Course Syllabus: Solid Earth and Exploration Geophysics

McCoy College of Science, Mathematics, and Engineering
GEOS-4834-101
Fall 2026

Contact Information

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Course Description

Welcome to Solid Earth and Exploration Geophysics! This course introduces the physical principles and methods used to investigate the structure, properties, and processes of the solid Earth and to characterize the shallow subsurface. We will examine gravity, magnetic, seismic, electrical, electromagnetic, ground-penetrating radar, and radiometric methods, with emphasis on survey design, data acquisition, processing, interpretation, and applications in exploration, engineering, environmental, and geologic investigations. Laboratory activities and applied exercises will connect geophysical theory with real data and practical subsurface problems.

Textbook & Instructional Materials

An Introduction to Applied and Environmental Geophysics by John M. Reynolds, 2nd Edition, Wiley, 2011.

The course will also include one or two fieldwork sessions, with dates and times arranged in advance.

Student Handbook

Refer to: Student Handbook

Academic Misconduct Policy & Procedures

Academic Dishonesty: Cheating, collusion, and plagiarism (the act of using source material of other persons, either published or unpublished, without following the accepted techniques of crediting, or the submission for credit of work not the individual's to whom credit is given). Additional guidelines on procedures in these matters may be found in the Office of Student Conduct.
Office of Student Conduct

Grading

Course grades will be based on a project and student presentation (20%), quizzes and homework assignments (10%), a midterm exam (20%), a final exam (25%), and laboratory assignments (25%). The midterm and final exams will assess understanding and application of the geophysical principles and methods covered in the course. A rubric and additional instructions for the project and presentation will be provided during the semester.

Table 1: Points allocated to each assignment.

Graded Items	Contribution to the Final Course Grade
Project & Student Presentation	20%
Quizzes & Homework Assignments	10%
Midterm Exam (Exam 1)	20%
Final Exam (Exam 2)	25%
Lab Assignments	25%

Table 2: Total points for final grade.

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

Quizzes & Homework Assignments

Quizzes and homework assignments will be given throughout the semester to reinforce concepts, calculations, interpretation, and applications discussed in class and laboratory. Assignments will be posted in D2L with due dates. Late submissions will follow the Late Work policy stated below.

Laboratory Assignments

Laboratory assignments will emphasize hands-on data analysis, geophysical interpretation, survey design, and, where appropriate, the use of geophysical software and field instrumentation. Laboratory activities are an essential component of the course.

The course will include laboratory assignments designed to reinforce concepts introduced in lecture and provide experience with geophysical data, processing, interpretation, and applications. There will also be one or two fieldwork sessions during the semester to provide hands-on experience with geophysical data

acquisition and field procedures. The dates and times for fieldwork will be arranged in advance based on course needs, field conditions, and student availability.

Exams

See the "Grading" section for details – **all exams** are provided in-person, unless otherwise specified. Students who have worked with DSS will be given additional time to complete exams.

Project & Student Presentation

Students will complete a geophysics project that integrates course concepts with an applied, exploration, or solid-Earth geophysics problem. The project will culminate in a student presentation during the final week of regular classes. Project guidelines and a grading rubric will be provided in D2L.

Midterm Exam

The midterm exam (Exam 1) accounts for 20% of the final course grade and will cover material presented during the first portion of the course.

Final Exam

The final exam (Exam 2) accounts for 25% of the final course grade and will be administered during the university final-examination period. The Final Exam is 110 minutes long. Students with approved Disability Support Services accommodations will receive additional time as appropriate.

Extra Credit

Extra credit assignments are not accepted in this course. The instructor may make revisions if deemed necessary.

Late Work

The following penalties will apply in all cases of late submissions (unless other arrangements have been made in advance): 10% for one week past due; 20% for two weeks past due; 30% for three weeks past due. Submissions more than three weeks overdue may receive a grade of zero.

Make Up Work/Tests

Students who miss assignments or exams because of serious and difficult circumstances may contact the instructor with appropriate documentation. Requests for make-up work or tests may be accommodated when circumstances are found to warrant an exception.

Important Dates

Change of Schedule & Late Registration: August 24-27, 2026. See Academic Calendar.
Deadline to file for graduation: September 21, 2026. See Academic Calendar.
Last Day to drop with a grade of "W:" November 23, 2026, at 4:00 p.m. See Academic Calendar.
Refer to: Drops, Withdrawals & Void

Desire-to-Learn (D2L)

Extensive use of the MSU D2L program is a part of this course. Each student is expected to be familiar with this program as it provides a primary source of communication regarding assignments, examination materials, and general course information. 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.

Attendance

Attendance is expected because lectures, laboratory activities, demonstrations, data interpretation, and student presentations are integral parts of the course. Students are responsible for material and activities missed during an absence.

Instructor Class Policies

Do not use AI to generate the course project or presentation unless the instructor explicitly authorizes a particular use.

Change of Schedule

For Fall 2026, a student who drops a course but remains enrolled in another course may receive a 100% refund for the dropped course through September 8, 2026. After September 8, 2026, the dropped-course refund is 0%. Refer to the published Schedule of Classes and refund schedule for applicable dates and policies.

