GEOL 3411: STRUCTURAL GEOLOGY, SPRING 2022 REVISED 4/3/2022
Lecture: TR 11:00 – 12:15, Lab: T 2:00 – 4:50

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Office: VIN 122
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Course Description
A study of ways rocks and continents deform by faulting and folding, methods of picturing geologic structures in three dimensions, and causes of deformation. Includes a weekend field trip project (March 3-6).
Prerequisite: Physical Geology or Historical Geology

Course Delivery Style: On-campus class and lab
Structural Geology lecture and lab will be run as face-to-face classes in Vincent 146. Short videos made by your professor coupled with required reading in our two textbooks will introduce terms and basic concepts. We will spend much time in class and lab applying terms and concepts to solve problems.

Please refer to this Health and Safety web page¹ for updated information about campus guidelines as they relate to the COVID-19 pandemic.

Required Textbook

Required Lab and Field Equipment
1. Geology field book (I will place an order for all interested and pay shipping)
2. Pad of Tracing paper, 8.5 in x 11 in or 9 in x 12 in (Buy at Hobby Lobby or Michaels)
3. Graph paper pad, 5-squares-per-inch grid
4. Set of colored pencils (Buy good ones at Hobby Lobby or Michaels)
5. Small protractor (4-inch) and ruler

Field Geology Gear and Camping Gear Sources
1. Happy Trails, San Angelo, [Happy Trails website]²
2. ASC Scientific, [Geology Equipment Website]³
Grading
- 9 Weekly Quizzes, 1.1% each (10% total)
- 2 exams, 11% each (22% total)
- Comprehensive final exam (13%)
- 11 graded lab projects, including required field trip and paper summary, 5% each (55% total)
- Each student will schedule a brief individual meeting with Dr. Joe after Exam 1.

On-campus Face-to-face Office hours (meet in my office, VIN 122)
- Tuesday: 1:00 – 2:00 pm
- Wednesday: 2:00 – 5:00 pm
- Mondays, Fridays: 2:00 – 4:00 pm

Course Expectations
1) You will attend and participate in every class and lab and view and take notes on every course video.
2) You will not distract yourself or others with electronic devices in lecture or lab. You will put your phone away during class and lab. During lab, you will step outside the room if you must text or take a call.
3) Take the next big step: let’s talk outside of class about almost anything. Topics I like to discuss: geology, hiking and backpacking trails, productive ways of learning geology, racquetball, Lord of the Rings, future careers, lame jokes, and more. You will schedule a brief meeting after Exam 1; I will buy the coffee!

Course Webpages
The Angelo State Blackboard site contains PowerPoint slides, course videos, web links to scenic areas mentioned in class, practice problems, answers to lab assignments, and your official grades.

Student learning outcomes
1. To learn and practice skills needed for summer field camp, GEOL 3600, a 5- or 6-week field geology course. Look at Sul Ross State University Field Camp, Sul Ross Field Camp information or Indiana University Field Camp, Indiana University Field Camp information
2. To recognize and measure linear and planar structural features in rocks, folds, and faults. You will learn how to use a Brunton compass to measure structures in the field.
3. To describe and visualize three-dimensional orientations of folds and faults by constructing cross-sections, stereonets, and orthographic projections.
4. To make interpretations about the forces that deform rocks (dynamic analysis) and the history of deformation (kinematic analysis).
5. To make interpretations about the details of plate tectonics, especially aspects related to the Marathon-Ouachita, Cordilleran, and Basin and Range orogens exposed in West Texas mountains.

