

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION: Well logging 2023/2024

This course includes an introduction to palpation, the basics of palpation, and rock specifications for wells on which well palpation operations take place, in addition to the petrophysical properties of rocks. The borehole represents the SPLog readings, the normal resistance probe readings, and the Induction Log. The course also includes Lateral Log, Macro Resistivity Log, as well as teaching students to Sonic log readings and extracting the initial porosity values from this probe, Density Log and Neutron log. Which from their sum we extract the total porosity and then teach the student how to extract the secondary porosity. The course also includes the readings of the depth well temperature probe (TDT) and the cement bond probe (CBL Log), as well as teaching the student how to extract hydrocarbon saturation (H_w) and water saturation (S_w) and then determine the depths of the oil column to be tracked by software to calculate the stored oil (Oil in Place).

1. Teaching Institution	Al-Ayen University
2. University Department/Centre	College of Petroleum Engineering
3. Course title/code	Well logging
4. Modes of Attendance offered	Online, classrooms and Tutorial
5. Semester/Year	Academic year 2023/2024
6. Number of hours tuition (total)	48 Theoretical hours+24 Tutorial
7. Date of production/revision of this specification	4/11/2023

8. Aims of the Course

1. Learn the interpretation of lithospheric layers and petrophysical characteristics.
2. Teaching the student to identify oil and gas reservoirs and the contact levels of oil, water, and oil and gas.
3. Learn to interpret the CBL and CCL.
and apply Ergi equations.
- 4- Learn how to find oil and water saturation

9. Learning Outcomes, Teaching, Learning and Assessment Methods

A- Cognitive goals.

A1- Apply the equations for finding oil saturation to determine the oil column and the areas of contact with water..

A2- Applying the equations to find the volume of the shale through instantaneous potential difference and gamma ray values for the purpose of determining the most productive areas.

B - Skills objectives of the course.

B1 - Learn to use the electrical resistance readings to know the oil evidence and determine the oil areas in the reservoir..

B2 - Application of sensory readings for the purpose of using them in Techlog programs and Inractive Petrphysics (IP).

Teaching and Learning Methods

- Lectures
- Discussions, dialogues and questions.
- Group tasks.

Assessment methods

- Quizzes
- Monthly exams
- Homework
- Evaluation of the performance in the laboratory.
- Final exam

C. Affective and value goals

C1. Academic honesty in duties and not use cheating.

C2. Get knowledge about the latest technologies.

Teaching and Learning Methods

- Lectures
- Discussions, dialogues and questions.
- Group tasks.

Assessment methods

- Quizzes
- Monthly exams
- Homework
- Evaluation of the performance in the laboratory.
- Final exam

D. General and rehabilitative transferred skills (other skills relevant to employability and personal development)
 D1. Encouraging teamwork and self-confidence to accomplish tasks better.
 D2. Encouraging creativity, innovation, and modernization.

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	2 theoretical+ 1 Tutorial	An explanation of the main types of geological and geophysical Logging.	An introduction	Theoretical lecture & Tutorial computer lab applications	Quizzes, monthly exams, homework, evaluation of the performance in the laboratory, and final exam.
2	2 theoretical+ 1 Tutorial	Lithological and petrophysical characteristics of rocks, which include rock type, density, porosity and permeability.	Petrophysical properties	Theoretical lecture & computer lab applications	Quizzes, monthly exams, homework, evaluation of the performance in the laboratory, and final exam.
3	2 theoretical+ 1 Tutorial	Porosity and permeability calculations for rocks	petro physical calculations	Theoretical lecture & tutorial	Quizzes, monthly exams, homework, evaluation of the performance in the laboratory, and final exam.
4	2 theoretical + 1 Tutorial	Principles of spontaneous potential of beds in wells.	Spontaneous potential log.	Theoretical lecture & Tutorial	Quizzes, monthly exams, homework, evaluation of the performance in the laboratory, and final exam.
5	2 theoretical + 1 Tutorial	How to use the spontaneous potential log(splog) to determine the permeable and low permeable areas.	Spontaneous potential log(Splog).	Theoretical lecture & Tutorial	Quizzes, monthly exams, homework, evaluation of the performance in the laboratory, and final exam.
6	2 theoretical + 1 Tutorial	Calculating the volume of shale using the equations for the spontaneous potential difference	V-shale calculation from sp log	Theoretical lecture & Tutorial	Quizzes, monthly exams, homework, evaluation of the performance in the laboratory, and final exam.
7	2 theoretical + 1 Tutorial	Basic principles of electrical Resistivity log calculations.	Conventional Resistivity Log	Theoretical lecture & Tutorial	Quizzes, monthly exams, homework, evaluation of the performance in the laboratory, and final exam.
8	2 theoretical	Principles of the work of the induction and	Induction log .	Theoretical lecture &	Quizzes, monthly exams, homework, evaluation of the

