



Course Code OGEE-523	Course Title Production Engineering	ECTS Credits 7.5
Prerequisites OGEE-520	Department Engineering	Semester Fall, Spring
Type of Course Required	Field Oil, Gas and Energy Engineering	Language of Instruction English
Level of Course 2 nd Cycle	Lecturer(s) Dr Ioannis Bakouros	Year of Study 1 st /2 nd
Mode of Delivery Face-to-face	Work Placement N/A	Co-requisites None

Objectives of the Course:

The main objectives of the course are to:

- Introduce the students to conventional completions.
- Explain the reservoir performance.
- Understand tubing performance.
- Provide solid knowledge of production from undersaturated oil reservoirs.
- Discuss production from two-phase reservoirs (oil-water, gas-oil).
- Complete the knowledge of production technology by examining production from natural gas reservoirs.
- Examine perforated well completions and their significance in reservoir performance.
- Provide basic understanding of reservoir stimulation.
- Interpret the methodology of matrix acidizing for overcoming skin problems.
- Present the hydraulic fracturing technique to enhance fluid flow.
- Understand unstable formations that eventually end up producing sand particles (erosion phenomena).

Learning Outcomes:

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

1. Distinguish the bottom-hole completion techniques for different types of reservoirs.
2. Discriminate between production and injection wells so as to understand optimum production/injection performance.
3. Select the types of production conduits based on their technology in order to optimize production from reservoirs.
4. Perform calculations for evaluation of well performance productivity and injectivity.
5. Identify the equipment inserted in the completion string and their purpose of usage (Jewellery).
6. Perform calculations for the reservoir performance (undersaturated, two-phase and natural gas).

7. Obtain first-hand experience from handling calculations with the Darcy fluid flow law accounting for compressibility, rate dependent skin and total skin factors.
8. Perform inflow performance evaluation (reservoir deliverability).
9. Handle intake pressure calculations and estimate the IPR (inflow performance relationship) and TCP (Tubing performance curve) for optimum estimation of production rate.
10. Understand the importance of Vogel and Fetkovich equations to estimate the reservoir performance.
11. Compute the tubing outflow performance and understand the different flow regimes in the tube.
12. Comprehend the Nodal Analysis methodology for assessment of well deliverability.
13. Solve optimum production problems utilizing the gradient curves methodology.
14. Review well construction methodologies and completion designs.
15. Discriminate between un-perforated wells and perforated wells.
16. Obtain basic knowledge of well stimulation techniques like the matrix acidizing and hydraulic fracturing to enhance production from reservoirs (permeability increase).
17. Analyze production problems from unstable formations so as to avoid unwanted solids production.

Course Contents:

- Types of well completions.
- Selection of the type of conduit.
- Conventional completions.
- Well equipment (Jewellery).
- Reservoir performance.
- IPR (inflow performance relationship).
- Tubing performance.
- Well deliverability.
- TCP (Tubing performance curve).
- Flow regimes in the tubing.
- Nodal analysis.
- Gradient curve analysis.
- Production from undersaturated reservoirs.
- Production from two-phase reservoirs.
- Production from natural gas reservoirs.
- Commingled fluids.
- Perforations.
- Reservoir stimulation.
- Hydraulic fracturing.
- Unstable formations.
- Erosion mechanisms (sand control).

Learning Activities and Teaching Methods:

Lectures, projects, in-class discussion, work in the PC Lab.

Assessment Methods:

Homework, project assignments, midterm exam, final exam.
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Required 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

Recommended Textbooks / Reading:

Title	Author(s)	Publisher	Year	ISBN
Petroleum Production Systems 2 nd edition	Economides M.J., A.D. Hill, C.E. Economides and D. Zhu.	Prentice Hall	2013	0-13-703158-0
Well completion design	Bellarby J.	Elsevier	2009	978-0-444-53210-7