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. As described below, 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.

College Policies

Campus Carry Rules/Policies
Refer to: Campus Carry Rules and Policies

Smoking/Tobacco Policy
Midwestern State University seeks to provide a safe, healthy, pleasant environment for its faculty, staff, and students. To this end, the use of tobacco products, including smoke and smokeless tobacco, and the advertising, sale, free distribution, and discarding of tobacco products shall be prohibited in all indoor and outdoor facilities and in all university vehicles. The policy extends to faculty, staff, students, vendors, guests, and visitors.

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.

Campus Carry
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 has 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.

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 MSUReady – Active Shooter. Students are encouraged to watch the video entitled "*Run. Hide. Fight.*" which may be electronically accessed via the University police department's webpage: *"Run. Hide. Fight."*

Grade Appeal Process

Students who wish to appeal a grade should consult the Midwestern State University MSU Catalog

*__Notice:__ Changes in the course syllabus, procedure, assignments, and schedule may be made at the discretion of the instructor.

Course Schedule:

The course will survey major methods in solid Earth, exploration, and near-surface geophysics during the 15 instructional weeks. Topics are interconnected through the physical properties of Earth materials, geophysical data acquisition, processing, modeling, and interpretation. Laboratory activities, assignments, and the course project will help integrate theory with practical applications.

Course Schedule

Week	Date	Topic
Week - 1	Tuesday, August 25, 2026	Introduction to Applied and Exploration Geophysics; Geophysical Methods and Applications
Week - 1	Thursday, August 27, 2026	Survey Planning, Design, Resolution, Noise, and Data Quality
Week - 2	Tuesday, September 1, 2026	Gravity: Physical Principles and Earth's Gravity Field
Week - 2	Thursday, September 3, 2026	Gravity Measurement, Corrections, Anomalies, and Interpretation
Week - 3	Tuesday, September 8, 2026	Magnetics: Principles, Earth's Magnetic Field, and Rock Properties
Week - 3	Thursday, September 10, 2026	Magnetic Surveying, Instruments, Processing, and Interpretation
Week - 4	Tuesday, September 15, 2026	Applied Seismology: Stress, Strain, Elasticity, and Seismic Waves
Week - 4	Thursday, September 17, 2026	Seismic Velocity, Raypaths, Sources, and Data Acquisition
Week - 5	Tuesday, September 22, 2026	Seismic Refraction: Principles and Survey Geometry
Week - 5	Thursday, September 24, 2026	Refraction Interpretation, Tomography, and Applications
Week - 6	Tuesday, September 29, 2026	Shear-Wave Methods and Multichannel Analysis of Surface Waves (MASW)
Week - 6	Thursday, October 1, 2026	MASW: Dispersion Curves, Vs Profiles, and Applications
Week - 7	Tuesday, October 6, 2026	Seismic Reflection: Principles, Acquisition, Processing, and Interpretation
Week - 7	Thursday, October 8, 2026	Exam 1 - Midterm Exam
Week - 8	Tuesday, October 13, 2026	Electrical Resistivity: Principles and Electrical Properties
Week - 8	Thursday, October 15, 2026	Electrode Arrays, Geometric Factors, VES, Profiling, and Survey Design
Week - 9	Tuesday, October 20, 2026	Electrical Resistivity Tomography (ERT): Processing, Inversion, and Interpretation

Week	Date	Topic
Week - 9	Thursday, October 22, 2026	ERT Applications and Case Histories
Week - 10	Tuesday, October 27, 2026	Self Potential and Induced Polarization
Week - 10	Thursday, October 29, 2026	Electromagnetic Methods: Fundamental Principles
Week - 11	Tuesday, November 3, 2026	Frequency-Domain Electromagnetics (FDEM)
Week - 11	Thursday, November 5, 2026	FDEM Instrumentation, Surveying, and Interpretation
Week - 12	Tuesday, November 10, 2026	Time-Domain Electromagnetics (TDEM): Principles and Applications
Week - 12	Thursday, November 12, 2026	VLF, Tellurics, and Magnetotellurics
Week - 13	Tuesday, November 17, 2026	Ground-Penetrating Radar: Principles, Wave Propagation, and Material Properties
Week - 13	Thursday, November 19, 2026	GPR Acquisition, Processing, Interpretation, and Applications
Week - 14	Tuesday, November 24, 2026	Radiometrics and Integrated Geophysical Interpretation
Week - 14	Thursday, November 26, 2026	Thanksgiving Holiday - No Class
Week - 15	Tuesday, December 1, 2026	Student Presentations I
Week - 15	Thursday, December 3, 2026	Student Presentations II
Week - 16	TBA	Exam 2 - Final Exam

Note: The course schedule is tentative. Depending on the pace of the course and other circumstances, we may not cover all topics listed. Classes may also temporarily transition to an online format when circumstances do not allow in-person instruction. One or two fieldwork sessions will also be conducted during the semester; their dates and times will be arranged in advance and may require adjustments to the tentative course schedule.

Schedule note: Thanksgiving holiday for students is November 25-29, 2026; classes resume November 30. The last class day is December 4, and final examinations are December 5-10.