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**The University of Tulsa**  
**Petroleum Engineering Department**  
**Course Syllabus**

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**Course General Information**

Number	Title	Credit Hours	Required or Elective
PE4053	Formation Evaluation	3	Required

**Catalog Description**

Electrical, acoustic, radioactive properties of rocks. Introduction to well logging theory and interpretation of subsurface logs, and computer logs. Prerequisites: Geol 3153; PE 2112, 2123, Phys 2063.

**Requisites**

Number	Title	Type (Pre or Co)
PE 2112	Rock Properties	Prerequisite
PE 2123	Fluid Properties	Prerequisite
Phys 2063	Physics II	Prerequisite
Geol 3153	Sedimentary Process	Prerequisite

**Requisites by Topics**

Rock and fluid properties. Basic knowledge on electricity, the propagation of acoustic waves and radioactivity.

**Class/Lab Schedule**

This course consists of 2.5-hour lecture each week. There is no lab associated with this course.

**Textbook and other Required Material**

*Theory, Measurement, and Interpretation of Well Logs*, SPE Textbook Series Vol. 4 (Second Edition), Zaki Bassiouni

**Auxiliary non-required References**

*Log Interpretation Principles/Applications*, Schlumberger  
*Basic Well Log Analysis (Second Edition)*, G. Asquith and D. Krygowski  
*Guide to Petrophysical Interpretation*, D. Krygowski  
*Well Log Interpretation*, D. Hilchie  
*Log Interpretation Charts - 2004*, Baker Atlas  
*Log Interpretation Charts-2001*, Halliburton  
*Log Interpretation Charts - 2005*, Schlumberger

**Course Objectives**

The objectives of this course are:

- To give students a basic understanding of the typical tools and methods used in openhole formation evaluation by incorporating basic engineering sciences (acoustics, nuclear and electric engineering).
- To provide fundamental knowledge in log analysis towards building knowledge in reservoir engineering.
- To develop the ability of analyzing open-ended problems and critical thinking through log analysis practices.
- To develop the ability of analyzing logs using available computer softwares.

**Main Topics Covered**

Archie's law; borehole environment; resistivity logs, lithology logs, density and neutron logs, acoustic logs; conventional interpretation methods; reconnaissance interpretation methods; pattern recognition techniques; complex lithology; shaly sand interpretation; and gas formation evaluation.

**Course Outcomes**

At the end of the course you should be able to analyze a suite of openhole logs and identify prospective zones for testing and calculate potential reserves in these zones. This course will help you tie together some of the loose ends of petroleum geology and reservoir engineering.

### Contribution to ABET Professional Program Criteria

ABET Professional Program Criteria are statements describing competencies that students must possess by the time of graduation. The following table summarizes the contribution of this course to the Program Specific Criteria.

Program Specific Criteria	
c	Competency in characterization and evaluation of subsurface geological formations and their resources using geoscientific and engineering methods
e	Competency in application of reservoir engineering principles and practices for optimizing resource development and management

### Relationship to ABET Program Outcomes

Program outcomes describe what students are expected to know or be able to do by the time of graduation from the Program. The following table summarizes the contribution of this course to the Program outcomes.

Outcome	
a	Ability to apply knowledge of mathematics, science, and engineering
c	Ability to design a system, component, or process to meet desired needs
e	Ability to identify, formulate, and solve engineering problems
k	Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

### Contribution to Program Professional Component and to Design Component

Course material and projects in this course use the basic sciences, mathematics, and the engineering principles to analyze well logs for reservoir characterization. This course contributes to the Program Professional Component by providing a connection of the basic sciences, mathematics and engineering principles from previous courses with the process of engineering design preparing the student for the engineering practice in the area of reservoir characterization.

### Person Responsible for Course Syllabus

This syllabus was prepared by Philip Schenewerk, 12/27/2007.

### Spring 2008 Information

*Instructor:* Dr. Philip Schenewerk,  
e-mail: philip-schenewerk @utulsa.edu

*Class Hours:* Monday 5:30 - 8:00 at KEP - M 4

*Office Hours:* Before and after class or by appointment

*Grading:* There will be a mid-term and final exam in this course. The mid-term will be on March 10, 2008 and will cover the course material through March 3, 2008. The nature of the course material necessitates that the final exam be comprehensive and it will be given on the date and time determined by the University calendar, May 5, 2008. In addition, there will be weekly quizzes at the start of class and a series of small projects/homework over the course of the semester. You will be able to drop your lowest weekly quiz score. In the event of an excused absence for a major exam, see the policy sheet attached, an oral make-up exam will be given at the end of the next class session. Your weighted average grade will be calculated as follows: Mid Term – 30%, Final Exam – 40%, Quizzes – 20%, and Projects – 10% . .

