



Course Syllabus: Applied Petroleum Geology: Subsurface Geomechanics

McCoy College of Science, Mathematics, and Engineering

GEOS 4134 Section 201

Spring 2026

Contact Information

Instructor: Dr. Brad Carter

Office: Bolin Hall, 101F

Office hours: Tuesday and Wednesday 2-4 pm; Thursday 10-11am

Office phone: (940) 397-4031 (Note: E-mail is the preferred method of communication)

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Course Description

In this course, you will learn about subsurface geomechanics and its application in subsurface engineering activities. Specifically, you will learn the fundamentals of solid continuum mechanics, rock yield and failure, and subsurface stress and pore pressure prediction and how these fundamentals are applied in wellbore, fault, petroleum trap, and surface stability analyses and hydraulic fracturing planning.

Textbooks

Espinoza, D.N., (2025), Introduction to Energy Geomechanics. Available at <https://dnicolasespinoza.github.io>. DOI: <https://doi.org/10.5281/zenodo.17100796>

Flemings, P., 2021, A Concise Guide to Geopressure: Origin, Prediction, and Applications, Cambridge University Press, 267p. Online resources available at <https://www.jsg.utexas.edu/flemings/geopressure/>

Grading

The final grade for this course is determined by your performance on lecture exams, research paper, laboratory assignments, laboratory exams, and laboratory quizzes.

Table 1: Points allocated to each assignment.

Assignments (Quantity)	Points
Lecture Examinations (4)	400
Homework Assignments (6)	240
Total Points	600

Table 2: Total points for final grade.

Grade	Points
A	576 and up
B	512 to 575
C	448 to 511
D	384 to 447
F	Less than 383

Lecture Exams

There will be four lecture exams (100 points each). Lecture exams will be given during a Wednesday class session. Students who have worked with DSS will be given additional time to complete exams.

Homework Assignments

There will be six homework assignments (40 points each). These assignments will be due a week from the day that they are assigned.

Extra Credit

As the semester progresses, the instructor may give extra credit assignments. If assigned, these extra credit assignments will be given to the entire class, not individual students. If the extra credit assignment is not completed by the due date, no extra credit will be given.

Make-Up Work/Tests

For legal, paper-documented excuses make-ups for homework, quizzes, and examinations can be completed. Make-up work should be arranged for in advance wherever possible. The instructor will give you a new deadline that is reasonable for the course timeline. ***No make-up work will be allowed beyond 10 days past the original deadline.**

Late Work

No late work will be accepted. Missed examinations and homework may be turned in late with a legal, paper-documented excuse.

Class Policies

The following policies are the policies that are integral for our successful completion of the course and should be read thoroughly. If you have any questions, please see the instructor.

Academic Honesty

Academic dishonesty is considered cheating, collusion, and plagiarism. Any unauthorized assistance during the completion of assignments, using on aids beyond those authorized for an assignment, or the use of other people or services to complete assignments is considered cheating. Working with others in a way that is not authorized by the instructor to complete assignments is considered to be collusion. Plagiarism is the use of another person's materials (by paraphrase or direct quotation) without giving them full and clear acknowledgement. The use of material prepared by another person or agency selling term papers and academic materials is also considered plagiarism.

The use of any artificial intelligence (AI) in completing course assignments is NOT allowed. AI in this sense is any technology that summarizes, writes, or answers questions on its own. College is about you learning to write, you developing your voice, and you learning how to process, summarize, and properly cite information. Any use of AI is considered a violation of this academic honesty policy.

If a student is caught cheating, colluding, or plagiarizing on any assignment the assignment grade will automatically be a zero. Two or more violations will result in failure of the course.

Desire-to-Learn (D2L)

Extensive use of the MSU D2L learning management system is required in this course. Each student is expected to be familiar with this program as it provides a primary source of communication regarding assignments, lecture materials, and general course information. You can log into through the MSU Homepage. If you experience difficulties, please contact the technicians listed for the program or contact your instructor.

Electronic Devices

Use of electronic devices for taking notes is allowed in my classroom. Recording (audio or video) is not allowed unless approved by the instructor for educational purposes. The use of social media or streaming anything is not an appropriate use of technology during class. If your use of technology is non-educational or is being disruptive to your peers, you will be asked to leave.

University Policies and Information

The following information and policies apply to this course. Please read each of these policies and ask your instructor if you have any questions.

Important Dates (Check dates on [Academic Calendar](#))

Spring 2026 Classes Begin: January 20, 2026

Last day for term schedule changes: January 23, 2026

Last day to drop with a grade of W for Spring 2026: April 29

Refer to: [Withdrawals and Drops](#)

Attendance

Students are expected to attend all meetings of the classes in which they are enrolled. Although in general students are graded on intellectual effort and performance rather than attendance, absences may lower the student's grade where class attendance and class participation are deemed essential by the faculty member. In those classes where attendance is considered as part of the grade, the instructor should so inform students of the specifics in writing at the beginning of the semester in a syllabus or separate attendance policy statement. An instructor who has an attendance policy must keep records on a daily basis. The instructor must give the student a verbal or written warning prior to being dropped from the class. Instructor's records will stand as evidence of absences. A student with excessive absences may be dropped from a course by the instructor. Any individual faculty member or college has the authority to establish an attendance policy, providing the policy is in accordance with the General University Policies.

