region Boudinage	
Nov. 26-30	Folding theory, foliations, refolded folds	Chap. 13, 14
Dec. 3-7	Causes of plate motion Plate margin types	Chap. 19, 20

HOUR EXAM DATES	#1	Friday, September 28
	#2	Monday, November 5
	#3	Thursday, December 13, 2:00-5:00PM

RESERVE BOOKS - GEOLOGY LIBRARY

Good Supplementary Textbooks:

- (1) Davis and Reynolds, 1996, *Structural Geology of Rocks and Regions*, 2nd Ed.
[QE 601 D3 1996 GEOL]
- (2) Means, 1976, *Stress and Strain* [QE 604 M4 GEOL]
- (3) Hobbs, Means, and Williams, 1976, *An Outline of Structural Geology* [QE 601 H6 GEOL]
- (4) Suppe, 1984, *Principles of Structural Geology* [QE 601 S94 1985 GEOL]
- (5) Ramsay and Huber, 1983, *Techniques of Modern Structural Geology, v. 1, Strain Analysis*
[QE 601 R254 1987 V. 1 GEOL]
- (6) Ramsay and Huber, 1987, *Techniques of Modern Structural Geology, v. 2: Folds and Fractures*
[QE 601 R254 1987 V. 2 GEOL]
- (7) Ramsay and Lisle, 2001, *Techniques of Modern Structural Geology, v. 3: Applications of Continuum Mechanics in Structural Geology* [QE 601 R254 1987 V. 3 GEOL]

Atlases:

- (8) Shelton, 1966, *Geology Illustrated* [QE 26 S5 GEOL]
- (9) Pettijohn and Potter, 1964, *Atlas and Glossary of Primary Sedimentary Structures*
[QE 471 P44 GEOL]
- (10) Weiss, 1972, *The Minor Structures of Deformed Rocks* [qQE 604 W45 GEOL]
- (11) Borradaile, Bayly, and Powell, 1982, *Atlas of Deformation and Metamorphic Rock Fabrics*
[QE 475 A2 A87 1982 GEOL]
- (12) Bally, 1983, *A Picture and Work Atlas: Seismic Expression of Structural Styles*
[-F- TN 269 S35 1983 GEOL]

Lab Manuals:

- Marshak and Mitra, 1988, *Basic Methods of Structural Geology* [QE 601 M365 1988 GEOL]
Ragan, 1985, *Structural Geology: An Introduction to Geometrical Techniques*
[QE 601 R23 1984 GEOL]