اعتماد
NCAAA

T4

2020

Course Specifications

Course Title:	Geophysical Well Logging
Course Code:	GPH 410
Program:	B.Sc. in Geophysics
Department:	Geology and Geophysics
College:	College of Science
Institution:	King Saud University

Table of Contents

A. Course Identification

1. Credit hours:	**3 (2 + 0 + 2)**

2. Course type

a.	University	☐	College	☐	Department	**X**	Others ☐
b.		Required	**X**	Elective	☐		

3. Level/year at which this course is offered: **7th level or 8th level / Fourth Year**

4. Pre-requisites for this course (if any)**: GPH 201**

5. Co-requisites for this course (if any)**: NA**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	**4**	**100%**
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	**30**
2	**Laboratory/Studio**	**30**
3	**Tutorial**	
4	**Others** (specify)	
	Total	**60**

B. Course Objectives and Learning Outcomes

1. Course Description

Usage of geophysical well logging - Physical properties of the rocks and its relation to the reservoir formation evaluation -Operating principals of the different types of geophysical well logging tools such as, electrical logging including self-potential logging, resistivity logging using normal types, lateral, focused laterolog and spherical as well as induction logging. Natural and induced radioactivity logging, density logging (gama--gama) and Neutron logging. Seismic logging. Interpretation of the different types of geophysical logs. Case Studies. (Field work - Two days).

2. Course Main Objective

• Providing a foundation of knowledge which can be built upon later in the field of open hole logging.
• Acquisition of knowledge for the properties of rocks using petro-physical techniques.
• To develop the students' understanding of the basic knowledge of well logging techniques such as electric, radioactive, and acoustical.
• To develop the students' understanding of the well logging interpretation.
• To develop the students' appreciation of the well logging as an exploration technique for oil and groundwater supported by theory as an interpretive and predictive tool.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	**Recognize the knowledge of petro-physical properties of rocks for formation evaluation.**	**1.1**
1.2	**Describe the physics behind well logging techniques.**	**1.2**
1.3	**Know the basic principles of geophysical well logging interpretation**	**1.2**
1...		
2	**Skills :**	
2.1	**Apply the well logging interpretation methods.**	**2.1**
2.2	**Classify and contrast the different methods of geophysical well logging**	**2.2**
2.3		
2...		
3	**Values:**	
3.1	**Work homogeneously and efficiently in group with good time management.**	**3.1**
3.2	**Good presentation skills.**	**4.1**
3.3		
3...		

C. Course Content

No	List of Topics	Contact Hours
1	Basic Relationships of well log interpretation	2
2	Invasion and resistivity profiles	2
3	Basic information needed in log interpretation for formation evaluation	2
4	The spontaneous potential log	2
5	Resistivity logs (Normal traditional logs, Induction electric log, Dual Induction Focused log, Laterolog, Microlog, Microlaterolog).	6
6	Porosity logs (Natural Gamma log, Density log, Neutron logs).	4
7	Sonic log	2
8	Field Trip (11th week)	
9	Other well logging types (Caliper logging, Television logging, Fluid-Velocity logging)	2
10	Log Interpretation	6
11	Case Studies	2
...		
Total		

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Recognize the knowledge of petro-physical properties of rocks for formation evaluation.	- Lectures - Discussions	- Quizzes - Home works - Mid-Term Exam - Final Exam
1.2	Describe the physics behind well logging techniques.	- Lectures - Discussions	
1.3	Know the basic principles of geophysical well logging interpretation	- Lectures - Discussions	
2.0	**Skills**		
2.1	Apply the well logging interpretation methods.	- Practical labs - Discussions - Research	- Mid Term & Final Practical examinations - Report on Research work assignment
2.2	Classify and contrast the different methods of geophysical well logging	- Practical labs - Discussions - Research	

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
…			
3.0	**Values**		
3.1	Work homogeneously and efficiently in group with good time management.	- Research work - Assignments	- Timely-submission of the research work and assignments
3.2	Good presentation skills.	- presentations	Design and deliver a presentation.
…			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Homework 1	3	1%
2	Homework 2	5	1%
3	First Mid-term exam	6	10%
4	Homework 3	8	1%
5	Homework 4	10	1%
6	Second Mid-term exam	12	10%
7	Presentation and Oral exam	14	6%
8	Practical exam	15	30%
9	Final exam	16	40%

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

The Academic Faculty is available in his office for 4 hrs/week for consultation and academic advice to students. The Office Hours timings are pre-notified at the beginning of the Semester.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	- Ellis, D., Singer, J., 2007, Well Logging for Earth Scientists, Springer. - Toby Darling , 2005, Well Logging and Formation Evaluation (Gulf Drilling Guides)
Essential References Materials	- SCHLUMBERGER, 2009, Log Interpretation Charts, 225 Schlumberger Drive Sugar Land, Texas 77478
Electronic Materials	http://petrowiki.org/Borehole_imaging http://pages.geo.wvu.edu/~tcarr/pttc/schlumberger_chartbook.pdf https://www.acronymfinder.com/Society-of-Professional-Well-Log-Analysts-(now-Society-of-Petrophysicists-and-Well-Log-Analysts)-(SPWLA).html

Other Learning Materials	**Petrel Software From Schlumberger or equivalent**

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	**- Classroom having seating capacity for about 20 students,** **- Classroom must have a board, overhead projector, computer and internet connection.**
Technology Resources (AV, data show, Smart Board, software, etc.)	**- laboratory with at least 20 places equipped with PCs** **- One PC connected to Data show in the lecture room**
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	**- Software for computational-practice on Log Interpretation by students,** **Petrel Software from Schlumberger** **- Typical Logs and their interpretations -- demonstrating oil-field case studies**

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of Teaching and assessment	Students	Indirect - Student course evaluation at the conclusion of the course
Extent of achievement of course learning outcomes	Faculty	Direct Calculating of the successes percentage for each student in each learning outcome of the course from the exams results
Quality of learning resources	Students	Indirect - Student course evaluation at the conclusion of the course

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	