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 that were paid to MSU for the semester. **HOWEVER**, if the student received financial aid (federal/state/institutional grants, loans and/or scholarships), all or a portion of the refund may be returned to the financial aid programs. Two formulas, federal and state, exist in determining the amount of the refund. Examples of each refund calculation will be made available upon request.

Services for Students with Disabilities

In accordance with Section 504 of the Federal Rehabilitation Act of 1973 and the Americans with Disabilities Act 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 make application for such assistance through Disability Support Services, located in the Clark Student Center, Room 168, (940) 397-4140. Current documentation of a disability will be required in order to provide appropriate services, and each request will be individually reviewed. For more details, please go to [Disability Support Services](#).

Campus Carry Rules/Policies

Effective August 1, 2016, the Campus Carry law (Senate Bill 11) allows those licensed individuals to carry a concealed handgun in buildings on public university campuses, except in locations the University establishes as prohibited. The new Constitutional Carry law does not change this process. Concealed carry still requires a License to Carry permit, and openly carrying handguns is not allowed on college campuses. For more information, visit [Campus Carry Rules and Policies](#).

Active Shooter

The safety and security of our campus is the responsibility of everyone in our community. Each of us has an obligation to be prepared to appropriately respond to threats to our campus, such as an active aggressor. Please review the information provided by MSU Police Department regarding the options and strategies we can all use to stay safe during difficult situations. For more information, visit [Safety / Emergency Procedures](#).

Smoking/Tobacco Policy

College policy strictly prohibits the use of tobacco products in any building owned or operated by MSU. Adult students may smoke only in the outside 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 prohibits 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

Following the appropriate procedure for grade appeals requires you to speak to your instructor first, so talk to your instructor. Students who wish to appeal a grade should consult the Midwestern State University [Undergraduate Catalog](#).

Course Schedule

***Notice:** Changes in the course syllabus, procedure, assignments, and schedule may be made at the discretion of the instructor. I will make sure to inform you a head of time should that happen.

***Notice:** In case of inclement weather, classes will be online through the Zoom link on the course D2L page.

Week	Date	Topic
Week 1	Wednesday, January 21, 2026	Introduction
	Friday, January 23, 2026	NO CLASS
Week 2	Monday, January 26, 2026	Subsurface Stresses and Pore Pressure
	Wednesday, January 28, 2026	Subsurface Stresses and Pore Pressure
	Friday, January 30, 2026	Subsurface Stresses and Pore Pressure
Week 3	Monday, February 2, 2026	Subsurface Stresses and Pore Pressure
	Wednesday, February 4, 2026	Subsurface Stresses and Pore Pressure
	Friday, February 6, 2026	Fundamentals of Solid Continuum Mechanics
Week 4	Monday, February 9, 2026	Fundamentals of Solid Continuum Mechanics
	Wednesday, February 11, 2026	Fundamentals of Solid Continuum Mechanics
	Friday, February 13, 2026	Fundamentals of Solid Continuum Mechanics
Week 5	Monday, February 16, 2026	Fundamentals of Solid Continuum Mechanics
	Wednesday, February 18, 2026	Exam 1
	Friday, February 20, 2026	Rock Yield and Failure
Week 6	Monday, February 23, 2026	Rock Yield and Failure
	Wednesday, February 25, 2026	Rock Yield and Failure
	Friday, February 27, 2026	Rock Yield and Failure
Week 7	Monday, March 2, 2026	Rock Yield and Failure
	Wednesday, March 4, 2026	Stresses on Faults and Fractures
	Friday, March 6, 2026	Stresses on Faults and Fractures

Week 8	Monday, March 9, 2026	NO CLASS - SPRING BREAK
	Wednesday, March 11, 2026	NO CLASS - SPRING BREAK
	Friday, March 13, 2026	NO CLASS - SPRING BREAK
Week 9	Monday, March 16, 2026	Stresses on Faults and Fractures
	Wednesday, March 18, 2026	Stresses on Faults and Fractures
	Friday, March 20, 2026	Stresses on Faults and Fractures
Week 10	Monday, March 23, 2026	Exam 2
	Wednesday, March 25, 2026	Wellbore Stability
	Friday, March 27, 2026	Wellbore Stability
Week 11	Monday, March 30, 2026	Wellbore Stability
	Wednesday, April 1, 2026	Wellbore Stability
	Friday, April 3, 2026	NO CLASS - HOLIDAY BREAK
Week 12	Monday, April 6, 2026	Wellbore Stability
	Wednesday, April 8, 2026	Hydraulic Fracturing
	Friday, April 10, 2026	Hydraulic Fracturing
Week 13	Monday, April 13, 2026	Hydraulic Fracturing
	Wednesday, April 15, 2026	Hydraulic Fracturing
	Friday, April 17, 2026	Hydraulic Fracturing
Week 14	Monday, April 20, 2026	Exam 3
	Wednesday, April 22, 2026	Reservoir Depletion and Injection
	Friday, April 24, 2026	Reservoir Depletion and Injection
Week 15	Monday, April 27, 2026	Reservoir Depletion and Injection
	Wednesday, April 29, 2026	Reservoir Depletion and Injection
	Friday, May 1, 2026	Reservoir Depletion and Injection
Week 16	Monday, May 4, 2026	Final Exam
	Wednesday, May 6, 2026	Final Exam
	Friday, May 8, 2026	Final Exam Due