

Course Syllabus: Physical Geology
McCoy College of Science, Mathematics, and Engineering
GEOS 3434-201 Structural Geology
Spring 2024

Contact Information

Instructor: Dr. Andrew Katumwehe

Office: Pierce 206

GEOS 3434-201 Lecture: T, R 12–1:20 pm RM B115

GEOS 3434-21A R 1:30 –3:20 pm RM 115

Office hours: Tue, Th: 10:00 – 11:00 am and W: 1:00- 4:00 pm

Office Phone: (940) 397-4031

Email: andrew.katumwehe@msutexas.edu

Course Description

This course introduces deformation processes and the use of continuum mechanics in assessing deformation. It explains the intricate interplay between stress and strain and their preservation in the geological record. In addition, it provides in-depth coverage of the analysis of brittle and ductile structures, such as fractures, faults, and folds. Furthermore, it aids in comprehending the connection between mesoscopic planar and linear fabrics with notable brittle and ductile structures. This includes a thorough examination of regions of structural associations.

- Understand stress and deformation.
- Understand the information preserved in structural features
- Learn to quantify and mathematically manipulate structural information
- Understand structures in light of tectonism and orogenesis.
- Become proficient in extending limited two-dimensional information into a regional three-dimensional picture.

Required Textbook & Instructional Materials

Fossen, H. 2016. Structural Geology. Cambridge University Press. 463 p. ISBN: 978-1107-05764-7

Stephen M. Rowland, Earnest M. Duebendorfer and Ilsa M Schiefelbein. Structural Analysis and Synthesis. A laboratory Course in Structural Geology. Blackwell Publishing Ltd. ISBN: 978-4051-1652-7

Student Handbook

Refer to: [Student Handbook 2017-18](#)

Academic Misconduct Policy & Procedures

Academic Dishonesty: MSU is committed to maintaining the highest standards of integrity and ethical conduct. This level of ethical behavior and integrity will be maintained in this course. Participating in behavior that violates academic integrity (e.g., unauthorized collaboration, plagiarism, multiple submissions, cheating on examinations, helping another person cheat, unauthorized advance access to examinations, altering or destroying the work of others, and altering academic records) will result in an official academic sanction. Violations may subject you to disciplinary action, including the following: receiving a failing grade on an assignment, examination, or course, receiving a notation of a violation of academic integrity on your transcript, and being suspended from the University. You have the right to appeal the charge. Additional guidelines on procedures in these matters may be found in the Office of Student Conduct.

Grading

Lecture Portion of course = 60% of final grade. Exam 1 = 10% of the final grade; Lecture Exam 2 = 15% of the final grade; Final Exam = 15% of the final grade; lecture quizzes 20%. Lab Portion of course = 40% of final grade. Exams and Lab Quizzes may be made up only if (1) you have a written excuse for why you missed the exam and (2) you notified Dr. Katumwehe in advance that you would miss the exam. A missed exam or quiz must be made up within one week, or you may receive a grade of zero. However, there may be extreme circumstances as to why prior notice was not given. These will be evaluated on a case-by-case basis. Oversleeping is not an acceptable reason! Lecture exams, lab quizzes, and lab completion grades are curved" by a simple arithmetic adjustment, so the class grade average is between 76-80%. However, this only applies to students whose lab and class attendance is unquestionable and who have submitted their quizzes, exams, lab assignments, and research papers. All components of your final grade must be completed by April 27, 2024. The homework assignments will be posted on D2L and during laboratory lectures. Homework due dates are listed in the syllabus. The Table below (next page) summarizes the grading policy for this course.

Table 1: Grade points as discussed in the grading section above.

Graded Items	Contribution to Final Course Grade
Exam 1	10%
Exam 2	10%
Final Exam 3	15%
Lecture Quizzes	15%
Lab	50%

Table 2: Final grades are typically rounded to the nearest integer before assigning the final course letter grade. For example, a final calculated course grade of 89.8% will be rounded to a final grade of 90%.

Grade	Points
A	90 and above
B	80-89
C	70-79
D	60-69
F	Less than 60

Homework

I will issue specific assignments in class and in the lab. Completed work may be remitted to the professor in person, through his office mailbox (Pierce 206 or B111), or by electronic submission. All submissions must be neat and legible.