FIELD TRIP
1. Lab 11: Precambrian and Paleozoic Structures in the Llano uplift, Saturday, March 5, 2022. We will depart at 7:00 am and return by 7:00 pm. Barbeque lunch in Kingsland. Those in 2021 Structure class are invited to join us!
<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture/Discussion Topics and Required reading</th>
<th>Lab Projects</th>
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<tbody>
<tr>
<td>I: 1/18, 1/20 Chapter 1</td>
<td>Opportunities to order field book, other equipment&lt;br&gt;1a. Rock Description Checklist (p. 21, Video)&lt;br&gt;1b. Block project: drawing strike and dip symbols, apparent dip (p. 713-718, 721)&lt;br&gt;1c. Deformation: meaning and regional, local causes (p. 7-16, Video)</td>
<td>No lab meeting</td>
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<td>II: 1/25, 1/27 Chapters 1, 2</td>
<td>1d. The time factor and the geologic time scale (p. 32-33)&lt;br&gt;1e. Primary structures, How applied as Facing Indicators (p. 706-711)&lt;br&gt;2a. Displacement Vectors vs Deformation Paths, (p. 37-43)&lt;br&gt;2b. Hot Spot Project&lt;br&gt;2c. Rigid body translation, rotation (p. 44-59, video)&lt;br&gt;2d. Strain: distortion and dilation (p. 37)&lt;br&gt;1/27: QUIZ 1: Chapter 1 topics (1a – 1e)</td>
<td>1: Dagger Mountain cross-section: Cross-section construction review, converting true dip to apparent dip (p. 718 – 721)</td>
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<td>III: 2/1, 2/3 Chapter 2</td>
<td>2d. Strain: Calculating changes in line length and changes in angle between lines (p. 64-71)&lt;br&gt;2e. Strain analysis projects (Belemnites, Brachiopods, Skolithos)&lt;br&gt;2f. The Strain Ellipse, fundamental strain equations (video, p. 73-77)&lt;br&gt;2/3: QUIZ 2: Chapter 2, Displacement and Strain (take-home)</td>
<td>2: Orthographic Projections: Solving true, apparent dip problems, strike and dip problems, thickness problems (Ragan, Ch 1 and 2)</td>
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<td>IV: 2/8, 2/10 Chapter 3</td>
<td>Strain projects continued&lt;br&gt;3a. Plate-tectonic forces (p. 99-100)&lt;br&gt;3b. Calculating Traction underground (p. 101-106)&lt;br&gt;3c. Going from Traction to Stress, How stress defined (p. 106-108)</td>
<td>3, Part 1: Interpreting strike and dip from map patterns: The three-point problem, (Ragan, Ch 3)&lt;br&gt;Complete Lab 2</td>
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<td>V: 2/15, 2/17 Chapter 3</td>
<td>2/15: QUIZ 3: Chapter 3, Forces, tractions, Principal Stresses&lt;br&gt;3d. Interpreting Principal Stress Directions from faults, stylolites (p. 288-291)&lt;br&gt;3e. Strength/rock behavior terms (p. 120-128, Video)&lt;br&gt;3f. Evaluating Mechanical behavior during testing (p. 138-147)&lt;br&gt;5a. Types of Joints and Shear Fractures (p. 193-199, 201-202)</td>
<td>3, Part 2: Making a structure contour map, an introduction to geologic mapping, interpreting sequence of events</td>
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<td>VI: 2/22, 2/24 Chapter 5</td>
<td>2/22: EXAM 1: Chapters 1, 2, and 3&lt;br&gt;5b. Practical Importance of Jointing (p. 199-201)&lt;br&gt;Project: mapping joints with aerial photos</td>
<td>4: Basic stereonet techniques</td>
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<td>VII: 3/1, 3/3 Chapter 5</td>
<td>5c. Joints as Paleostress Indicators&lt;br&gt;5d. Detailed Look at Joint Surfaces (p. 204-212)&lt;br&gt;5e. Video: Examples of Regional Joint Patterns (p. 239-247)&lt;br&gt;5f. Joint Intersection Patterns reveal relative timing (p. 212-216)&lt;br&gt;5g. Joint Spacing (p. 216-225)&lt;br&gt;3/3: QUIZ 4: Chapter 5 topics</td>
<td>5: More stereonet techniques</td>
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<td>3/14 – 3/18</td>
<td>SPRING BREAK: GET OUTSIDE!</td>
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<td>Week</td>
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<td>XI:</td>
<td>4/5 Chapter 6 Normal faulting (p. 321-333) 6k. Plate-tectonic settings of normal faults (2) 6l. Growth faults 6m. Normal fault zones: ramps, flats, synthetic vs antithetic faults 6n. Low-angle normal faults: metamorphic core complexes vs Yerington domino model Project: Interpreting Corsair Trend seismic section 6o. Strike-slip faulting including Reidel Shears (p. 334-343) 4/7: No formal class meeting. Watch, take notes on course videos over strike slip faults</td>
<td>No formal lab meeting (Field Methods departs Wednesday) Lab open to finish Lab 8. Lab 8 due date extended to 4/12</td>
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<td>XV:</td>
<td>5/3, 5/5 Review projects Review field trip (on-campus!) Subsurface mapping project</td>
<td>11: PAPER SUMMARY DUE Discuss paper in lab</td>
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<td>XVI:</td>
<td>5/10 5/10: FINAL EXAM, Tuesday, 10:30 AM – 12:30 PM</td>
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Late Assignment Policy

- Ten-point penalty assessed if turned in after due date stated on lab handout
- One week after lab is due is the last possible time to turn in assignment. These are ethics and project management issues!
- If quarantined, accommodations will be provided for late work. Please let Dr. Joe know in writing.

Your future career in Geology

The US Department of Labor Occupational Handbook\(^7\) contains information on geology careers, salaries, education needed, and future job outlook in geology.

