Ministry of Higher Education and Scientific Research
University of Misan
College of Engineering
Department of Petroleum Engineering
Committee of Quality Assurance and Academic accreditation

Academic Program and Course Description Guide for the Bachelor's Program in Petroleum Engineering According to the Courses System for the Fourth Stages

2025-2026

Introduction:

The educational program is a well-planned set of courses that include procedures and experiences arranged in the form of an academic syllabus. Its main goal is to improve and build graduates' skills so they are ready for the job market. The program is reviewed and evaluated every year through internal or external audit procedures and programs like the External Examiner Program.

The academic program description is a short summary of the main features of the program and its courses. It shows what skills students are working to develop based on the program's goals. This description is very important because it is the main part of getting the program accredited, and it is written by the teaching staff together under the supervision of scientific committees in the scientific departments

Academic Program Description Form

University Name: University of Misan

Faculty/Institute: College of Engineering

Scientific Department: Petroleum Engineering Department

Academic or Professional Program Name: Bachelor's Petroleum Engineering

Final Certificate Name: Bachelor

Academic System: Courses system (Fourth Stage)

Description Preparation Date: 01/06/2025

File Completion Date: 01/07/2025

Signature:

Head of Department Name:

Assist. Prof. Dr. Jabbar Raheem Rashed

Date: 20/7/2025

Signature:

Scientific Associate Name:

Assist. Prof. Dr. Hassnin Abbas Hassan

Date: 23/7/2025

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Assist. Prof. Dr. Fatin Ibrahim Musa

Date: 20/7/2025

Signature:

Approval of the Dean

Prof. Dr. Abbas Oda Dawood

23/7/2025

1. Program Vision

The Department of Petroleum Engineering at the College of Engineering, University of Misan aspires to become a leading academic and research program at both the national and regional levels in the field of Petroleum Engineering. The Department is committed to delivering innovative, high-quality engineering education that aligns with international quality standards and the principles of the Bologna Process, while advancing scientific research, fostering innovation, and producing highly qualified graduates equipped with the knowledge, professional skills, and ethical values required to meet the evolving demands of the petroleum industry.

2. Program Mission

The Department of Petroleum Engineering is committed to educating highly qualified petroleum engineers with strong theoretical knowledge and practical competencies in petroleum exploration, production, and reservoir management. The Department aims to equip graduates with engineering expertise, technical skills, critical thinking, problem-solving abilities, teamwork, and effective communication skills. It promotes the application of advanced technologies, numerical modelling, simulation, and artificial intelligence in petroleum engineering while fostering innovation, professional ethics, social responsibility, and lifelong learning to support the sustainable development of the Petroleum industry.

3. Program Objectives

The Department of Petroleum Engineering aims to:

- Prepare qualified petroleum engineers with strong theoretical knowledge and practical skills in petroleum engineering.
- Develop students' technical and analytical skills through practical training, modern engineering tools, and problem-solving.

• Enhance communication, teamwork, leadership, and multidisciplinary collaboration for professional practice.

• Promote professional ethics, industrial safety, environmental responsibility, and sustainable engineering practices.

• Equip graduates with emerging technologies, including digital technologies and artificial intelligence, to meet industry needs.

• Encourage lifelong learning, research, innovation, and industry engagement to support sustainable development.

4. Program Accreditation

Does the program have program accreditation? And from which agency?

- NO

5. Other external influences

Is there a sponsor for the program?

- NO

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	4 (for all stages)	8 (Sum of 4 courses)	3.33 % (8/240)	Basic
College Requirements	8 (for all stages)	28 (Sum of 8 courses)	11.66% (28/240)	Basic
Department Requirements	50 (for all stages)	204 (Sum of 50 courses)	85% (204/240)	Basic
Summer Training	1 (1 month)	N.A	N.A	N.A

* This can include notes whether the course is basic or optional.

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
Fourth Year / Semester I	PE402	Applied Reservoir Engineering	4	
Fourth Year / Semester I	PE404	Directional Drilling Engineering	4	
Fourth Year / Semester I	PE404	Well Testing	4	
Fourth Year / Semester I	PE412	Integrated Reservoir Management	3	
Fourth Year / Semester I	PE410	Natural Gas Engineering	3	
Fourth Year / Semester I	PE408	Secondary Oil Recovery	4	
Fourth Year / Semester I	EN410	Engineering Project I	1	2
Fourth Year / Semester I	PE400	Applied Numerical Methods	3	2
Fourth Year / Semester II	PE401	Reservoir Simulation	3	2
Fourth Year / Semester II	PE411	Optimization	3	
Fourth Year / Semester II	PE405	Drilling Optimization	4	
Fourth Year / Semester II	PE413	Engineering Ethics	3	
Fourth Year / Semester II	PE407	Principals of Multiphase flow in porous media	4	
Fourth Year / Semester II	PE409	Enhanced Oil Recovery	4	
Fourth Year / Semester II	PE403	Reservoir Characterization	4	
Fourth Year / Semester II	EN411	Engineering Project II	1	2

8. Expected learning outcomes of the program	
Knowledge	
Learning Outcomes 1	Design and perform petroleum engineering measurements, laboratory experiments, and field tests by applying appropriate procedures and quality assurance practices.
Learning Outcomes 2	Analyze, interpret, and compare experimental and field data to identify trends, evaluate performance, and draw technically sound conclusions.
Learning Outcomes 3	Apply petroleum engineering principles to test, validate, and justify engineering solutions based on experimental evidence and engineering judgment.
Learning Outcomes 4	Evaluate the accuracy and reliability of measurement and testing results, recommend appropriate improvements, and defend engineering decisions using technical evidence and professional standards.
Skills	
Learning Outcomes 5	Conduct, measure, collect, analyze, interpret, evaluate, and validate experimental and field data to solve complex petroleum engineering problems using engineering judgment.
Learning Outcomes 6	Develop, design, model, simulate, optimize, and modify petroleum engineering systems, processes, and operations to meet specified technical, economic, environmental, health, safety, and sustainability requirements.
Learning Outcomes 7	Operate, use, utilize, configure, maintain, calibrate, test, and troubleshoot petroleum engineering equipment and modern engineering tools to support safe and effective engineering practice.
Learning Outcomes 8	Communicate, present, document, and report engineering information effectively to technical and non-technical audiences, and develop, adapt, and improve professional knowledge to support lifelong learning.
Ethics	
Learning Outcomes 9	Apply ethical principles, evaluate, and justify engineering decisions by considering professional responsibilities and the economic, environmental, societal, health, safety, and global impacts of petroleum engineering practice.
Learning Outcomes 10	Collaborate, communicate, coordinate, and lead multidisciplinary teams to plan, organize, manage, and implement petroleum engineering projects while making decisions, solving problems, and ensuring successful project outcomes.

Learning Outcomes 11	Practice ethically, demonstrate professionalism, show responsibility, and apply ethical principles to evaluate and justify engineering decisions in petroleum engineering practice.
Learning Outcomes 12	Collaborate, lead, coordinate, manage, plan, and monitor engineering activities, solve problems, make decisions, and improve team performance to achieve project objectives.

9. Teaching and Learning Strategies

1. Lectures.

2- Discussion.

3- Presentations and listening.

4- Encourage students to team working.

5- Encouraging students to submit reports on problem and solutions related to the curriculum.