Note: You may not submit a paper for a grade in this class that already has been (or will be) submitted for a grade in another course unless you obtain explicit written permission from me and the other instructor involved in advance.

Lab Assignments

See the Grading Section for details – All Lab Assignments must be submitted to your lab TA during your regular lab section meeting.

Lab Attendance Policy – Important!

Students who **miss three** or more lab section meetings may be dropped from the course by the instructor. Students are responsible for working on their lab section and making up any missed material in a timely fashion. Students must notify their Dr. Andrew Katumwehe by email in advance of missing a lab section. Students who leave lab sections and class early may be marked absent.

Exams

See the Grading Section for details – The class requires completing a midterm and final examination. The instructor will provide additional information a week before the scheduled date. Three lecture exams are included in your course grade; see the Grades section for details.

Lecture (Attendance) Extra Credit

Limited extra credit opportunities will be available regularly and randomly during the lecture part of the course. Generally, these opportunities will involve a short written response to a question or problem posed during the lecture or, more often than not, simply your signature on an attendance sheet. (Therefore, bring paper and pen/pencil to lectures!). There will be 10 to 14 regular extra credit opportunities during the semester. Note that the final curve will be based on class attendance, participation, submission of all the assignments, lab work, and final research paper.

Special Extra Credit

Special extra credit opportunities may also be announced during the semester. These opportunities, worth up to a total of one (1) special extra credit (added to your final calculated course grade), typically have included the scheduled Geology Colloquium talks or other special lectures or film showings on campus that pertain to geology or participation in Undergraduate Research presentations or evaluations.

Late Work

Late work will be accepted through 04/24/2024. Please refer to the conditions above. However, the following penalties will apply in all cases of late submittals: 10% for one day past due, 20% for two days past due, and 30% for three days past due; after three days, a grade of zero may be recorded. No course assignments will be accepted after 04/27/2024.

Important Dates on the Spring 2024 schedule of classes.

The Last Day to drop this course with a grade of "W" is 4pm, March 25, 2024, drops after this date will receive grades of "F." Refer to academic calendar:

[Drops, Withdrawals & Void](#)

Desire-to-Learn (D2L)

The MSU D2L program is a part of this course. Lectures, review materials, and course information will be available through D2L. You can log into [D2L](#) through the MSU Homepage. If you experience difficulties, please contact the technicians listed for the program or contact your instructor.

Change of Schedule

A student dropping a course (but not withdrawing from the University) within the first 12 class days of a regular semester or the first four class days of a summer semester is eligible for a 100% refund of applicable tuition and fees. Dates are published in the Schedule of Classes each semester.

Refund and Repayment Policy

A student who withdraws or is administratively withdrawn from Midwestern State University (MSU) may be eligible to receive a refund for all or a portion of the tuition, fees, and room/board charges paid to MSU for the semester. However, if the student received financial aid (federal/state/institutional grants, loans, and/or scholarships), the refund may be returned to the financial aid programs. As described below, two formulas (federal and state) exist to determine the refund amount (Examples of each refund calculation will be made available upon request).

Services for Students with Disabilities

Per Section 504 of the Federal Rehabilitation Act of 1973 and the Americans with Disabilities Act (ADA) of 1990, Midwestern State University endeavors to make reasonable accommodations to ensure equal opportunity for qualified persons with

disabilities to participate in all educational, social, and recreational programs and activities. After notification of acceptance, students requiring accommodations should apply for such assistance through Disability Support Services, located in the Clark Student Center, room 168. Documentation of a disability will be required to provide appropriate services, and each request will be individually reviewed. For more details, please go to [Disability Support Services](#).

College Policies

Campus Carry Rules/Policies are given here: [Campus Carry Rules and Policies](#).

Smoking/Tobacco Policy

College policy strictly prohibits the use of tobacco products in any building. Adult students may smoke outside and only in designated smoking areas at each location.

