Course Syllabus: Electrical and Electromagnetic Methods in Geophysics
McCoy College of Science, Mathematics, and Engineering
GEOS 5853-101
Fall 2022

Contact Information

Instructor: Dr. Andrew Katumwehe
Office: Bolin 102A
Lecture: MWF 11:00-11:50 AM RM 115
Lab: T 1:00-2:50 PM RM 105
Office hours: T, W: 2:00 – 4:00PM, R 3-4: 00PM and by appointment
Office phone: (940) 397-4031
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Course objectives

a. To provide each student with the fundamental knowledge on the principles of the different geo-electrical methods (Electrical Resistivity (DC resistivity), Induced Polarization, Complex Resistivity/Spectral Induced Polarization, Self-Potential, Electromagnetic (including Time domain, Frequency domain, MT, Ground Penetrating Radar), basic interpretation, and applications. Recent advances in geo-electrical methods will be attained through an in depth review of pertinent literature including case studies.
b. To develop in each student the ability to think objectively and critically, so that the student may be capable of assessing a given geologic problem and determine the appropriateness of the geophysical method(s) to be applied in solving that problem.
c. To develop presentation and oral communication skills.
d. To develop skills in writing abstracts and scientific project reports.

Style / Mode of Teaching:

This class will be conducted through formal lectures, student presentations, & class discussions of current literature. Labs are hands-on and will be an extension from previous experience from solid earth and exploration geophysics.
Active participation and completion of all lab sessions is a must. If you are going to miss a lab you must let Dr. Katumwehe know in advance. It is not possible to redo a lab since it requires more than 3 people to run a lab. A missed lab will receive a completion grade of zero. Note that some labs will consist of take home problem sets, whereas other labs will require use of software available on computers in Bolin 105.

Required Textbook & Instructional Materials

1- Applied Geophysics by Telford, Geldart and Sheriff.
ISBN-13:978-0521339384
2- Introduction to Applied and Env. Geophysics by Reynolds.
3- Introduction to Geophysical Prospecting by Dobrin and Savit/Dobrin
4- Principles of Applied Geophysics by Parasnis.
5- Environmental and Engineering Geophysics by Sharma

Student Handbook

Refer to: Student Handbook 2017-18

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 norm of crediting, or the submission for credit of work not the individual's to whom credit is given). Although I encourage you to discuss the lab problems and answers to some of the extra credit assignments with each other, your answers should be written only by you. However, it is unacceptable to turn in any work that is not your own. Cooperation = good. Plagiarism = not acceptable for your information industry is brutal to the lazy one. Additional guidelines on procedures in these matters may be found in the Office of Student Conduct. The expectation for all students in this course is that complete integrity will be demonstrated at all times. Violations may subject you to disciplinary action including the following: receiving a failing grade (0%) on an assignment, examination or course, receiving a notation of a violation of academic integrity on your transcript, and being suspended from the University. Violations of academic integrity will be reported for administrative action, and the penalties for such infractions will be as listed in the MSU policy on Academic Integrity.

Grading

Lecture portion of this course = 60% of final grade. Lecture Exams = 25% of final grade; Assignments = 15% of final grade; class presentations = 20% of final grade, labs = 25% of final grade and labs = 150% of final grade. Consult the syllabus for these dates. If you are going to miss an exam/project, you must let me know beforehand. No make-ups allowed except in the case of an emergency (note from Health Service or police is required) or unavoidable situations (note from faculty, coaches or other officials is required). I have no obligation to allow you to make-up a test if you do not inform me ahead of time. Social events, weddings, vacations, hunting trips, and fundraisers are not valid reasons for missing exams or quizzes. While the exams/micro projects will not be explicitly comprehensive, the material in this course builds upon previous concepts. Therefore, once a concept has been introduced, it will be assumed that you remember it and understand it in subsequent lectures. These are tips for making a good grade1. Regular class attendance and stay awake! Remember class

attendance/participation is considered in the final grade (attitude & effort)! 2. Preparation for class is important- read & master all assigned papers 3. Class presentations should be of professional quality 4. If you are having difficulties seek professor's help ASAP. Class Presentations should be of high quality and will be accompanied by a 1page abstract. This equally applies to micro projects. The table below summarizes the grading policy for this course.

Table 1: Points allocated to graded item or group of items discussed in the Grading Section above.

Graded Items	**Contribution to Final Course Grade**
Exams/Micro projects	20%
Homework	15%
Presentations	25%
Final Project	15%
Labs	25%

Table 2: Final grade determination (grades are rounded up to the nearest integer before assigning the final course letter grade. For example, a final calculated course grade of 89.8% will be rounded up 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
See Grading Section for details – All Homework to be submitted to my office in your regular lab section

Lab Assignments
See Grading Section for details – All lab Assignments to be submitted to me 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 to work with their lab section TA to make up any missed material in a timely fashion. Students must notify their lab TA and Dr. Katumwehe by email in advance of missing a lab section. Students **who leave lab sections and class early may be marked absent, geophysical labs are labor intensive in putting them up and putting them down.** However, any proximal interaction, including supervision

or collegial interaction in the class, lab and outside during demonstration requires individual protection.