10. Evaluation methods

- Quizzes
- Assignments
- Midterm
- lab Exam
- lab Report
- project
- Evaluation
- Final Exam

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Prof. Dr.					1	
Asst. Prof. Dr.					3	
Asst. Prof. Dr.					2	
Asst. Prof.					1	
Lecturer						2
Lecturer					7	
Lecturer					3	
Assit. Lecturer					5	
Assit. Lecturer					3	
Assit. Lecturer						5

Professional Development

Mentoring new faculty members

New college members are guided through various aspects before becoming actively involved in the educational process and being assigned theoretical courses. They are also introduced to all academic and administrative components of the department through several measures, including: highlighting the important role of university professors in guiding Petroleum Engineering students toward their future careers; emphasizing the significance of the professor's character and academic competence and their direct impact on students in all aspects; and stressing the importance of attention to even minor details and consulting senior and more experienced faculty members before making important decisions.

Professional development of faculty members

Faculty members are encouraged to engage in continuous professional development through Participation in training courses on modern teaching methods, student-centered learning, and outcome-based education. They are also encouraged to attend workshops, seminars, and scientific conferences to enhance their teaching and research capabilities. Professional growth is further supported through collaboration with experienced academic staff, active involvement in laboratory activities, and the preparation and delivery of seminars on specialized topics. These activities contribute to improving teaching effectiveness, promoting lifelong learning, and ensuring alignment with current developments in engineering education and professional practice.

12. Acceptance Criterion

(Setting regulations related to enrollment in the college or institute, whether central admission or others)

- Central admission and the registration thought the SIS system and HIPIQ.

13. The most important sources of information about the program

For comprehensive information about the Petroleum Engineering program at the Engineering College / University of Misan, the following resources are essential:

1) Department's Official Website: The Petroleum Engineering Department's homepage provides detailed insights into the department's vision, mission, objectives, academic programs, faculty profiles, and recent news.

2) Program Specification Document: The Program Specification outlines the curriculum structure, course descriptions, learning outcomes, and assessment methods, offering a clear understanding of the academic framework.

3) University's Main Website: The University of Misan-Iraq's official site offers broader information about university policies, admissions, campus facilities, and other departments, providing context to the Petroleum Engineering program within the university's ecosystem.

4) Departmental News and Events: Regular updates on departmental activities, conferences, seminars, and student achievements can be found on the department's news section, keeping stakeholders informed about ongoing developments. These resources collectively offer a thorough overview of the Petroleum Engineering program, its academic offerings, and its role within the University of Misan-Iraq.

14. Program Development Plan

The Petroleum Engineering Department at the University of Misan-Iraq has developed a comprehensive program development plan to align with its mission of educating and empowering future engineers. The key components of this plan include:

1) Curriculum Enhancement: Regular updates to the curriculum ensure alignment with international accreditation standards and industry advancements. This includes integrating sustainable design principles, renewable energy technologies, and environmental impact assessments to prepare students for contemporary challenges.

2) Faculty Development: Investing in faculty through continuous professional development programs enhances teaching methodologies and research capabilities, fostering an environment of academic excellence.

3) Research Initiatives: Encouraging faculty and students to engage in innovative research addresses real-world challenges in the oil and gas sector, promoting a culture of inquiry and problem-solving.

4) Industry Collaboration: Establishing partnerships with leading industry organizations provides students with practical exposure through internships, workshops, and collaborative projects, bridging the gap between academia and industry.

5) Community Engagement: Participating in community development initiatives and addressing local needs fosters social responsibility among students and contributes to societal wellbeing.

6) Infrastructure Development: Upgrading laboratories, classrooms, and learning resources ensures students have access to state-of-the-art facilities, enhancing the learning experience.

7) Quality Assurance: Implementing robust quality assurance mechanisms maintains high educational standards and aligns with international best practices.

This strategic plan reflects the department's commitment to producing well rounded, competent, and socially responsible engineers capable of contributing positively to the oil and gas industry and society at large.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
Fourth Year / Semester I	PE402	Applied Reservoir Engineering	Basic	0											
Fourth Year / Semester I	PE404	Directional Drilling Engineering	Basic		0								0		
Fourth Year / Semester I	PE404	Well Testing	Basic	0											
Fourth Year / Semester I	PE412	Integrated Reservoir Management	Basic	0	0			0				0	0		
Fourth Year / Semester I	PE410	Natural Gas Engineering	Basic	0											
Fourth Year / Semester I	PE408	Secondary Oil Recovery	Basic	0				0							

Fourth Year / Semester I	**EN410**	**Engineering Project I**	**Basic**	**0**	**0**								**0**		
Fourth Year / Semester I	**PE400**	**Applied Numerical Methods**	**Basic**	**0**								**0**			
Fourth Year / Semester II	**PE401**	**Reservoir Simulation**	**Basic**	**0**											
Fourth Year / Semester II	**PE411**	**Optimization**	**Basic**	**0**				**0**		**0**					
Fourth Year / Semester II	**PE405**	**Drilling Optimization**	**Basic**		**0**								**0**		
Fourth Year / Semester II	**PE413**	**Engineering Ethics**	**Basic**	**0**											
Fourth Year / Semester II	**PE407**	**Principals of Multiphase flow in porous media**	**Basic**	**0**											
Fourth Year / Semester II	**PE409**	**Enhanced Oil Recovery**	**Basic**	**0**				**0**							

Fourth Year / Semester II	**PE403**	**Reservoir Characterization**	**Basic**	**0**											
Fourth Year / Semester II	**EN411**	**Engineering Project II**	**Basic**	**0**	**0**								**0**		

- **Please tick the boxes corresponding to the individual program learning outcomes under evaluation.**

Fourth Grade – Semester one

Course Description of Module 1

1. Course Name:	
Applied Reservoir Engineering	
2. Course Code:	
PE402	
3. Semester / Year:	
4^{th} – S1	
4. Description Preparation Date:	
01/09/2025	
5. Available Attendance Forms:	
Face–to–face (Lectures)	
6. Number of Credit Hours (Total) / Number of Units (Total)	
60 Hours / 3 Units	
7. Course administrator's name (mention all, if more than one name)	
Name: Taha Mohammed Jasim Email: taha.m.j@uomisan.edu.iq	
8. Course Objectives	
Course Objectives	• Understand the fundamental principles of reservoir engineering. • Analyze reservoir rock and fluid properties. • Apply reservoir characterization techniques using geological and petrophysical data. • Evaluate reservoir performance using engineering methods. • Estimate hydrocarbon reserves and recovery efficiency. • Apply reservoir engineering concepts to field development and management.
9. Teaching and Learning Strategies	
Strategy	• Preparation and presentation of electronic lectures (PDF and PowerPoint). • Detailed explanation of course topics. • Interactive classroom discussions and student participation. • Periodic assignments, reports, and homework. • Problem-solving exercises and case studies.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week1	4		Introduction to Applied Reservoir Engineering.		
Week2	4		Fundamental concepts and introduction to depletion drive, gas cap drive, water drive, gravity drainage reservoir, combination drive reservoir,		
Week3	4		Maintenance, secondary recovery, gas reservoir, gas condensate reservoir, miscellaneous subject		
Week4	4		Oil reservoir and application of Material Balance Equation		
Week5	4		material balance equation Applications in Gas Reservoirs Quiz		
Week6	4		Single Phase Gas Reservoir		
Week7	4		Midterm Exam		
Week8	4		Gas Condensate Reservoir Material Balance Equation in Oil Reservoirs		
Week9	4		Under-saturated & Saturated Oil Reservoirs		
Week10	4		Water influx		
Week11	4		Oil Well Performance and MBE		
Week12	4		Driving Mechanisms and driving indices		
Week13	4		Final Project and Review Students work on a final project related to Applied Reservoir Engineering		
Week14	4		Review of key concepts and topics covered throughout the course. Discussion and presentation of final projects.		