Alcohol and Drug Policy

To comply with the Drug-Free Schools and Communities Act of 1989 and subsequent amendments, students and employees of Midwestern State are informed that strictly enforced policies are in place, which prohibit the unlawful possession, use, or distribution of any illicit drugs, including alcohol, on university property or as part of any university-sponsored activity. Students and employees are also subject to all applicable legal sanctions under local, state, and federal law for any offenses involving illicit drugs on University property or at University-sponsored activities.

Grade Appeal Process

Students who wish to appeal a grade should consult the Midwestern State University [Undergraduate Catalog](#).

Notice

The course syllabus, procedure, assignments, and schedule changes may be made at the instructor's discretion. Changes will be communicated to all students through [D2L](#). Please check the course news regularly for schedule updates and your school email.

The course schedule details are given on the following three pages. The first Table lists lecture topics, textbook readings, and the three lecture exams. The second Table lists the dates for the lab topics, three lab quizzes, homework assignment due dates, and self-assessment assignments.

Course Schedule – Lecture Topics and Exams, Text Reading (Page 1 of 3)

Date	Topic and Topic Number	Textbook Pages
15-Jan	Martin Luther Day	
16-Jan	Course Overview and Introduction	Pages
18-Jan	Structural analysis	Pages 1-22
23-Jan	Plate Tectonics - Part 1	Pages 1-22
23-Jan	Deformation 1	Pages 1-22
25-Jan	Deformation II	Pages 25-55
30 Jan	Strain in rocks	Pages 59-70
30-Feb	Stress	Pages 73-80
01-Feb	Stress in the lithosphere	Pages 83-98
01-Feb	Rheology	Pages 101-119
06-Feb	Review Exam 1	
08-Feb	Exam 1	
13-Feb	Fractures	Pages 123-149
13-Feb	Faults I	Pages 177-216
15-Feb	Faults II	Pages 177-216
15-Feb	Kinematics of brittle regime	Pages 221-231
20-Feb	Deformation at the micro-scale	Pages 221-231
20-Feb	Folds and Folding I	Pages 221-231
23-Feb	Folds and Folding I	Pages 257-278
26-Feb	Folds and Folding II	Pages 257-278
27-Feb	Folds and Folding II	Pages 257-278
29-Feb	Foliation and cleavage	Pages 283-297
05-March	Foliation and cleavage	Pages 283-297
19- March	Review Exam 2	
08- 17 March	Spring break - No Classes	
21- March	Exam 2	
26- March	Lineations I	Pages 301-311
21- March	Lineations II	Pages 301-311
27- 31 March	Break - No Classes	
02-April	Boudinage I& II	Pages 315-325
04-April	Stereonets I & II	Pages 329-351
09-April	Structural Domains I &II	Pages 329-351
11-April	Contractual Domains I	Pages 355-373

Course Schedule – Lecture Topics and Exams, Text Reading (Page 3 of 3)

Date	Topic and Topic Number	Textbook Pages
16-April	Contractual Domains II	Pages 355-373
18-April	Extensional regimes I	Pages 377-396
23-April	Extensional regimes	Pages 377-396
25-April	Strike-slip systems I	Pages 401-414
25-April	Strike-slip systems I	Pages 401-414
29-April	Strike-slip systems II	Pages 401-414
01-May	Final Exam Review	
01-May		Last Day to Submit Any Late Assignments!
09-May 10:30am- 12:30am	THIRD EXAM (will cover all material presented in the lecture) - 20% of grade. Room and time per University Final Exam Schedule.	

Course Schedule –for Labs, Lab Quizzes, Homework, Research Paper, and Assessments (Page 1 of 2)

Date (Week of date listed unless otherwise noted as a specific date)	Lab Topic, Lab Quiz
Jan-30	Lab #1:Introduction
Feb-06	Lab #2: Structural contours.
Feb-13	Lab #3:Strain measurements
Feb-20	Lab #4:Mohr circle I
Feb-27	Lab #5:Mohr circle II
March-05	Lab #6:Three point problems
March-19	Lab #7:Fault Analysis
March-26	Lab #8: Fault Analysis II
April-02	Lab #9: Fold Geometry
April-09	Lab #10: Normal strike, slip Faults, and Thrust faults
April-16	Lab #11: Stereonets
March-29	Lab#12: Structural Analysis I
April-23	Lab#13: Structural Analysis II