

**Course Syllabus: Seismic Interpretation**  
**McCoy College of Science, Mathematics, and Engineering**  
GEOS 5863-101  
Fall 2023

**Contact Information**

Instructor: Dr. Andrew Katumwehe  
Office: Bolin 102A Moving to Pierce Hall 2<sup>nd</sup> Floor  
Lecture: TR 4:30-5:50 PM RM 105  
Lab: F 4:30-5:20 PM RM 105  
Office hours T; 1:00 – 4:00 and W; R:1-3 PM and by appointment  
Office Phone: (940) 397-4031  
Email: [andrew.katumwehe@msutexas.edu](mailto:andrew.katumwehe@msutexas.edu)

**Course Description**

This course aims to provide students with basic seismic interpretation. It focuses on methods and approaches appropriate for deeper targets, especially oil and gas exploration. Lectures cover only the most essential aspects, mostly fundamental principles of experimental designs to support the theory and brief discussions on how data is processed and interpreted.

We examine the elements involved, such as seismic data acquisition and processing principles for refraction and seismic reflection. The course covers Seismic Well tie based on modeling a synthetic seismogram from sonic and density logs to match them with seismic reflection data to produce a relationship between the Logs (measured in depth) and the seismic (measured in travel time). Many sedimentary layers behave differently due to the difference in acoustic impedance. This difference is used in inferring the geology of the subsurface from processed seismic records directed toward the creation of structural maps of the subsurface. Other important topics will be seismic amplitude and attribute analysis, the two most essential elements in fault interpretation and horizon correlation. We will discuss Attributes such as coherency and amplitude and how they aid in identifying structural and depositional phenomena. We will discuss the theory of wave propagation, velocity models, and the importance of seismic migration. This course outline/syllabus contains a detailed schedule, including a list of specific topics. You must attend lectures and come prepared. The Lab portion of the course has an industry-standard hands-on project designed for individual participation and a final project presentation.

If you are going to miss a lab, you must let Dr. Andrew know in advance. Note that labs will consist of take-home problems only, whereas most labs will require software available on computers in Bolin 105 or Bolin 308. We will first use part of the lab time to finalize lecture materials before embarking on the individual project.

**Required Textbook & Instructional Materials**

1- First steps in Seismic Interpretation by Donald A. Herron 2011

## **Student Handbook**

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

### **Academic Misconduct Policy & Procedures**

Academic Dishonesty: These are unacceptable habits: cheating, collusion, submitting similar projects, 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 to whom credit is given). Additional guidelines on procedures in these matters may be found in the Office of Student Conduct.

### **Chat GPT and University Policy**

We recognize that a variety of AI programs are available to assist writers. AI programs do not replace human creativity, originality, and critical thinking. Writing is a craft you must develop over time to develop your writing voice. This course assumes that all work submitted by students will be written by the students, working individually or in groups. Students should not have another person/entity write any substantive portion of an assignment for them, which includes hiring a person or a company to write assignments and using artificial intelligence tools like ChatGPT. All coursework without proper citation or attribution is a form of academic dishonesty.

### **Turnitin**

AI writing detection complements Turnitin's similarity-checking workflow and is integrated with D2L. The detection component provides a percentage score for AI-written text. However, the AI score will include all text consistency, including Grammarly, spell-check, predictive text, etc., and is not limited to ChatGPT.

### **Grading**

Assignments=10% of the final grade. Lab assignments =30%, while individual final project contributes 60% of the total grade. If you miss any of the classes, makeup is possible only if (1) you have a written excuse as to why you missed the class and (2) you notified Dr. Andrew Katumwehe in advance. Note that oversleeping is not an acceptable reason! The final project will be an individual effort. If you are working with seismic data, this is an excellent opportunity to use your research data to complete the project. Lab attendance and participation, lab exercise completion, and homework assignments will determine your overall lab completion grade. The final project includes an oral presentation ( I will upload the grading rubric on D2L during the semester), submitted in print and electronic form. The electronic form will follow the following criteria: 1-Geology summary (use two lithological units) and faulting.2-Interpretation workflow. 3-Horizon interpretation (inline and crossline). 4-Results map figure showing synthetic tie, with Well tie showing horizon. 5-Discussion (figure showing the faults, contours, structure, isochrones, and amplitudes. 6-Conclusion.The latter should be submitted via Dr. Andrew Katumwehe's University email at [andrew.katumwehe@msutexas.edu](mailto:andrew.katumwehe@msutexas.edu) with

the words "GEOS 5863 Paper Fall 2023" and your paper title in the email subject line. The project grade is determined based on format compliance. All components of your final grade must be submitted/completed by December 8. The Table below (next page) summarizes the grading policy for this course.