- The SARS-Cov2 virus is a threat to the execution of this class. We will replicate conditions that have been useful to healthcare workers. Our shared responsibility and approach must be to continue to monitor and adapt to the changing dynamics of the virus just as other Texas cities, corporations, and institutions are doing in recent days. As such, we once again on you to remain vigilant and take steps to prevent the spread of COVID-19.

  Rules:

  For more information please follow the link
- Self-isolation will be required for all students (vaccinated or unvaccinated) who test positive for COVID-19. Students who live in university housing will be provided with a location to complete the self-isolation period.
- Any student (vaccinated or unvaccinated) who has a laboratory confirmed case of COVID-19 must complete the COVID-19 Reporting Form for Students.
- You can watch "This is Your Shot: Vaccine Facts & Science" for questions regarding the COVID-19 vaccine.

COVID-19 ACCOMMODATIONS
Students may apply through this link

Presentations

This course will have multiple opportunities to present class projects. No exams are expected but the projects are graded. Time is of essence, you will not be allowed to make-up a missed presentation unless you have informed Dr. Katumwehe in advance and you have a certifiable excuse that can be documented (doctor's note, note from coach, other faculty, etc). Please use font 28 for body texts and 44 for headers! Clean images are a must if included on the slides and tables must be legible.

Class Project

See Grading Section for details about content and format. All Class project Papers must be submitted in Microsoft Word or PDF format to andrew.katumwehe@msutexas.edu and paper copy to my physical mailbox in Bolin 102A. The class will culminate in a class project at any of the selected field sites in Wichita Falls. The objective would be to apply the electrical techniques to characterize the site.

Lecture (attendance) Extra Credit

Limited extra credit opportunities will be available on an irregular and random basis during the lecture portion of the course. Each individual extra credit opportunity will be worth up to one (1.0) extra credit point. Generally, these opportunities involve a short written response to a question or problem posed during the lecture or more often than not, simply your signature on attendance

sheet (therefore, bring paper and pen/pencil to lectures and printouts for the presentations).

Late Work
Late work will be accepted with the following penalties; 10% for one day past due; 20% for two days past due; 30% for one weeks past due; after one week a grade of zero may be recorded. No course assignments will be accepted after 12/01/2022.

Important Dates
The last Day to drop this course with a W is October 04th 2022 at 4pm and is found in the University 2022 fall calendar under Drops, Withdrawals & Void

Desire-to-Learn (D2L)
The MSU D2L program is a part of this course. Lectures, review materials, and course information are 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.

Computer Requirements
Geophysics requires considerable use of excel and other computer programs. It is your responsibility to have (or have access to) a working computer in this class. Assignments and tests are due by the due date, and personal computer technical difficulties may not be considered as a reason for the instructor to allow students extra time to submit assignments, tests, or discussion postings. Computers are available on campus in various areas of the buildings as well as the Academic Success Center. Your computer being down is not an excuse for missing a deadline or an exam! Contact your instructor immediately upon having personal computer trouble. If you have technical difficulties in the course, there is also a student helpdesk available to you. The college cannot work directly on student computers due to both liability and resource limitations.

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. As described below, two formulas (federal and state) exists

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, MSU 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 are given here: Campus Carry Rules and Policies

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 MSU 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
Students who wish to appeal a grade should consult the Midwestern State University appeal of course grade.

Notice
Changes in the course syllabus, procedure, assignments, and schedule may be made at the discretion of the instructor. These changes will be communicated to all students through D2L**.** Please check the course news on a regular basis for schedule updates. The course schedule detail is given on the next page. The table lists lecture topics, textbook readings, and the three lecture exams.

Campus Carry and Active Shooter

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 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.

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. 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."

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

Date	Topic and Topic Number	Reading assignment
22-Aug	Course overview, and Introduction	
24-Aug 26-Aug	Self-Potential Basic Theory Literature Review	Pages 349-427 Check papers on D2L
05-Sept	**Labor day no classes**	
07-Sept	Recent Advances and case studies/class discussions/student presentations.	
09-Sept	Lab on electrical properties (Archie's Law) Field Demonstrations/lab	
12-Sept	**Exam/ Project 1**	
12-Sept 14-Sept 16-Sept 19-Sept	Electrical Resistivity (1) Basic Theory Induced Polarization/Complex Resistivity **Recent Advances – Literature Review and case studies/class discussions/student** presentations	Chapter 7 - Telford Check papers on D2L SIP/IP
21-Sept	Field Demonstrations – 1 & 2-d ER/IP surveys	
23-Sept	**Exam /Project 2**	
26-Sept 28-Sept 29-Sept 30-Sept	Electromagnetic Methods (2) – EMI, TEM, MT Basic Theory Recent Advances and case studies/class discussions/student presentations	Chapter 7 - Telford Check papers on D2L
03-Oct	Field Demonstrations/lab- EM-34/31	
05-Oct 07-Oct 10-Oct 12-Oct	Electromagnetic Methods (3) – GPR Basic Theory Recent Advances and case studies/class discussions/student presentations	
14-Oct	**Field Demonstrations/lab - GPR**	
17-Oct	**Assignment 5- EM, IP and GPR**	
19-Oct-19 Nov	**Final Research Presentation**	
22-27-Nov	**Thanksgiving Break - No Class**	
06-Dec. Tuesday	**Final Project Reports Due & Presentation of Projects**	