Week15	4		Exam preparation and review.		

11. Course Evaluation

Quizzes	3	5% (5)
Homework	2	5% (5)
Midterm Exam	1.5 hr	20% (20)
Final Exam	3 hr	70% (50)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Craft, B. C., & Hawkins, M. F. (1991). Applied Petroleum Reservoir Engineering (2nd ed.). Prentice Hall.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	Ahmed, T. (2010). Reservoir Engineering Handbook (4th ed.). Gulf Professional Publishing.
Electronic References, Websites	

Course Description of Module 2

13. Course Name:	
Directional Drilling Engineering	
14. Course Code:	
PE404	
15. Semester / Year:	
4th – S1	
16. Description Preparation Date:	
11/09/2025	
17. Available Attendance Forms:	
Face–to–face (Lectures)	
18. Number of Credit Hours (Total) / Number of Units (Total)	
60 Hours / 3 Units	
19. Course administrator's name (mention all, if more than one name)	
Name: Montadher Ali Jabber Email: Montdher.j@uomisan.edu.iq	
20. Course Objectives	
Course Objectives	• Understand the principles of directional and horizontal drilling. • Apply well trajectory planning and directional calculations. • Analyze torque, drag, and hole cleaning problems. • Design horizontal and multilateral wells. • Identify directional drilling tools and equipment. • Evaluate wellbore trajectories to achieve drilling targets.
21. Teaching and Learning Strategies	
Strategy	• Preparation and presentation of electronic lectures (PDF and PowerPoint). • Detailed explanation of course topics. • Interactive classroom discussions and student participation. • Periodic assignments, reports, and homework. • Problem-solving exercises and case studies.

22. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
Week1	4		Introduction to Directional drilling Overview the applications of directional drilling		
Week2	4		Directional well planning Reference Systems and Coordinates Planning the well trajectory.		
Week3	4		Surveying calculations -1 Tangential method. Balance Tangential method. Average angle method.		
Week4	4		Surveying calculations-2 Radius of curvature method.		
Week5	4		Directional wells Design-1 Type-1 (build& hold)- well profile design and calculations. Quiz		
Week6	4		Directional wells Design-2 Type-2 (S-shape) well-profile design and calculations		
Week7	4		Midterm Exam		
Week8	4		Directional surveying tools Inclination surveying tools Magnetic Single shot (MSS		
Week9	4		Directional well deflection-tools-1 Down hole motors (Turbines, Positive displacement motors (PDM) whipstocks jetting action		
Week10	4		Directional well deflection tools-2 Down hole motors and bent sub Steerable positive displacement motors		

			Rotary steerable system (RSS)		
Week11	4		Bottom hole Assemble (BHA) design for directional wells Pendulum assembly Packed bottom hole assembly Rotary build assembly		
Week12	4		Horizontal and multi-lateral wells Types and applications of horizontal and multi-lateral wells Profiles of horizontal wells		
Week13	4		Well profile and Design considerations of horizontal wells Design and calculations of single-build horizontal well Design and calculations of Double-build horizontal well		
Week14	4		Torque and drag while directional drilling Calculation of Torque while rotating of bottom. Calculation of Torque while rotating on bottom.		
Week15	4		Hole cleaning considerations in deviated and horizontal wells Final Exam		

23. Course Evaluation

Quizzes	3	5% (5)
Homework	2	5% (5)
Midterm Exam	1.5 hr	20% (20)
Final Exam	3 hr	70% (50)

24. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	HORIZONTAL AND DIRECTIONAL DRILLING by Richard S. Carden and Robert D. Grace
Main references (sources)	
Recommended books and references (scientific journals, reports…)	Well engineering and construction by H. Rabia Applied drilling Engineering by Adam T. Bourgoyne
Electronic References, Websites	

Course Description of Module 3

25. Course Name:	
Natural Gas Engineering	
26. Course Code:	
PE410	
27. Semester / Year:	
4th – S1	
28. Description Preparation Date:	
10/09/2025	
29. Available Attendance Forms:	
Face–to–face (Lectures)	
30. Number of Credit Hours (Total) / Number of Units (Total)	
45 Hours / 3 Units	
31. Course administrator's name (mention all, if more than one name)	
Name: Mohammed Saed Salah Email: mymohammed79@uomisan.edu.iq	
32. Course Objectives	
Course Objectives	• Understand the principles of natural gas exploration, production, and processing. • Explain the properties and flow behavior of natural gas in reservoirs and pipelines. • Apply engineering methods to gas treatment, transportation, and field development. • Evaluate natural gas operations for efficient, safe, and sustainable resource management.
33. Teaching and Learning Strategies	
Strategy	• Delivering interactive lectures supported by electronic learning materials, including PDF notes and PowerPoint presentations. • Providing detailed explanations of theoretical concepts with practical engineering examples. • Assigning regular homework, reports, and in-class exercises to reinforce learning and assess students' understanding. • Encouraging active student participation through classroom discussions, questions, and problem-solving activities.

34. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week1	3		Introduction: What is Natural gas Reservoir Utilization of natural gas		
Week2	3		Natural gas industry Natural gas resources.		
Week3	3		Properties of natural gas I		
Week4	3		Properties of natural gas II		
Week5	3		Natural gas composition and phase behavior Quiz		
Week6	3		Natural gas exploration , Drilling and well completion		
Week7	3		Midterm Exam		
Week8	3		Natural gas well deliverability		
Week9	3		Natural gas production: Darcy and Non-Darcy flow in porous media		
Week10	3		Natural gas deliverability. Quiz.		
Week11	3		Natural Gas Processing: Separation of gas liquids, Dehydration		
Week12	3		Natural gas Sweeting-Acid gases removal testing.		
Week13	3		Natural gas transportation: pipelines and compressed natural gas.		
Week14	3		Liquefied natural gas (LNG).		
Week15	3		Natural gas supply, Alternative energy source, and the environment. Exam Preparation		

35. Course Evaluation

Quizzes	3	5% (5)
Assignments	2	5% (5)
Midterm Exam	1.5 hr	20% (20)
Final Exam	3 hr	70% (50)

36. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Xiuli Wang and Michael Economides, Advanced Natural Gas Engineering, Copyright © 2009 by Gulf Publishing Company, Houston, Texas. n
Main references (sources)	
Recommended books and references (scientific journals, reports…)	H. Dale Beggs-Gas Production Operations -Oil & Gas Consultants International (2002)..
Electronic References, Websites	

Course Description of Module 4

37. Course Name:	
Applied Numerical Methods	
38. Course Code:	
PE400	
39. Semester / Year:	
4th – S1	
40. Description Preparation Date:	
11/09/2025	
41. Available Attendance Forms:	
Face–to–face (Lectures)	
42. Number of Credit Hours (Total) / Number of Units (Total)	
75 Hours / 3 Units	
43. Course administrator's name (mention all, if more than one name)	
Name: Ali Nooruldeen Abd al-kareem Email: ali.nooruldeen@uomisan.edu.iq	
44. Course Objectives	
Course Objectives	• Understand the principles of applied numerical methods in petroleum engineering. • Apply numerical techniques to solve engineering and reservoir problems. • Develop numerical models using MATLAB or Python. • Analyze and interpret numerical simulation results for engineering decision-making. • Enhance problem-solving skills through practical petroleum engineering applications.
45. Teaching and Learning Strategies	
Strategy	• Preparation and presentation of electronic lectures (PDF and PowerPoint). • Detailed explanation of course topics. • Interactive classroom discussions and student participation. • Periodic assignments, reports, and homework. • Problem-solving exercises and case studies.

46. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week1	5		Introduction to Interpolation, (Linear, Lagrange),		
Week2	5		Matrices, Review of matrix properties, Determinates, inverse of matrix,		
Week3	5		solution of system of linear equations (Gaussian elimination, Gauss • Jordan method, Jacobi method, Gauss Seidel method),		
Week4	4		least Square method (linear equations, polynomial equations)		
Week5	4		Reservoir simulation (Introduction, types of simulators) flow through .Quiz		
Week6	4		porous media (derivation of single phase, one-dimensional flow equation,		
Week7	4		Midterm Exam		
Week8	4		The Flow Equations: single phase •The single phase pressure equation •Extension of Single Phase Pressure Equation to 2D & 3D		
Week9	4		The Flow Equations: two phase flow •The two-phase flow equations •Review of Two-Phase Flow Concepts •Derivation of the Two-Phase Conservation Equations.		
Week10	4		Numerical Methods in Reservoir Simulation •Introduction		

			•Review of finite differences •Application of finite differences to partial differential equations (PDEs)		
Week11	4		Numerical Methods: Explicit and Implicit Finite Difference Approximation •Explicit Finite Difference Approximation of the Linear Pressure Equation •Implicit Finite Difference Approximation of the Linear Pressure Equation		
Week12	4		Numerical Methods: Implicit Finite Difference in 2D models •Implicit Finite Difference Approximation of the 2D Pressure Equation •Discretisation of the 2D Pressure Equation •Numbering Schemes in Solving the 2D Pressure Equation		
Week13	4		Numerical Methods: Matrix principles •Definitions of matrices •Determinant of Matrix •Cofactor of matrix •Transpose of Matrix		
Week14	4		Numerical Methods: Matrix solutions •Solving systems of linear equations •Direct Methods: Gaussian Elimination and Gauss Jorden •Iterative Methods: Jacobi iteration and Gauss Seidel		
Week15	4		Final Exam		

47. Course Evaluation

Quizzes	2	5% (5)
Homework	2	5% (5)
Labs		10% (10)
Midterm Exam	1.5 hr	20% (20)
Final Exam	3 hr	60% (60)

48. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Chapra, S. C., & Canale, R. P. (2015). Numerical Methods for Engineers (7th ed.). McGraw-Hill Education.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	Ahmed, T. (2010). Reservoir Engineering Handbook (4th ed.). Gulf Professional Publishing.
Electronic References, Websites	

Course Description of Module 5

49. Course Name:	
Integrated Reservoir Management	
50. Course Code:	
PE412	
51. Semester / Year:	
4th – S1	
52. Description Preparation Date:	
01/09/2025	
53.Available Attendance Forms:	
Face–to–face (Lectures and Laboratory)	
54.Number of Credit Hours (Total) / Number of Units (Total)	
45 Hours / 1 Units	
55. Course administrator's name (mention all, if more than one name)	
Name: Ali Nooruldeen Abd al-kareem Email: ali.nooruldeen@uomisan.edu.iq	
56. Course Objectives	
Course Objectives	• Understand the fundamentals of reservoir management. • Develop reservoir models using simulation software. • Analyze reservoir performance under different production scenarios. • Interpret simulation results to support reservoir management. • Apply simulation techniques to optimize hydrocarbon recover
57. Teaching and Learning Strategies	
Strategy	• The teacher prepares lectures on the subject in electronic (pdf (and PowerPoint) format and presents them to the students. • The teacher delivers lectures in detail. • The teacher requests periodic reports, homework, and questions to be answered immediately to ensure students' interaction within the classroom regarding the basic topics of the subject.

	• Lab works weekly to implement project

58. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week1	3		Introduction to Reservoir management		
Week2	3		Permeability up-scaling of Single-phase flow		
Week3	3		Permeability up-scaling of Single-phase flow II		
Week4	3		Permeability up-scaling of Two-phase flow		
Week5	3		Permeability up-scaling of Two-phase flow: Dynamic Methods		
Week6	3		Additional Topics of up-scaling		
Week7	3		Geopseudo up-scaling Method		
Week8	3		Geostatistics principles for Simulation		
Week9	3		Geostatistics principles for Simulation II		
Week10	3		Modelling single-phase flow at the pore-scale - a brief overview		
Week11	3		Modelling multiphase flow at the pore-scale		
Week12	3		Empirical and theoretical approaches to generating petrophysical properties for reservoir simulation		
Week13	3		Wettability - concepts and applications		
Week14	3		Closing remarks for reservoir case study		
Week15	3		Final Project and Exam Preparation		

59. Course Evaluation

Quizzes	2	5% (5)
Assignments	2	5% (5)
Projects		30% (30)
Midterm Exam	1.5 hr	20% (20)
Final Exam	3 hr	40% (50)

60. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education
Main references (sources)	
Recommended books and references (scientific journals, reports…)	DC Electrical Circuit Analysis: A Practi Approach Copyright Year: 2020, dissidents
Electronic References, Websites	

Course Description of Module 6

61. Course Name:	
Secondary Oil Recovery	
62. Course Code:	
PE408	
63. Semester / Year:	
4th – S1	
64. Description Preparation Date:	
05/09/2025	
65. Available Attendance Forms:	
Face–to–face (Lectures)	
66. Number of Credit Hours (Total) / Number of Units (Total)	
60 Hours / 3 Units	
67. Course administrator's name (mention all, if more than one name)	
Name: Zahir Khalid Chaloob Email: ZaherPetro@uomisan.edu.iq	
68. Course Objectives	
Course Objectives	• Understand the principles and mechanisms of secondary oil recovery methods. • Evaluate water flooding and gas injection techniques for improving oil recovery. • Analyze reservoir performance during secondary recovery operations. • Apply secondary recovery concepts to optimize reservoir management and hydrocarbon production.
69. Teaching and Learning Strategies	
Strategy	• Electronic Lectures: Preparing and presenting PDF and PowerPoint lectures. • Detailed Explanation: Providing clear explanations of well testing concepts and applications. • Interactive Learning: Encouraging discussions and student participation. • Assignments and Reports: Assigning homework and reports to enhance understanding.

70. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
Week1	4		Introduction to Reservoir rock properties Main reservoir rock properties Geological classification of porosity, Methods used for measuring porosity		
Week2	4		Introduction to Secondary oil recovery methods Oil Recovery Stages, Selection the Best EOR Methods (Screening Criteria).		
Week3	4		Water Flooding Candidate for water flooding, Advantage and dis advantage of water flooding.		
Week4	4		Buckley and Leverett Theory Overall recovery efficiency (Displacement, vertical and areal sweep efficacies). Fractional flow equation (Derivation, applications and examples).		
Week5	4		Factors effecting on fractional flow curve Effect of Water and Oil Viscosities, effect of Dip Angle and Injection Rate .Quiz		
Week6	4		Frontal Advance Equation •Derivation of distance vs time relationship. •Water saturation profile during water flooding.		
Week7	4		Oil Recovery Calculations Data preparation Midterm Exam		
Week8	4		Reservoir Heterogeneity Dykstra-Parson's method •Vertical Heterogeneity		