GEO, the student organization for all interested in geology, meets twice a month, Wednesdays at 6:00 pm. The first meeting will be: GEO is a Student Chapter of American Association of Petroleum Geologists\(^8\).

Academic Integrity

Students are expected to maintain complete honesty and integrity in all work. Any student found guilty of any form of dishonesty in academic work is subject of disciplinary action and possible expulsion from ASU. The College of Science and Engineering adheres to the university’s Statement of Academic Integrity\(^9\).

Policy for this course: first offense- zero for exam or assignment, second offense- F in course

Plagiarism

Plagiarism is a serious topic covered in ASU’s Academic Integrity policy in the Student Handbook. Plagiarism is the action or practice of taking someone else’s work, idea, etc., and passing it off as one’s own. Plagiarism is literary theft.

In your discussions and/or your papers, it is unacceptable to copy word-for-word without quotation marks and the source of the quotation. It is expected that you will summarize or paraphrase ideas giving appropriate credit to the source both in the body of your paper and the reference list.

Papers are subject to be evaluated for originality. Resources to help you understand this policy are available at the ASU Writing Center\(^10\).

Accommodations for Students with Disabilities

ASU is committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs or activities of the university, or be subjected to discrimination by the university, as provided by the Americans with Disabilities Act of 1990 (ADA), the Americans with Disabilities Act Amendments of 2008 (ADAAA), and subsequent legislation.

Student Disability Services is located in the Office of Student Affairs, and is the designated campus department charged with the responsibility of reviewing and authorizing requests for reasonable accommodations based on a disability. It is the student’s responsibility to initiate such a request by contacting an employee of the Office of Student Affairs, in the Houston Harte University Center, Room 112, or contacting the department via email at ADA@angelo.edu. For more information about the application process and requirements, visit the Student Disability Services website.\(^{11}\) The employee charged with the responsibility of reviewing and authorizing accommodation requests is:

Dallas Swafford, Director of Student Disability Services
Office of Student Affairs, Houston Harte University Center, Room 112
Title IX
The University prohibits discrimination based on sex, which includes pregnancy, sexual orientation, gender identity, and other types of Sexual Misconduct. Sexual Misconduct is a broad term encompassing all forms of gender-based harassment or discrimination including: sexual assault, sex-based discrimination, sexual exploitation, sexual harassment, public indecency, interpersonal violence (domestic violence and/or dating violence), and stalking. As a faculty member, I am a Responsible Employee meaning that I am obligated by law and ASU policy to report any allegations I am notified of to the Office of Title IX Compliance.

Students are encouraged to report any incidents of sexual misconduct directly to ASU’s Office of Title IX Compliance and the Director of Title IX Compliance/Title IX Coordinator at:
Michelle Miller, J.D.
Special Assistant to the President and Title IX Coordinator
Mayer Administration Building, Room 210
325-486-6357
325-942-2022, michelle.boone@angelo.edu

You may also file a report online12 24/7.
If you are wishing to speak to someone about an incident in confidence you may contact the University Health Clinic and Counseling Center at 325-942-2173 or the ASU Crisis Helpline at 325-486-6345.

For more information, visit Title IX website13.

Student Absence for Observance of Religious Holy Days
A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. See ASU Operating Policy 10.19 Student Absence for Observance of Religious Holy Day14 for more information

Incomplete Grade Policy
It is policy that incomplete grades be reserved for student illness or personal misfortune. Please contact faculty if you have serious illness or a personal misfortune that would keep you from completing course work. Documentation may be required. See ASU Operating Policy 10.11 Grading Procedures15 for more information.

General Policies Related to This Course
All students are required to follow the policies and procedures presented in these documents:
- Angelo State University Student Handbook16
- Angelo State University Catalog17

Modifications to the Syllabus
This syllabus, including grade evaluation and course schedule, is subject to modification. In particular, the COVID-19 pandemic may require significant changes in course delivery and content on potentially short notice.
https://www.angelo.edu/covid-19/returning-to-campus/health-and-safety.php

http://www.happytrailsshop.com/

http://www.ascscientific.com/

https://blackboard.angelo.edu

http://www.sulross.edu/geology-field-camp

http://www.indiana.edu/~iugfs/


https://www.aapg.org/about/membership/types/student

https://www.angelo.edu/student-handbook/community-policies/academic-integrity.php

https://www.angelo.edu/dept/writing_center/academic_honesty.php

https://www.angelo.edu/services/disability-services/

http://www.angelo.edu/incident-form

www.angelo.edu/title-ix

https://www.angelo.edu/content/files/14206-op-1019-student-absence-for-observance-of

https://www.angelo.edu/content/files/14197-op-1011-grading-procedures

https://www.angelo.edu/student-handbook/

https://www.angelo.edu/catalogs/