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
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

Instructor: Mark Cloos

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

Nov. 12-16  Thrust faulting  Chap. 5
Normal faulting  Chap. 4
Strike-slip faulting  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  Chap. 19, 20
Plate margin types

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]
(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]
[QE 475 A2 A87 1982 GEOL]
[-F- TN 269 S35 1983 GEOL]

Lab Manuals:
Ragan, 1985, Structural Geology: An Introduction to Geometrical Techniques
[QE 601 R23 1984 GEOL]