			•Dykstra-Parson's permeability variation V (Tutorial example).		
Week9	4		Methods of predicting recovery performance for layered reservoirs. •Simplified Dykstra–Parsons Method •Modified Dykstra–Parsons Method		
Week10	4		Calculation Vertical Sweep Efficiency. •Vertical Sweep Efficiency (Stiles' Method) •Vertical Sweep Efficiency (The Dykstra-Parsons Method) •Quiz.		
Week11	4		Calculation Areal Sweep Efficiency •Factors affecting Areal Sweep Efficiency. •Areal Sweep Efficiency (Before, At and After Breakthrough). •Fluid Injectivity		
Week12	4		Selection of flooding patterns •Irregular Injection Patterns and Regular injection patterns		
Week13	4		Peripheral injection patterns and Crestal and basal injection patterns		
Week14	4		Gas Injection The Displacement of Oil by Gas, with Gravitational Segregation •The Displacement of Oil by Gas, without Gravitational Segregation		
Week15	4		Final Exam		

71. Course Evaluation

Quizzes	2	5% (5)
Report	2	5% (5)
Midterm Exam	1.5 hr	20% (20)
Final Exam	3 hr	70% (50)

72. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Tarek Ahmed PhD PE - Reservoir Engineering Handbook, Third Edition (2006, Gulf Professional Publishing.
Main references (sources)	Lake, L.W., 1989. Enhanced oil recovery.
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	https://petrowiki.spe.org

Course Description of Module 7

73. Course Name:	
Well Test	
74. Course Code:	
PE406	
75. Semester / Year:	
4th – S1	
76. Description Preparation Date:	
09/09/2025	
77. Available Attendance Forms:	
Face–to–face (Lectures)	
78. Number of Credit Hours (Total) / Number of Units (Total)	
60 Hours / 3 Units	
79. Course administrator's name (mention all, if more than one name)	
Name: Mohammed Abdul Ameer Email: Dr.alhumairi@uomisan.edu.iq	
80. Course Objectives	
Course Objectives	• Understand the principles of well testing and oil production systems. • Interpret well test data to evaluate reservoir and well performance. • Apply production engineering techniques to optimize oil well productivity. • Evaluate production operations using safe and efficient engineering practices.
81. Teaching and Learning Strategies	
Strategy	• Electronic Lectures: Preparing and presenting PDF and PowerPoint lectures. • Detailed Explanation: Providing clear explanations of well testing concepts and applications. • Interactive Learning: Encouraging discussions and student participation. • Assignments and Reports: Assigning homework and reports to enhance understanding.
82. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week1	4		Introduction to Well Testing Overview of well testing objectives and applications		
Week2	4		Reservoir properties affecting well test analysis Wellbore storage effects and correction methods.		
Week3	4		Well Test Design and Planning Role of Oil Well Tests and Information in Petroleum Industry		
Week4	4		History of Oil Well Testing and Uses of Oil Well Tests		
Week5	4		Well Test Execution Procedures for conducting well tests Quiz		
Week6	4		Pressure Transient Analysis Pressure transient behavior and analysis techniques Pressure buildup and drawdown tests		
Week7	4		Midterm Exam		
Week8	4		Exercise to constructing well test (build up test) Pressure Drawdown Testing		
Week9	4		Exercise to constructing drawdown test.		
Week10	4		Multi -rate and Multilayer Well Test Analysis Analysis techniques for multi-rate and multilayer reservoirs Quiz.		
Week11	4		Two phase flow through pipes (different methods)		
Week12	4		Two phase flow exercise and application different methods		

Week13	4		Water cut calculation and control the well production. Original and Average Reservoir Pressure Estimation Methods		
Week14	4		Final Project and Exam Preparation Completion of a well test project Exam preparation and review		
Week15	4		Final Exam		

83. Course Evaluation

Quizzes	3	5% (5)
Assignments	2	5% (5)
Midterm Exam	1.5 hr	20% (20)
Final Exam	3 hr	70% (50)

84. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Well Testing" by John Lee, John Rollins, and John Spivey
Main references (sources)	Well Test Analysis" by Roland Horne
Recommended books and references (scientific journals, reports…)	Well engineering and construction by H. Rabia Applied drilling Engineering by Adam T. Bourgoyne
Electronic References, Websites	

Course Description of Module 8

85. Course Name:	
Engineering Project–I	
86. Course Code:	
EN410	
87. Semester / Year:	
4th – S1	
88. Description Preparation Date:	
05/09/2025	
89. Available Attendance Forms:	
Face–to–face (Lectures, Laboratory and Field Visits)	
90. Number of Credit Hours (Total) / Number of Units (Total)	
45 Hours / 3 Units	
91. Course administrator's name (mention all, if more than one name)	
Name: Multi-Teachers Email:	
92. Course Objectives	
Course Objectives	• Apply petroleum engineering principles to solve real-world engineering problems through an individual or team-based project. • Develop project planning and management skills, including scheduling, resource allocation, and project execution. • Design and evaluate engineering solutions by considering technical, economic, safety, and environmental factors. • Strengthen analytical, critical thinking, and problem-solving skills using appropriate engineering methods and software tools. • Enhance teamwork, leadership, communication, and technical reporting skills through collaborative project work. • Promote professional ethics, lifelong learning, and independent research in petroleum engineering practice.
93. Teaching and Learning Strategies	
Strategy	• Project supervision and regular meetings to provide academic guidance, monitor progress, and discuss technical challenges. • Independent research and project-based learning through literature review, engineering analysis, design, and problem-solving. • Student presentations and technical report writing to develop communication skills and present project outcomes effectively.

94. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week1	3		Introduction to Engineering Projects		
Week2	3		Project Planning and Initiation		
Week3	3		Project Organization and Team Formation		
Week4	3		Project Risk Management		
Week5	3		Project Scheduling and Resource Management		
Week6	3		Project Cost Estimation and Budgeting		
Week7	3		Project Quality Management		
Week8	3		Project Execution and Monitoring		
Week9	3		Project Communication and Reporting		
Week10	3		Project Integration and Scope Management		
Week11	3		Finalizing project reports and handover procedures		
Week12	3		Project Case Studies and Presentations: •Analyzing and discussing real-world engineering project case studies		
Week13	3		Project Case Studies and Presentations: •Presenting individual or group projects to the class		
Week14	3		Project Case Studies and Presentations: •Q&A sessions and feedback on project presentations		
Week15	4		Project Case Studies and final Presentations:		

95. Course Evaluation

First Discussion 5% (5)
Supervisor evaluation 20% (20)
Final Discussion 50% (50)

96. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	A Hamdy, Operations Research an introduction, Edition, Pearson Prentice Hall, 8th, 2007.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	Introduction to Operations Research, Seventh Edition/ F.S. Hillier/G. J. Lieberman, Mc Graw-Hill.
Electronic References, Websites	

Fourth Grade – Semester Two

Course Description of Module 1

97. Course Name:	
Drilling Optimization	
98. Course Code:	
PE405	
99. Semester / Year:	
4th – S2	
100. Description Preparation Date:	
11/09/2025	
101. Available Attendance Forms:	
Face–to–face (Lectures)	
102. Number of Credit Hours (Total) / Number of Units (Total)	
60 Hours / 3 Units	
103. Course administrator's name (mention all, if more than one name)	
Name: Montadher Ali Jabber Email: Montdher.j@uomisan.edu.iq	
104. Course Objectives	
Course Objectives	• Understand the principles and objectives of drilling optimization. • Analyze drilling parameters to improve drilling performance and efficiency. • Apply optimization techniques to reduce drilling time, cost, and operational risks. • Evaluate drilling operations using modern technologies and engineering best practices.
105. Teaching and Learning Strategies	
Strategy	• Preparation and presentation of electronic lectures (PDF and PowerPoint). • Detailed explanation of course topics. • Interactive classroom discussions and student participation. • Periodic assignments, reports, and homework. • Problem-solving exercises and case studies.

106. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
Week1	4		Introduction drilling optimization Overview the importance of drilling optimization in oil and gas industry		
Week2	4		Factors affecting rate of penetration General review on factors effecting rate of penetration.		
Week3	4		Factors affecting rate of penetration according to Lummus' study Effect of rock properties on rate of penetration.		
Week4	4		Effect of drilling fluid properties on rate of Penetration		
Week5	4		Effect of drilling fluid solid content on rate of penetration. Effect of drilling fluid oil content on rate of penetration. Quiz		
Week6	4		Hydraulic Optimization Hydraulic Optimization with limited surface Pressure		
Week7	4		Midterm Exam		
Week8	4		Using Maximum Impact force as optimization criterion . Determining the turbulence index using Robinson method		
Week9	4		Hydraulic Optimization using the Modified Goins method Discussing the effect of increasing mud density on hydraulics optimization		
Week10	4		Expected value as optimization criterion		

			Introducing the concept of expected value. Determining the optimum drill pipe size.		
Week11	4		Expected value as optimization criterion Determining the optimum drill collar size. Determining the optimum mud circulation time.		
Week12	4		Mathematical drilling Models The concept of a Mathematical drilling model Steps for Developing a mathematical drilling model.		
Week13	4		Mathematical drilling models for optimizing drilling parameters Introducing the development of Galle-Woods mathematical drilling model		
Week14	4		Reviewing the recent advances in drilling optimization The concept of real-time drilling optimization. Field cases of drilling optimization		
Week15	4		Hole cleaning considerations in deviated and horizontal wells Final Exam		

107. Course Evaluation

Quizzes	1	5% (5)
Homework	1	5% (5)
Midterm Exam	1.5 hr	20% (20)
Final Exam	3 hr	70% (50)

108. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	- Applied drilling Engineering by Adam T. Bourgoyne - Drilling and well completions by Carl Gatlin
Main references (sources)	
Recommended books and references (scientific journals, reports…)	Advanced oil well drilling Engineering by Bill-J-Mitchell - Applied Drilling Engineering Optimization. -Authors: G. Robello Samuel, Jamal J. Azar,
Electronic References, Websites	

Course Description of Module 2

109. Course Name:	
Engineering Ethics	
110. Course Code:	
PE413	
111. Semester / Year:	
4th – S2	
112. Description Preparation Date:	
15/09/2025	
113. Available Attendance Forms:	
Face–to–face (Lectures)	
114. Number of Credit Hours (Total) / Number of Units (Total)	
45 Hours / 1 Units	
115. Course administrator's name (mention all, if more than one name)	
Name: Jabber Raheem Rashad Email: dr.jabar72@uomisan.edu.iq	
116. Course Objectives	
Course Objectives	• To enhance students' analytical, critical, and creative thinking skills in relation to ethical issues in engineering. • To familiarize students with classic cases in engineering ethics and typical ethical and professional issues that arise in engineering. • To train students in analyzing complex problems and finding ethical resolutions •
117. Teaching and Learning Strategies	
Strategy	• Preparation and presentation of electronic lectures (PDF and PowerPoint). • Detailed explanation of course topics. • Interactive classroom discussions and student participation. • Periodic assignments, reports, and homework. • Problem-solving exercises and case studies.

118. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week1	4		Introduction to Course Materials.		
Week2	4		The Profession of Engineering. 1		
Week3	4		The Profession of Engineering. 2		
Week4	4		Professionalism and Codes of Ethics. 1		
Week5	4		Professionalism and Codes of Ethics. 2 quiz		
Week6	4		Understanding Ethical Problems. 1		
Week7	4		Midterm Exam		
Week8	4		Understanding Ethical Problems. 2		
Week9	4		Ethical Problem-Solving Techniques. 1		
Week10	4		Ethical Problem-Solving Techniques. 2 Quiz 2		
Week11	4		Risk, Safety, and Accidents.		
Week12	4		• The Rights and Responsibilities of Engineers.1		
Week13	4		The Rights and Responsibilities of Engineers.2		
Week14	4		Ethics in Research and Experimentation.		
Week15	4		Exam preparation and review.		

119. Course Evaluation

Quizzes	2	5% (5)
Homework	2	5% (5)
Midterm Exam	1.5 hr	20% (20)
Final Exam	3 hr	70% (50)

120. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	- Charles B. Fleddermann, "Engineering Ethics", Fourth Edition,2012, Pearson Education, Inc., publishing as Prentice Hall, 1 Lake Street, Upper Saddle River, NJ 07458,USA.
Main references (sources)	-Naagarazan R.S., "A Textbook on Professional Ethics and Human Values",2006, New Age International (P) Ltd., Publishers, New Delhi, India.
Recommended books and references (scientific journals, reports…)	Charles E. Harris, Michael S. Pritchard, Michael J. Rabins, "Engineering Ethics, Concepts and Cases", Fourth Edition, 2009,Wadsworth, USA.
Electronic References, Websites	

Course Description of Module 3

121. Course Name:	
Enhanced Oil Recovery	
122. Course Code:	
PE409	
123. Semester / Year:	
4th – S2	
124. Description Preparation Date:	
05/09/2025	
125. Available Attendance Forms:	
Face–to–face (Lectures)	
126. Number of Credit Hours (Total) / Number of Units (Total)	
60 Hours / 3 Units	
127. Course administrator's name (mention all, if more than one name)	
Name: Zahir Khalid Chaloob Email: ZaherPetro@uomisan.edu.iq	
128. Course Objectives	
Course Objectives	• Understand the principles and methods of enhanced oil recovery. • Evaluate thermal, chemical, and gas injection EOR techniques. • Select appropriate EOR methods based on reservoir characteristics. • Assess the technical, economic, and environmental aspects of EOR projects.
129. Teaching and Learning Strategies	
Strategy	• Electronic Lectures: Preparing and presenting PDF and PowerPoint lectures. • Detailed Explanation: Providing clear explanations of well testing concepts and applications. • Interactive Learning: Encouraging discussions and student participation. • Assignments and Reports: Assigning homework and reports to enhance understanding.
130. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week1	4		Introduction to Enhanced Oil Recovery Oil recovery Mechanism, Definition of EOR, Goal of EOR, EOR target.		
Week2	4		Microscopic Displacement of Fluids in a Reservoir Single phase properties, two phases' properties.		
Week3	4		Macroscopic Displacement of Fluids in a Reservoir Volumetric Displacement efficiency and Mobility Ratio.		
Week4	4		Miscible Gas Injection (Part1) Introduction to T-P relationship. P-Composition relationship. Ternary Diagram and mechanisms of miscible gas injection		
Week5	4		Miscible Gas Injection (Part2) •Types of injected gas and categories of miscibility •First contact Miscibility (FCM), Multiple- contact miscibility. •Condensing and Vaporizing gas drive. .Quiz		
Week6	4		Polymer Flooding (Part1) •Polymer types, mechanisms, polymer properties. •Rheology and evaluation methods.		
Week7	4		Polymer Flooding (Part2) •Flow regimes determination. Midterm Exam		
Week8	4		Polymer flooding (Case Study) Daqing field (Polymer flooding).		