# Petroleum Engineering 4053/6453

## Formation Evaluation

Spring Semester 2008

**Instructor:** Philip Schenewerk, Ph.D., PE  
philip-schenewerk@utulsa.edu (easiest way to get in touch with me)  
Office Phone 918.

**Texts:** *Theory, Measurement, and Interpretation of Well Logs*,  
SPE Textbook Series Vol. 4 (Second Edition), Zaki Bassiouni

**References:** *Log Interpretation Principles/Applications*, Schlumberger  
*Basic Well Log Analysis (Second Edition)*, G. Asquith and D. Krygowski  
*Guide to Petrophysical Interpretation*, D. Krygowski  
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*Log Interpretation Charts - 2004*, Baker Atlas  
*Log Interpretation Charts-2001*, Halliburton  
*Log Interpretation Charts - 2005*, Schlumberger

### Bulletin Scope

Electrical, acoustic, and radioactive properties of rocks. Introduction to well logging theory and interpretation of surface and computer logs. Pre-requisites: GEOL 3153, PE 2112, 2123, PHY 2063

### Course Objectives

*The objective of the course is to give you a basic understanding of the typical tools and methods used in openhole formation evaluation. At the end of the course you should be able to read and interpret a suite of openhole logs and identify prospective zones for testing and calculate potential reserves in these zones.*

*This course will help you tie together some of the loose ends of petroleum geology and reservoir engineering and is a building block in the reservoir engineering sequence. Along the way you will have the chance to analyze open-ended problems, do some critical thinking, and begin to develop a proficiency in computerized log analysis.*

### Policies and Procedures:

There will be a mid-term and final exam in this course. The mid-term will be on March 10, 2008 and will cover the course material through March 3, 2008. The nature of the course material necessitates that the final exam be comprehensive and it will be given on the date and time determined by the University calendar, May 5, 2008. In addition, there will be weekly quizzes at the start of class and a series of small projects/homework over the course of the semester. You will be able to drop your lowest weekly quiz score. In the event of an excused absence for a major exam, see the policy sheet attached, an oral make-up exam will be given at the end of the next class session.

Your weighted average grade will be calculated as follows:

Mid Term – 30%  
Final Exam – 40%  
Quizzes – 20%  
Projects/Homework – 10%

### Spring Semester 2008 Weekly Course Outline

1. Introduction to Formation Evaluation (Chapter 1) – January 14
2. MLK Holiday
3. Borehole Environment (Chapter 4) – January 28
4. Resistivity Logs (Chapter 5) – February 4
5. Lithology Logs (Chapter 6 and 7) – February 11
6. Density Logs (Chapter 2 and 8) – February 18
7. Neutron Logs (Chapter 2 and 9) – February 25
8. Acoustic Logs (Chapter 3 and 10) – March 3
9. Quiz 1 – March 10
10. Spring Break - March 17
11. Conventional Interpretation Methods (Chapter 11) – March 24
12. Reconnaissance Interpretation Methods (Chapter 12) – March 31
13. Pattern Recognition Techniques (Chapter 13) – April 7
14. Complex Lithologies (Chapter 14) and Quiz 2 – April 14
15. Shaly Sand Interpretation (Chapter 15) – April 21
16. Gas Formation Evaluation (Chapter 16) – April 28
17. Final Exam – May 5

The Mid-Term will cover the following material:

Lectures 1-8 and Chapters 1-10 in the text

The Final Exam is by nature comprehensive but will emphasize the following material:

Lectures 11 – 16 and Chapters 11-16 in the text

## **POLICY ON ACADEMIC MISCONDUCT**

The policy in this class on academic misconduct will follow that stated in:

Policies and Procedures Relating to Academic Misconduct in the College of Engineering and Applied Sciences.

Any action by the instructor on a specific instance of alleged academic misconduct can be appealed by the student involved to the Review Board for Cases of Academic Misconduct if he/she so desires.

Any student detected cheating on an examination will receive a grade of zero on the examination for the first offense and a grade of F will be given for the course if there is a second offense. If another student is involved in the offense knowingly, he will receive the same penalty.

Any student detected copying homework, or allowing his or her homework to be copied, will receive a zero grade for that homework. Repeated offenses will result in an F grade in the course.

In the event that the instructor awards an F grade in the course because of academic misconduct, he will so notify the Review Board and will recommend to them that if the student has been involved in similar cases that the student be dismissed from the University.

## **POLICY ON ABSENCES**

Although attendance is not required, it is clear that attendance is desirable because a good deal of the factual information conveyed (which may be covered in the exams) is passed on in class. Furthermore, class discussion of regularly assigned homework enhances a student's understanding. In case of a final grade that is borderline, attendance will be considered as a deciding factor.

Absence at examination time is excusable only in case of illness of the student or a similar emergency. A written doctor's statement is necessary in case of an illness that requires makeup of an exam. An unexcused absence from an exam will result in a zero grade on that exam.