

FOURTH YEAR

Code	Subject		Week/Hour						Units
			First Term			Second Term			
			Th.	Tut.	Lab.	Th.	Tut.	Lab.	
PE400	Petroleum Reservoir Eng. II	هندسة المكامن ٢	3	2	-	3	2	-	6
PE402	Petroleum Drilling Eng. II	هندسة الحفر ٢	3	2	-	3	2	-	6
PE404	Petroleum Production Eng. I	هندسة الانتاج ٢	3	2	-	3	2	-	6
PE406	Secondary Oil Recovery	انتاج النفط بالطرق الثانوية	3	-	-	3	-	-	6
PE408	Numerical Methods and Reservoir Simulation	تحليلة عددية ونمذجة مكامن	2	-	2	2	-	2	6
PE410	Engineering Project	مشروع هندسي	1	-	2	2	-	2	4
PE401	Gas Technology	تكنولوجيا الغاز	3	-	-	-	-	-	3
PE403	Optimization	مثالية	-	-	-	3	-	-	3
PE405	Integrated Reservoir Management	ادارة مكمنية متكاملة	1	1	-	1	1	1	3

Department of Petroleum Engineering

The Syllabus

The following is the syllabus of the subjects in the department Curriculum.

FOURTH YEAR

PE 400 Petroleum Reservoir Engineering II

Fundamental concepts; oil reservoirs: depletion drive; gas cap drive, water drive, gravity drainage reservoir, combination drive reservoirs; pressure maintenance; secondary recovery; gas reservoirs; gas- condensate reservoirs; miscellaneous subjects.

PE 402 Petroleum Drilling Engineering II

Casing landing (landing as cemented, landing in tension at the freeze point, landing in compression at the freeze point); buckling phenomenon, wellhead loads, blowout and blowout prevention, well kick (methods of control, driller's method, engineer's method); factors affecting drilling rate (effect of pressure, effect of physical properties of drilling mud, effect of weight on bit and rotary speed, economical effect),

hole problems (pipe sticking, surge and swab pressure, hole deviation); directional drilling; factors affecting hole inclination of directional wells; types of directional wells; geometry of a directional well; methods of calculations of directional wells; horizontal drilling; types of horizontal wells; air drilling; design of air drilling operations.

PE 404 Petroleum Production Engineering II

Types of reservoirs and radial flow in the reservoirs, productivity index, inflow performance relationship (IPR), effect of stratification and water cut on IPR, productivity index test, Vogel method, Standing method, Couto method, Fetkovich method, Al-Sadon method, mathematical and physical principles for pressure drop calculations, flow pattern and its relation with pressure drop, Poetman and Carpenter method, Dukler

method, working charts, analysis of choke performance, prediction of restricted and unrestricted production, effect of other parameters on well performance, derivation and solutions of diffusivity equation, application of Horner solution, multi-rates test, build-up test, draw-down test, effect of skin factor on well testing, analysis of tests that affected by barrier, bounded reservoirs, gas lift operations, stimulation operations (acidizing and fracturing).

PE 406 Secondary Oil Recovery

Principles and definitions, choice of proper methods for enhanced oil recovery, recovery by water displacement, Buckley-Leverett method, Welgemehod, Stiles method, original and improved Dyksra-Parsons method, pattern of flooding, sweep efficiency, properties of injected water, injected pressures, recovery by immiscible gas, Tarner method, Muskat method, recovery by miscible gas, dry gas injection, enriched gas injection, CO₂ injection, N₂ injection, thermal recovery, heat flow through rocks, seam injection, insitu combustion, tertiary oil recovery, surfactant flooding,, solvent injection, polymer injection.

PE 408 Numerical Methods and Reservoir Simulation

Interpolation,(Linear; Lagrange); Matrices, Review of matrix properties, Determinants, inverse of matrix; Solution of system of linear equations (Gaussian elimination, Gauss Jordan method, Jacobi method, Gauss Seidel method); Least square method (Linear equations; Polynomial equations); Reservoir simulation (Introduction, types of simulators); Flow through Porous Media (derivation of single-phase, one-dimensional flow equation, Two and three-dimensional flow equation); Finite Difference Method (Taylor series; Forward difference; Backward difference; Central difference; Concepts of explicit and implicit methods); Solution of system of difference equations (tridiagonal algorithm); Use of Irregular Gridding: Transmissibility; The finite difference form of the flow equation in terms of Transmissibility; Averaging of rock and fluid properties; Solution of radial form of

the flow equation; Two dimensional flow, setting up the finite difference ordering; Resulting matrix structure; Introduction to multi-phase flow through porous media.

PE 410 Engineering Project

Students as groups (of 3 or 4) are requested to carry out a study on one of the problems related to petroleum engineering under the supervision of one of the staff members. Each group must submit a report before the end of the second term. The students must give a presentation of their work to an interview committee of staff members.

PE 401 Gas Technology

Properties of gases; gas system analysis; gas flow through P. M.; gas transportation, gas treatment & liquefaction; gas sweetening and dehydration.

PE 403 Optimization

Introduction, applications in optimization, Linear programming, applications in linear programming, Graphical method, applications in graphical method, Simplex method, applications in simplex method, Transportation method, applications in transportation method, Nonlinear programming, applications in nonlinear programming, Lagrange multiplier method, applications in Lagrange multiplier method.

PE 405 Integrated Reservoir Management

What is reservoir management?, the base map, isopach map, net pay thickness, cross sections, well correlation using logs, is porosity map, bubble map, routine map, analysis, special core analysis, screening of core data, using correlations to estimate missing data, calculation of initial fluids in place, material balance, determination of reservoir type, building reservoir model, history matching, optimization of surface facilities, suggestions to increase production by plugging, perforation, completion, etc., development strategies, drilling new wells, completion, suggesting additional necessary surface equipment's, economic evaluation of the proposed strategy.