Week9	4		Chemical Flooding •Surfactant flooding, Alkaline flooding and (ASP) flooding. •Phase Behavior of Microemulsions and Phase Behavior and IFT		
Week10	4		Thermal methods •Introduction to thermal methods, Mechanisms. •Heat Losses During Steam Injection, Cyclic Steam Stimulation. •Quiz.		
Week11	4		CO2 Flooding •Introduction to CO2 flooding, mechanism of EOR •Sequestration of Carbon Dioxide •Case studies		
Week12	4		Reservoir Conformance Problems and Gel Properties •Introduction to reservoir Heterogeneity and Gel treatments •Types of Gel treatments. •Polymer -Gel systems		
Week13	4		Screaming Criteria for EOR Methods •Reservoir Simulation studies •Taber's tables. •EORgui Software for screening.		
Week14	4		Final Project and Exam Preparation •Completion of a EOR project •Exam preparation and review		
Week15	4		Final Exam		

131. Course Evaluation

Quizzes	2	5% (5)
Report	2	5% (5)
Midterm Exam	1.5 hr	20% (20)
Final Exam	3 hr	70% (50)

132. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Lake, L.W., 1989. Enhanced oil recovery.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	https://petrowiki.spe.org

Course Description of Module 4

133. Course Name:
Multiphase Flow in Porous Media
134. Course Code:
PE407
135. Semester / Year:
4th – S2
136. Description Preparation Date:
15/09/2025
137. Available Attendance Forms:
Face–to–face (Lectures)
138. Number of Credit Hours (Total) / Number of Units (Total)
60 Hours / 3 Units
139. Course administrator's name (mention all, if more than one name)
Name: Mohammed Abdul Ameer Email: Dr.alhumairi@uomisan.edu.iq
140. Course Objectives

Course Objectives	• Understand the principles of multiphase flow in porous media. • Analyze the flow behavior of oil, gas, and water in petroleum reservoirs. • Apply relative permeability and capillary pressure concepts to reservoir performance. • Evaluate multiphase flow processes for reservoir development and production optimization.
141. Teaching and Learning Strategies	
Strategy	• Preparation and presentation of electronic lectures (PDF and PowerPoint). • Detailed explanation of course topics. • Interactive classroom discussions and student participation. • Periodic assignments, reports, and homework. • Problem-solving exercises and case studies.

142. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
Week1	4		Introduction to Multiphase Flow in Porous Media Overview of well testing objectives and applications		
Week2	4		Reservoir Properties and Wellbore Storage Reservoir properties affecting Multiphase Flow in Porous Media analysis		
Week3	4		Well Test Design and Planning Test objectives and design considerations Test types and duration		
Week4	4		Well Test Equipment Introduction to Multiphase Flow in Porous Media equipment Downhole tools, surface equipment, and measurement devices		
Week5	4		Well Test Execution Procedures for conducting well tests Safety precautions and operational considerations quiz		
Week6	4		Pressure Transient Analysis Pressure transient behavior and analysis techniques Pressure buildup and drawdown tests		
Week7	4		Midterm Exam		
Week8	4		Well Test Interpretation - Numerical Methods Introduction to numerical well test interpretation Finite difference and finite element methods		
Week9	4		Well Test Interpretation - Unconventional Reservoirs		

			Well test analysis in unconventional reservoirs Challenges and considerations		
Week10	4		Multi -rate and Multilayer Well Test Analysis Analysis techniques for multi-rate and multilayer reservoirs Interpretation challenges and solutions.		
Week11	4		Well Test Analysis in Fractured Reservoirs Well test analysis in fractured reservoirs Dual porosity and dual permeability models		
Week12	4		Well Test Analysis in Naturally Fractured Reservoirs Well test analysis in naturally fractured reservoirs Fracture matrix interaction models		
Week13	4		Well Test Analysis in Gas Reservoirs Analysis techniques for gas reservoirs Deliverability and deliverability testing. Report Due.		
Week14	4		Well Test Analysis Case Studies Review and analysis of real-world well test data Interpretation challenges and solutions		
Week15	4		Exam preparation and review.		

143. Course Evaluation

Quizzes	2	5% (5)
Homework	2	5% (5)
Midterm Exam	1.5 hr	20% (20)
Final Exam	3 hr	70% (50)

144. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education
Main references (sources)	
Recommended books and references (scientific journals, reports…)	DC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2020, dissidents.
Electronic References, Websites	

Course Description of Module 5

145. Course Name:	
Optimization	
146. Course Code:	
PE411	
147. Semester / Year:	
4^{th} – S2	
148. Description Preparation Date:	
10/09/2025	
149. Available Attendance Forms:	
Face–to–face (Lectures)	
150. Number of Credit Hours (Total) / Number of Units (Total)	
45 Hours / 3 Units	
151. Course administrator's name (mention all, if more than one name)	
Name: Mohammed Saed Salah Email: mymohammed79@uomisan.edu.iq	
152. Course Objectives	
Course Objectives	• To introduce students to the concept and importance of optimization. • To provide an understanding of the applications of optimization in various fields. • To develop knowledge and skills in linear programming and its formulation. • To explore the graphical method and simplex method for solving linear programming problems. • To understand the applications of the simplex method in optimizing complex systems.
153. Teaching and Learning Strategies	
Strategy	• Delivering interactive lectures supported by electronic learning materials, including PDF notes and PowerPoint presentations. • Providing detailed explanations of theoretical concepts with practical engineering examples. • Assigning regular homework, reports, and in-class exercises to reinforce learning and assess students' understanding.

	• Encouraging active student participation through classroom discussions, questions, and problem-solving activities.

154. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week1	3		Introduction to the Optimization concept		
Week2	3		Applications in optimization.		
Week3	3		Linear programming.		
Week4	3		Applications in linear programming.		
Week5	3		Graphical method. Quiz		
Week6	3		Applications in graphical method.		
Week7	3		Midterm Exam		
Week8	3		Simplex method. 1		
Week9	3		Application in Simplex method.		
Week10	3		Transportation method. Quiz.		
Week11	3		Application in transportation method.		
Week12	3		Nonlinear programming		
Week13	3		Applications in nonlinear programming		
Week14	3		Lagrange multiplier method. Applications in Lagrange multiplier method.		
Week15	3		Exam Preparation		

155. Course Evaluation

Quizzes	3	5% (5)
Assignments	2	5% (5)
Midterm Exam	1.5 hr	20% (20)
Final Exam	3 hr	70% (50)

156. Learning and Teaching Resources

Required textbooks (curricular books, if any)	A Hamdy, Operations Research an introduction, Edition, Pearson Prentice Hall, 8th, 2007.
Main references (sources)	

Recommended books and references (scientific journals, reports…)	Introduction to Operations Research, Seventh Edition/ F.S. Hillier/G. J. Lieberman, Mc Graw-Hill.
Electronic References, Websites	

Course Description of Module 6

157. Course Name:
Reservoir Characterization
158. Course Code:
PE403
159. Semester / Year:
4th – S2
160. Description Preparation Date:
15/09/2025
161. Available Attendance Forms:
Face–to–face (Lectures)
162. Number of Credit Hours (Total) / Number of Units (Total)
60 Hours / 3 Units
163. Course administrator's name (mention all, if more than one name)
Name: Taha Mohammed Jasim Email: taha.m.j@uomisan.edu.iq
164. Course Objectives

Course Objectives	• Understand the fundamental principles of reservoir characterization. • Analyze geological, petrophysical, and reservoir data to evaluate reservoir properties. • Apply reservoir characterization techniques to develop reservoir models. • Interpret reservoir data to support reservoir management and field development decisions.
165. Teaching and Learning Strategies	
Strategy	• Preparation and presentation of electronic lectures (PDF and PowerPoint). • Detailed explanation of course topics. • Interactive classroom discussions and student participation. • Periodic assignments, reports, and homework. • Problem-solving exercises and case studies.

166. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week1	4		Introduction to Reservoir Characterization.		
Week2	4		Introduction to Petrophysical Rock Properties: CAL, SCAL.		
Week3	4		Introduction to Petrophysical Rock Properties: Wireline methods, and seismic inversion.		
Week4	4		Rock-Fabric Classification		
Week5	4		Depositional Textures Quiz		
Week6	4		Depositional Petrophysics		
Week7	4		Midterm Exam		
Week8	4		Reservoir Data Reconciliation.		
Week9	4		Reservoir Mapping, and Volumetric.		
Week10	4		Reservoir Characterization Workflow		
Week11	4		Reservoir Characterization Workflow		
Week12	4		Reservoir Classification I		
Week13	4		Reservoir Classification II		
Week14	4		Students work on a final project related to Applied Reservoir Engineering. Review of key concepts and topics covered throughout the course. Discussion and presentation of final projects.		
Week15	4		Exam preparation and review.		

167. Course Evaluation

Quizzes	2	5% (5)
Homework	2	5% (5)
Midterm Exam	1.5 hr	20% (20)
Final Exam	3 hr	70% (50)

168. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Craft, B. C., & Hawkins, M. F. (1991). Applied Petroleum Reservoir Engineering (2nd ed.). Prentice Hall.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	Ahmed, T. (2010). Reservoir Engineering Handbook (4th ed.). Gulf Professional Publishing.
Electronic References, Websites	

Course Description of Module 7

169. Course Name:	
Reservoir Simulation	
170. Course Code:	
PE401	
171. Semester / Year:	
4th – S2	
172. Description Preparation Date:	
11/09/2025	
173. Available Attendance Forms:	
Face–to–face (Lectures)	
174. Number of Credit Hours (Total) / Number of Units (Total)	
75 Hours / 3 Units	
175. Course administrator's name (mention all, if more than one name)	
Name: Ali Nooruldeen Abd al-kareem Email: ali.nooruldeen@uomisan.edu.iq	
176. Course Objectives	
Course Objectives	• Understand the principles and numerical methods of reservoir simulation. • Develop reservoir simulation models using industry-standard software. • Analyze reservoir performance under different production scenarios. • Interpret simulation results to support reservoir management and production optimization.
177. Teaching and Learning Strategies	
Strategy	• Preparation and presentation of electronic lectures (PDF and PowerPoint). • Detailed explanation of course topics. • Interactive classroom discussions and student participation. • Periodic assignments, reports, and homework. • Problem-solving exercises and case studies.

178. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week1	5		Introduction to Reservoir simulation •What is a simulation model? •A simple example of a simulation model		
Week2	5		Field Applications of Reservoir Simulation •Discussion of Changes in Reservoir Simulation; 1970s – 2000 •The Treatment of Uncertainty in Reservoir Simulation		
Week3	5		Reservoir Simulation Model Set-Up •Setting up a reservoir simulation model •Data input and output •Example input data file		
Week4	4		Reservoir Simulation Model Set-Up: II •Grid and Rock Properties •Fluid Properties •Initial Conditions •Output Requirements •Production Schedule		
Week5	4		Gridding And Well Modelling: Gridding •Introduction •Gridding in Reservoir Simulation .Quiz		
Week6	4		Gridding And Well Modelling: Block to block flow calculations •The calculation of block to block flows in reservoir simulators		
Week7	4		Midterm Exam		

Week8	4		The Flow Equations: single phase •The single phase pressure equation •Extension of Single Phase Pressure Equation to 2D & 3D		
Week9	4		The Flow Equations: two phase flow •The two-phase flow equations •Review of Two-Phase Flow Concepts •Derivation of the Two-Phase Conservation Equations.		
Week10	4		Numerical Methods in Reservoir Simulation •Introduction •Review of finite differences •Application of finite differences to partial differential equations (PDEs)		
Week11	4		Numerical Methods: Explicit and Implicit Finite Difference Approximation •Explicit Finite Difference Approximation of the Linear Pressure Equation •Implicit Finite Difference Approximation of the Linear Pressure Equation		
Week12	4		Numerical Methods: Implicit Finite Difference in 2D models •Implicit Finite Difference Approximation of the 2D Pressure Equation •Discretisation of the 2D Pressure Equation •Numbering Schemes in Solving the 2D Pressure Equation		
Week13	4		Numerical Methods: Matrix principles •Definitions of matrices •Determinant of Matrix •Cofactor of matrix		

			•Transpose of Matrix		
Week14	4		Numerical Methods: Matrix solutions •Solving systems of linear equations •Direct Methods: Gaussian Elimination and Gauss Jorden •Iterative Methods: Jacobi iteration and Gauss Seidel		
Week15	4		Final Exam		

179. Course Evaluation

Quizzes	1	5% (5)
Homework	1	5% (5)
Labs		10%(10)
Midterm Exam	1.5 hr	20% (20)
Final Exam	3 hr	60% (60)

180. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education
Main references (sources)	
Recommended books and references (scientific journals, reports…)	DC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2020, dissidents.
Electronic References, Websites	

Course Description of Module 8

181. Course Name:	
Engineering Project–II	
182. Course Code:	
EN411	
183. Semester / Year:	
4th – S1	
184. Description Preparation Date:	
05/09/2025	
185. Available Attendance Forms:	
Face–to–face (Lectures, Laboratory and Field Visits)	
186. Number of Credit Hours (Total) / Number of Units (Total)	
45 Hours / 3 Units	
187. Course administrator's name (mention all, if more than one name)	
Name: Multi-Teachers Email:	
188. Course Objectives	
Course Objectives	• Apply petroleum engineering principles to solve real-world engineering problems through an individual or team-based project. • Develop project planning and management skills, including scheduling, resource allocation, and project execution. • Design and evaluate engineering solutions by considering technical, economic, safety, and environmental factors. • Strengthen analytical, critical thinking, and problem-solving skills using appropriate engineering methods and software tools. • Enhance teamwork, leadership, communication, and technical reporting skills through collaborative project work. • Promote professional ethics, lifelong learning, and independent research in petroleum engineering practice.
189. Teaching and Learning Strategies	
Strategy	• Project supervision and regular meetings to provide academic guidance, monitor progress, and discuss technical challenges. • Independent research and project-based learning through literature review, engineering analysis, design, and problem-solving. • Student presentations and technical report writing to develop communication skills and present project outcomes effectively.

190. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week1	3		Introduction to Engineering Projects		
Week2	3		Project Planning and Initiation		
Week3	3		Project Organization and Team Formation		
Week4	3		Project Risk Management		
Week5	3		Project Scheduling and Resource Management		
Week6	3		Project Cost Estimation and Budgeting		
Week7	3		Project Quality Management		
Week8	3		Project Execution and Monitoring		
Week9	3		Project Communication and Reporting		
Week10	3		Project Integration and Scope Management		
Week11	3		Finalizing project reports and handover procedures		
Week12	3		Project Case Studies and Presentations: •Analyzing and discussing real-world engineering project case studies		
Week13	3		Project Case Studies and Presentations: •Presenting individual or group projects to the class		
Week14	3		Project Case Studies and Presentations: •Q&A sessions and feedback on project presentations		
Week15	4		Project Case Studies and final Presentations:		

191. Course Evaluation

First Discussion	5% (5)
Supervisor evaluation	20% (20)
Final Discussion	50% (50)

192. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	A Hamdy, Operations Research an introduction, Edition, Pearson Prentice Hall, 8th, 2007.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	Introduction to Operations Research, Seventh Edition/ F.S. Hillier/G. J. Lieberman, Mc Graw-Hill.
Electronic References, Websites	