**Table 1: Points allocated to graded items discussed in the Grading Section above.**

<b>Graded Items</b>	<b>Contribution to Final Course Grade</b>
Lecture Assignments and Attendance	10%
Lab Assignments	30%
Final Projects	60%

**Table 2: Final grade determination** (grades are rounded to the nearest integer before assigning the final course grade). For example, a final calculated course grade of 89.8% is rounded to a final grade 90.)

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

### **Lab Assignments**

See the Grading Section for details – All Lab Assignments will be submitted to me during regular lab meetings.

### **Lab Attendance Policy – Important!**

- Students who **miss three** or more lab section meetings may be dropped from the course by the instructor. You are responsible for working with the lab TA to make up any missed material in a timely fashion. Students must email their lab TA and Dr. Katumwehe before missing a lab section. Students **who leave lab sections and class early may be marked absent.**

### **Exams**

This course has no exams, but you will be examined on the final individual project. The final project can be completed using Kingdom, Petrel, or GeoGraphix, depending on personal knowledge and experience. I highly recommend that if you use seismic data in your thesis research, take advantage of this course and use the data during the class project (beneficial).

## **Final Project**

See the grading Section for details about content and format. You must submit a digital PowerPoint presentation in PDF format to [andrew.katumwehe@msutexas.edu](mailto:andrew.katumwehe@msutexas.edu).

## **Late Work**

Late work will only be accepted with the following penalties: 10% for one day past due, 20% for two days past due, and after one week, a grade of zero may be recorded. No course assignments will be accepted after 12/08/2023.

## **Important Dates**

The last day to drop this course is on the University 2023 Fall calendar under [Drops, Withdrawals, Void](#). More information can be found at <https://msutexas.edu/registrar/assets/files/pdfs/acadcal2324.pdf>.

## **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, don't hesitate to contact the program's technicians or 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 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 refund amount (examples of each refund calculation will be made available upon request).

## **Services for Students with Disabilities**

Under Section 504 of the Federal Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, MSU makes 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 in the Clark Student Center, Room 168, (940) 397-4140. For more details, please go to [Disability Support Services](#).

## College Policies

Campus Carry Rules/Policies can be found here: [Campus Carry Rules and Policies](#).

## Smoking/Tobacco Policy

College policy prohibits using 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 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

Modifications to the course syllabus, procedures, assignments, and schedule are subject to the instructor's discretion for any such alterations. Regularly monitor the course news section on [D2L](#) for any schedule adjustments.

## Course Schedule – Laboratory and Lecture Topics

Date	Topic and Topic Number	
28- Aug	Course overview, Schedule	
30- Aug	Fundamentals of seismic methods	
01- Sep	Refraction seismic method	
04- Sep	Labor Day - No Classes	
08- Sep	Reflection seismic methods	
11- Sep	Seismic reflection acquisition	
13- Sep	Seismic reflection acquisition	
15- Sep	Seismic synthetics	
18- Sep	Coherence and amplitude	
20- Sep	Seismic attribute-curvature	
22- Sep	Seismic lab Project-Kingdom suite	
25- Sep	Seismic attribute-curvature	
27- Sep	Seismic attribute-curvature	
29- Sep	Seismic correlation	
02- Oct	Seismic correlation	
04- Oct	Seismic amplitude gradients	

<b>Date</b>	<b>Topic and Topic Number</b>	
06- Oct	Seismic amplitude gradients	
09- Oct	Seismic correlation	
11- Oct	Seismic amplitude gradients	
13- Oct	Project Introduction	
16- Oct	Sequence stratigraphy	
18- Oct	Sequence stratigraphy	
20- Oct	Structure styles in oil and gas	
23- Oct	Structure styles in oil and gas	
25- Oct	Fracture analysis	
27- Oct	Fracture analysis	
30- Oct	Individual Project	
01-Nov	Individual Project	
03- Oct	Individual Project	
06- Nov	Individual Project	
08- Nov	Individual Project	
10- Nov	Individual Project	
13- Nov	Individual Project	
15- Nov	Individual Project	
17- Nov	<b>Project Presentation</b>	
20- Nov	<b>Project Presentation</b>	
<b>21-26 Nov</b>	<b>Thanksgiving Break</b>	
24- Nov	<b>Project Presentation</b>	
08-Dec	<b>Submission of the Final Project</b>	