Course Code	Course Title	ECTS Credits
OGEE-524	Well Engineering	7.5
Prerequisites	**Department**	**Semester**
OGEE-520	Engineering	Fall, Spring
Type of Course	**Field**	**Language of Instruction**
Required	Oil, Gas and Energy Engineering	English
Level of Course	**Lecturer(s)**	**Year of Study**
2nd Cycle	Dr Ernestos Sarris	1st/2nd
Mode of Delivery	**Work Placement**	**Co-requisites**
Face-to-face	N/A	None

Objectives of the Course:

The main objectives of the course are to:

- Review the basic principles of fluid flow in porous media.
- Enhance knowledge to gas flow in porous media and understand the Klingenberg effect.
- Explain the extent of the rock damage after drilling.
- Identify the implications of damage on the underestimated permeability (skin problems) of the reservoir.
- Understand the artificial lift methodology to access vertical lift performance of the wells.
- Provide solid knowledge on designing artificial lift to optimize well performance.
- Examine the gas lift method for optimizing well performance.
- Provide solid understanding of well testing methods.
- Explain the pressure transient regimes and the build-up test.
- Familiarize the students with other well testing methods (Multi-rate test).
- Examine well testing through "type curves" methodology (Ramey's curves, McKinley curves and Gringarden et al. curves).
- Complete the knowledge by examining the flow-after-flow gas wells testing.
- Provide basic understanding of the pseudo-pressure in gas well test analysis.

Learning Outcomes:

After completion of the course students are expected to be able to:

1. Distinguish the parameters that govern single and multiphase flows in porous media.
2. Discriminate between actual and damaged permeability and its importance in the prediction of the well deliverability for well testing.
3. Understand the damage mechanisms from well drilling and stress concentrations around wellbores.
4. Perform calculations for evaluation and designing vertical lift to access the performance of the wells.
5. Use knowledge to apply artificial lift to enhance well performance.

6. Identify the important parameters that govern gas lift for optimization of tube performance and well deliverability.
7. Identify the mechanisms that provide energy to lift oil from bottom-hole to surface.
8. Comprehend what are testing methods and their importance.
9. Comprehend how to sustain or enhance oil and gas production rates.
10. Identify problems that compromise oil and gas production rate prediction.
11. Obtain first-hand experience from solution of practical problems with real well data.
12. Perform calculations from transient pressure build up test data.
13. Manipulate calculations to reach estimations from data obtained from multi-rate tests.
14. Understand the importance of empirical relations in well testing (Ramey's curves, McKinley curves and Gringarden et al. curves).
15. Comprehend the flow-after-flow gas well testing.
16. Review the pseudo-pressure in gas well design.
17. Solve well production problems utilizing the decline analysis so as to predict well performance and deliverability.

Course Contents:

- The fluid flow in porous media.
- Formation damage after drilling.
- Selection of artificial lift to enhance well performance.
- Design of artificial lift to optimize well performance.
- The gas lift methodology for optimum well performance.
- Pressure build up tests for production performance prediction.
- The ideal and the actual build up tests.
- Pressure drawdown test.
- Multi-rate test.
- Production decline analysis.
- Analysis of well using type curves.
- Ramey's curves.
- McKinley curves.
- Gringarden et al. curves.
- Gas wells testing.
- Flow-after-flow tests.
- Pseudopressure in gas well test analysis.

Learning Activities and Teaching Methods:

Lectures, In-class Exercises, Quizzes, Demonstration Videos.

Assessment Methods:

Assignments, Exercises, Projects, Midterm Exams and Final Exam.

Required Textbooks / Reading:

Title	Author(s)	Publisher	Year	ISBN
Oil Well Testing Handbook	Chaudhry A.U	Elsevier, Gulf Professional Publishing	2004	0-7506-7706-6

Recomended Textbooks / Reading:

Title	Author(s)	Publisher	Year	ISBN
Petroleum Production Engineering, A computer-Assisted Approach	Guo B., W.C. Lyons and A. Ghalambor.	Elsevier, Gulf Professional Publishing	2007	978-0-7506-8270-1
Well Testing	Lee J.	SPE	1982	978-089520-317-5