

Syllabus

GEOL 5399: Special Topics: Introduction to well log analysis and interpretation.

MayTerm 2017

Time: 10am - 12 pm & 1 pm – 3pm

Professor: Matt Hornbach

Email: mhornbach@smu.edu

Phone: (512) 636-5030

Office: 316 Heroy

Office hours: 3 pm-4 pm

or, (better yet) by appointment

Course Description: Well log analysis represents a fundamental tool in the oil and gas business for detecting, evaluating, and quantifying oil and gas resources. Understanding how to collect, analyze, and interpret geophysical well logs is therefore an essential skill for any aspiring petroleum engineer or economic geologist/geophysicist. The goal of this class is to provide students an intensive, hands-on introduction to geophysical well log interpretation and analysis. The course includes not only background theory but also incorporates well log tool development and collection strategies, basic log interpretation, and direct application to active oil and gas fields. The course will include analysis and interpretation of multiple logging tools including Gamma Ray, Magnetic, Neutron/Density, Caliper, Resistivity, Temperature, and Sonic logging methods and interpretation. The class will be broken into two sections each day: approximately two hours in the morning will be spent presenting lecture material and two hours in the afternoon will have students working directly with well logs, analyzing and interpreting data. There will be significant focus on application and examples, with students working on two research projects that directly apply large well-logging datasets to particular fields of interest with special focus in basins with active oil and gas exploration/production.

What should you expect to learn?

1. The basic physics behind well logging.
2. How to collect well logs (with one field excursion likely).
3. How to interpret subsurface geology based on a suite of well logs.
4. The pitfalls associated with well log interpretation.
5. How to make geological/geophysical cross-sections with well logs
6. How to map/detect regions with high hydrocarbon production potential with well logs.
7. How to determine the subsurface structure and evolution of a basin using well logs.
8. How to access/utilize publicly-available well logs for basin-wide hydrocarbon analysis.

Reading/Assignments: Assignments for this class focus on reading basic papers on well log collection, analysis and interpretation, two research project assignments, and a class presentation. The course will consist of a multiple handouts and papers discussing well logging methods, applications, and pitfalls.

Grading:

In-class Exam : 20%	A = 97-100	A = 94-96	A- = 90-93
Group project #1: 30%	B+ = 87-89	B = 84-86	B- = 80-83
Individual Research project #2: 30%	C+ = 77-79	C = 74-76	C- = 70-73
Oral Presentation : 15%	D+ = 67-69	D = 64-66	D- = 60-63
Participation: 5%	F < 60		

May 18th :

Morning: An intro. and history of well logging. Introducing the Caliper, Gamma, Sonic, and SP Log.
Afternoon: Assessment and Interpretation of these fundamental well logs from Offshore US.

May 19th:

Morning: Introducing the Neutron/Density, Magnetic, Resistivity, Temperature/pressure Logs.
Afternoon: Assessment and Interpretation of these well logs in the Lesser Antilles.

May 22nd :

Morning: Introducing specialty logs (FMI-stress interpretations, corrosion logs).
Afternoon: Assessment and Interpretation of well logs in the Barnett Shale.

May 23rd:

Morning: In class Exam—assessing basic well logging interpretation skills..
Afternoon: Introducing Group Project: Determining the economic geology potential in SE Wyoming.

May 24th:

Morning: Assign groups. begin cross section/mapping for Hanna, Saratoga, Denver Basins.
Afternoon: Continue cross section/mapping for Hanna, Saratoga, Denver Basins.

May 25th:

Morning: Continue develop TOC, HF, Porosity cross section/mapping for SE Wyoming.
Afternoon: Students should start developing class presentations for project for their area.

May 26th:

Morning: Return/Discuss Exams. Begin group presentation.
Afternoon: Complete group presentations. Assign individual western US areas for well log analysis.

May 29th: Memorial Day-No Class.**May 30th:**

Morning and afternoon: Possible field trip to a well logging site (tentative).
Afternoon: students continue working on individual research project --areas of well log analysis.

May 31st:

Morning: brief discussion of well log case histories in Alaska.
--students continue working on individual research projects.
Afternoon: students continue working on individual areas of well log analysis.

May 1st:

Morning: brief discussion of well log case history in Montana.
--students continue working on individual research projects.
Afternoon: students write-up final project report.

May 2nd:

Morning: STUDENT PRESENTATIONS OF FINAL PROJECT.

Afternoon: STUDENT PRESENTATIONS OF FINAL PROJECT.

Classroom Policies: I ask that all cell phones or other two-way transmitting devices be turned off during class. Laptops are allowed during lectures, but internet/email should not be used. During exams, NO electronic material (phones laptops, ipads etc.) are allowed in the classroom. I expect the SMU honor code to be strictly adhered to and make no exceptions. Please contact me as soon as possible if you will miss class for any university-approved reasons.

Other Important Information:

Disability Accommodations: Students needing academic accommodations for a disability must first be registered with Disability Accommodations & Success Strategies (DASS) to verify the disability and to establish eligibility for accommodations. Students may call [214-768-1470](tel:214-768-1470) or visit <http://www.smu.edu/alec/dass.asp> to begin the process. Once registered, students should then schedule an appointment with the professor to make appropriate arrangements.

- **Religious Observance:** Religiously observant students wishing to be absent on holidays that require missing class should notify their professors in writing at the beginning of the semester, and should discuss with them, in advance, acceptable ways of making up any work missed because of the absence. (See University Policy No. 1.9.)

- **Excused Absences for University Extracurricular Activities:** Students participating in an officially sanctioned, scheduled University extracurricular activity should be given the opportunity to make up class assignments or other graded assignments missed as a result of their participation. It is the responsibility of the student to make arrangements with the instructor prior to any missed scheduled examination or other missed assignment for making up the work. (University Undergraduate Catalogue)