



Course Syllabus

Course Code	Course Title	ECTS Credits
OGEE-360	Production Engineering	8
Prerequisites	Department	Semester
OGAS-101	Management	Fall, Spring
Type of Course	Field	Language of Instruction
Required	Oil & Gas Management	English
Level of Course	Lecturer(s)	Year of Study
1 st Cycle	Dr Constantinos Hadjistassou	2 nd /3 rd
Mode of Delivery	Work Placement	Corequisites
Face-to-face	N/A	None

Course Objectives:

The main objectives of the course are to:

- Describe what reservoir engineering & petroleum production engineering are;
- Cover some of the properties of oil formations;
- Explain the recovery from undersaturated oil reservoirs;
- Detail the principle of well productivity and flow aspects;
- Emphasise the wellbore skin effects and well production geometries;
- Present the characteristics of wellbore flow performance;
- Examine the topics of horizontal wells and well deliverability;
- Highlight the importance of water and gas coning;
- Cover the particulars of wellhead choke performance;
- Understand the complexities of flow in horizontal and vertical wells;
- Explain the role of chokes and production decline analysis;
- Present the major artificial lift methods;
- Help diagnose and tackle well problems.

Learning Outcomes:

After completion of the course students are expected to:

- Become familiar with reservoir and petroleum production engineering;
- Appreciate the complexities of rock and petroleum reservoir fluid properties;
- Understand production from undersaturated oil formations;

- Comprehend the principles well productivity and oil flow production geometries;
- Appreciate the issue of skin effects near wellbores;
- Recognize the importance of horizontal wells related to hydrocarbon production;
- Familiarise with the elements of reservoir flow performance;
- Be able to perform basic calculations pertaining to tubing deliverability;
- Recognize and conduct calculations pertaining to water and gas coning;
- Predict well flow regimes and tell distinction between flow regimes;
- Comprehend the characteristics of wellhead choke performance;
- Recognise the significance of production decline analysis;
- Become accustomed to the important artificial lift techniques;
- Identify and suggest remedial approaches to various well issues.

Course Content:

- Principles of reservoir engineering and petroleum production engineering;
- Rock porosity, permeability, fluid saturation, reservoir characterization, rock facies, reservoir mapping, volumetrics, reserves estimation;
- Architecture of petroleum reservoirs and drive mechanisms;
- Hydrocarbon column, reservoir extent, porosity-permeability correlations;
- Pool boundaries, reservoir discontinuities, net and gross pay, uncertainties;
- Changes in volume of water, oil, gas and well productivity index;
- Horizontal well production; steady and pseudo-steady state flow;
- Radial and other drainage production geometries of wells, formation skin effects;
- Inflow performance relationship, Standing's methodology, tight reservoirs;
- Wellbore (tubing) performance, optimal production rate;
- Velocity profiles, pressure drop and drive mechanisms;
- Predicting water and gas coning, water production and injection;
- Nodal analysis, deliverability of vertical and horizontal wells;
- Single and multiphase flow patterns and prediction methodologies;
- Types of wellhead chokes, production rates;
- Various artificial lift systems: electrical submersible pumps, plunger lift, subsea compression;
- Low productivity, excessive gas production and excessive water output.

Learning Activities and Teaching Methods:

Lectures, exercises, examples, exams

Assessment Methods:

Class participation, problem sheet(s), examples, exams

Required Textbooks/Readings:

Title	Author(s)	Publisher	Year	ISBN
Petroleum Production Systems, 2 nd Ed.	Economides M.J., Hill A.D., Ehlig-Economides C., Zhu D.	Prentice Hall	2012	0137031580
Introduction to Petroleum Engineering	John R Fanchi, Richard L Christiansen,	Wiley	2016	1119193443

Recommended Textbooks/Readings:

Title	Author(s)	Publisher	Year	ISBN
Principles of Applied Reservoir Simulation, 4 th ed.	Fanchi J. John	Gulf Professional Publishing	2018	9780128155639
Petroleum production engineering: A computer-assisted approach, 2 nd ed.	Guo B., Liu X., Tan X.	Gulf Professional Publishing	2017	9780128093740