Course Syllabus: Seismic Interpretation
McCoy College of Science, Mathematics, and Engineering

GEOS 6853
Fall 2021

Contact Information

Instructor: Dr. Andrew Katumwehe
Office: Bolin 102A
Lecture: TR 4:30-5:50 PM RM 105
Lab: F 4:30-5:20 PM RM 105
Office hours: T, W, R; 2:00 – 3:00PM and by appointment
Office phone: (940) 397-4031
E-mail: andrew.katumwehe@msutexas.edu

Course Description

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

We will examine the different elements involved such seismic data acquisition and processing principles for both refraction and reflection seismics. The course will cover 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 impendence. Most times this difference is utilized in inferring the geology of the subsurface from processed seismic record directed towards the creation of structural maps of the subsurface. Other important topics covered will be seismic amplitude and attribute analysis, the two most important elements in fault interpretation and horizon correlation. We will look at Attributes such as coherency and amplitude on how they aid in identifying structural and depositional phenomena. The theory of wave propagation, velocity models and the importance of seismic migration will be discussed. This course outline/syllabus contains a detailed schedule including a list of specific topics. You are expected to attend lectures and come prepared. The Lab portion of the course has an industry standard hands-on project that is designed for individual participation and a final project presentation.
Active participation in all required lab sessions is expected. Completion of all lab assignments on time is expected. If you are going to miss a lab you must let Dr. Andrew know in advance. Note that labs will consist of take home problem sets only whereas most labs will require use of 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: 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's to whom credit is given). Additional guidelines on procedures in these matters may be found in the Office of Student Conduct.

Grading
Assignments=10% of final grade. Lab assignments =30%, while individual final project contributes 60% of the total grade. If you miss any of the classes make up 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 a great 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 must be orally presented (the grading rubric will be uploaded on D2L), submitted in both printed 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, figure 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 with the words "GEOS 6853 Paper Fall 2021" along with your paper title on 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 3. The homework assignments will be posted on D2L. The homework assignments will include questions to answer that focus on lecture and lab content. Homework due dates are listed in the syllabus. The Table below (next page) 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
Lecture Assignments	10%
Lab Assignments	30%
Final Projects	60%

Table 2: Final grade determination (grades are rounded up to the nearest integer before assigning the final course letter grade. This means, for example, that a final calculated course grade of 89.8% will be rounded up to a final course 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.** 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:**
- Fully vaccinated students who are not experiencing symptoms will NOT be required to quarantine or seek testing following an exposure to a COVID-19 positive person, including roommates. Following a known exposure, students should monitor for symptoms over the course of 14 days and quarantine if symptoms develop.
- Unvaccinated students who have been identified as having a known exposure to a COVID-19 positive person will be required to quarantine for a minimum of 10 days or longer depending upon testing and degree of contact. If a student is unvaccinated and can prove a COVID-19 diagnosis and recovery in the last 90 days and is symptom free, quarantine will not be required.
- You must pass a daily self-assessment whenever you engage in non-remote work – reporting the absence of fever or other symptoms.
- Maintain 6 feet distance when possible.
- Masks offer a protection and a recommended but not mandatory whenever in close proximity or in closed spaces.
- Individuals should be each assigned equipment, when possible.
- Wipe equipment disinfecting cleanser before exchanging users.
- Maintain the same sitting in the lab. For more information please follow the link
- https://msutexas.edu/return-to-campus/_assets/files/december-2020-reopening-taskforce-report.pdf.
- Reporting form for students https://cm.maxient.com/reportingform.php?MSUTexas&layout_id=9.
- **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.

Exams

This course has no exams but you will be examined on the final individual project. This will be completed using either kingdom, Petrel or GeoGraphix depending on individual knowledge and experience. I highly recommend that if you are using seismic data in your thesis research to take advantage and use it during the class project (Very helpful).

Final Project
See Grading Section for details about content and format. The power point presentation and PDF format must be submitted to andrew.katumwehe@msutexas.edu and paper copy to my physical mailbox in Bolin 102A.

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 12/04/2021.

Important Dates
The last Day to drop this course is found on the University 2021 Fall calendar under Drops, Withdrawals & Void. More information can be found on https://msutexas.edu/registrar/_assets/files/pdfs/acadcal2122.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, 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 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 Undergraduate Catalog

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.

Tentative Course Schedule – Laboratory and Lecture Topics

Date	Topic and Topic Number	
23- Aug	Course overview, Schedule	
25- Aug	Fundamentals of seismic methods	
30- Aug	Refraction seismic method	
01- Sep	Reflection seismic methods	
05- Sep	Seismic reflection acquisition	
06- Sep	Labor Day - No Classes	None
08- Sep	Seismic reflection acquisition	
10- Sep	Seismic synthetics	
13- Sep	Coherence and amplitude	
15- Sep	Seismic attribute-curvature	
17- Sep	Seismic lab project-Kingdom suite	
20- Sep	Seismic attribute-curvature	
22- Sep	Seismic attribute-curvature	
24- Sep	Seismic correlation	
27- Sep	Seismic correlation	
29- Sep	Seismic amplitude gradients	
01- Oct	Seismic amplitude gradients	
04- Oct	Seismic correlation	
06- Oct	Seismic amplitude gradients	
08- Oct	Project introduction	
11- Oct	Sequence stratigraphy	
13- Oct	Sequence stratigraphy	
15- Oct	Structure styles in oil and gas	
18- Oct	Structure styles in oil and gas	
20- Oct	Fracture analysis	
22- Oct	Fracture analysis	
25- Oct	Individual Project	
27- Oct	Individual Project	
29- Oct	Individual Project	
01- Nov	Individual Project	
05- Nov	Individual Project	
08- Nov	Individual Project	
10- Nov	Individual Project	
12- Nov	Individual Project	
15- Nov	**Project Presentation**	
17- Nov	**Project Presentation**	
19- Nov	**Project Presentation**	
22- Nov	**Project Presentation**	
23-30 Nov	**Thanksgiving Break**	
29-Nov	**Submission of the Final Project**	