	+ 1 Tutorial	conductivity of Rocks by means measurement of conductivity of rocks by means of the induction log .		Tutorial	performance in the laboratory, and final exam.
9	2 theoretical + 1 Tutorial	Types of induction logs, their working principles, and how to measure.	Induction Logs	Theoretical lecture & Tutorial	Quizzes, monthly exams, homework, evaluation of the performance in the laboratory, and final exam.
10	2 theoretical + I Tutorial	The results extracted from the induction logs.	Induction Electrical Log	Theoretical lecture & Tutorial	Quizzes, monthly exams, homework, evaluation of the performance in the laboratory, and final exam.
11	2 theoretical + I Tutorial	Working principles and outputs of lateral induction log.	Lateral induction log.	Theoretical lecture & Tutorial	Quizzes, monthly exams, homework, evaluation of the performance in the laboratory, and final exam.
12	2 theoretical + I Tutorial	Scale comparing lateral induction log with an induction log.	Lateral induction Log	Theoretical lecture & Tutorial	Quizzes, monthly exams, homework, evaluation of the performance in the laboratory, and final exam.
13	2 lecture + 1Tutorial	The basics of the work of the accurate electrical resistivity log	Micro log	Theoretical lecture & tutorial	Quizzes, monthly exams, homework, evaluation of the performance in the laboratory, and final exam.
14	2 lecture + 1Tutorial	The method of readings of the flashed zone resistance and the real uninvaded resistance.	Simple 1D Linear Flow with Sources/Sinks (part 1)	Theoretical lecture & Tutorial	Quizzes, monthly exams, homework, evaluation of the performance in the laboratory, and final exam.
15	2 lecture + 1Tutorial	The basics of the principle of the work of the acoustic log and the calculation of the velocity of sound waves for each configuration	Sonic log	Theoretical lecture & Tutorial	Quizzes, monthly exams, homework, evaluation of the performance in the laboratory, and final exam.
16	2 lecture + 1Tutorial	Calculation of the primary porosity of the sonic log	Sonic log	Theoretical lecture & tutorial.	Quizzes, monthly exams, homework, evaluation of the performance in the laboratory, and final exam.
17	2 lecture + 1Tutorial	The basics and principle of the work of the equipment of the density log - Calculation of the	Density log	Theoretical lecture & Tutorial	Quizzes, monthly exams, homework, evaluation of the performance in the laboratory, and final exam.

		porosity of the density log.			
18	2 lecture + 2 lab	The basics of the neutron log		Theoretical lecture & computer lab applications	Quizzes, monthly exams, homework, evaluation of the performance in the laboratory, and final exam.
19	2 lecture + 1 tutorial	Finding the porosity of the neutron log, hydrocarbon effects, and the presence of shale	Neutron Log	Theoretical lecture & Tutorial	Quizzes, monthly exams, homework, evaluation of the performance in the laboratory, and final exam.
20	2 lecture + 1 tutorial	Uses of the composite log in finding stony and porosity.	Composite neutron-Density log	Theoretical lecture & Tutorial	Quizzes, monthly exams, homework, evaluation of the performance in the laboratory, and final exam.
21	2 lecture + 1 tutorial	Basics of device operation and how to read gamma ray log.	Gamma ray Log	Theoretical lecture & Tutorial	Quizzes, monthly exams, homework, evaluation of the performance in the laboratory, and final exam.
22	2 lecture + 1 Tutorial	Calculation of Shale Volume from Gamma ray Log.	Gamma ray Log.	Theoretical lecture & Tutorial	Quizzes, monthly exams, homework, evaluation of the performance in the laboratory, and final exam.
23	2 lecture + 1 Tutorial	Calculations of the thermal gradient, the cement bond, and the linkage areas between the liners	TDT temperature sensors, CBL and CCL logs	Theoretical lecture & Tutorial	Quizzes, monthly exams, homework, evaluation of the performance in the laboratory, and final exam.
24	2 lecture + 1 Tutorial	Quick methods for determining oil evidence from sensors.	Hydrocarbon Detection	Theoretical lecture & Tutorial	Quizzes, monthly exams, homework, evaluation of the performance in the laboratory, and final exam.

11. Infrastructure

1. Books Required reading:

2. Main references (sources)

A- Recommended books and references (scientific journals,

reports...)

2- Book: The Basics of Well Probing, translated by Asquith and Gibson.

3-Fundamentals of Petrophysical Well-Log Interpretation: A course-note collection with commentary Paperback
– August 6, 2012

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12. The development of the curriculum plan

Adding more technical skills by introducing more problems.

11. Infrastructure

1. Books Required reading:

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