



College of Engineering

Petroleum and Natural Gas Engineering

Introductory Brochure for New Students in the Department of Petroleum and Natural Gas Engineering (PGED-KSU)

**ABET and NCAAA Accredited
Program**



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Written by
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Department of Petroleum and Natural Gas Engineering

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

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INTRODUCTION

The essential and pivot role of the Student Guidance and Counseling Unit in the Department of Petroleum and Natural Gas Engineering is to provide appropriate guidance and assist new students in choosing specializations that are commensurate with their abilities, tendencies, and career desires. This guidebook is prepared to save student's time and effort searching about information and the specializations available in the Department of Petroleum and Gas Engineering Nature at King Saud University.

The objectives of this handbook revolve around:

- Educating the student on his academic responsibilities and stating the study plans offered by The Department of Petroleum and Natural Gas Engineering.
- Student specializations available in the department and its objectives.

This brochure includes an introduction to the faculty members of the department, graduation projects, summer training, department facilities, laboratories and research centers affiliated with the department, and job opportunities for department graduates.

All the Best
Dr. Fahd Alqahtani

Head of the Students Academic Advising Unit
Department of Petroleum and Natural Gas Engineering

OVERVIEW

The Department of Petroleum and Natural Gas Engineering (PGED) was established in 1973 to become the first Petroleum and Natural Gas Engineering Department in the Kingdom and the entire Gulf region. Its establishment was a national response to the increasing demand for petroleum engineers in a country that has more than 25% of the total world oil reserves. This is the largest reserve in any single country in the world. A simple calculation shows that with the prevailing current oil production rate, this reserve will last more than 100 years. This indicates that the oil industry will continue to play a leading role and have the largest contribution to the economy. Based on these facts, it seems that, among other engineering and scientific disciplines, petroleum engineers will have the most secure jobs in the future.

Whenever an exploration team becomes confident about the existence of certain geological formations which may contain oil or natural gas, petroleum engineers start designing and setting up a general plan for the drilling programs. Then they study the amount of oil and natural gas reserves and the optimum methods for oil and gas production at the minimum cost, and the best methods for preserving the energy of the reservoir, keeping in mind the special conditions of each reservoir. This requires the collaboration of drilling, reservoir, and production engineers. Because of the need to acquire all these skills, basic sciences are interconnected with the specialized engineering sciences in an integrated program leading to a B.Sc. degree in petroleum and natural gas engineering. Both fundamental and applied courses are included in the curriculum, relating to the engineering areas of exploration, reservoir, drilling, production, transportation, economics, and natural gas. It is stressed on computer applications in petroleum engineering in order to better prepare the graduate engineer to work in the complex world of modern technology. In a developing country, more emphasis is needed on practical training, whether in the laboratory or in the field.

The department has well-equipped laboratories in different disciplines. Oil and natural gas companies working in the Kingdom attract and employ the largest number of petroleum and natural gas engineering graduates where they have good opportunities to practice and apply the knowledge they have acquired during their academic study. They enjoy attractive financial benefits as well as chances for studying and training missions inside and outside the Kingdom. Other governmental agencies such as the Ministry of Petroleum and Minerals, SABIC, KACST, etc. employ a large number of petroleum and natural gas engineering graduates. Service companies which are an integral part of the oil industry also present attractive job opportunities.

VISION

To be internationally recognized as a premier academic Department of Petroleum and Natural Gas Engineering.

MISSION

The Department of Petroleum and Natural Gas Engineering strives at:

1. Providing high-quality learning programs, training, and research activities
2. Graduating students with the required skills to compete at the international level
3. Attracting and developing high-caliber faculty members

GOALS

The objectives of the Department of Petroleum and Natural Gas Engineering are:

4. Maintaining national and international academic accreditation
5. Creating a strong relationship with society particularly the oil and gas industry
6. Producing highly qualified graduates each year

PROGRAM EDUCATIONAL OBJECTIVES

1. Graduates will perform as highly skilled engineers in the local and international petroleum and natural gas industry.
2. Graduates will continue to learn, improve and evolve in their jobs.
3. Graduates may pursue higher education to participate in academia and involve in research.

DEGREES OFFERED

1. Bachelor of Science in Petroleum and Natural Gas Engineering
2. Master of Science in Petroleum and Natural Gas Well Drilling Engineering
3. Master of Science in Petroleum and Natural Gas Reservoir Engineering
4. Master of Science in Petroleum and Natural Gas Production Engineering

FACULTY MEMBERS AND STAFF

Faculty Members

NO.	Name	Rank	Major	Office	email
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1	Faisal S. Altawati (Chairman of PGED)	Assistant Professor	Petroleum Engineering	2B 72	faltawati
2	Musaed N. J. AlAwad	Professor	Drilling Engineering	2B 81	malawwad
3	Emad S. AlHumadhi	Professor	Drilling Engineering	2B 78	ehomadhi
4	Aref Lashin	Associate Professor	Exploration	2C 97	arlashin
5	Taha Moawad	Associate Professor	Reservoir Engineering	2B 82	tmoawad
6	Khaled A. ElShreef	Associate Professor	Drilling Engineering	2C 2/95	kelshreef
7	Osama A. ElMahdy	Assistant Professor	Reservoir Engineering	2B 83	omahdy
8	Mustafa M. Kinawy	Assistant Professor	Reservoir Engineering	2C 1/95	mkinawy
9	Abiodun Matthew	Assistant Professor	Reservoir Engineering	2B 77	aamao
10	Mohammed Khamis	Assistant Professor	Reservoir Engineering	2B76	mokhamis
11	Ali S. AlNetaifi	Assistant Professor	Reservoir Engineering	2B 85	aalnetaiifi
12	Fahd M. Alqahtani	Assistant Professor	Reservoir Engineering	2B 75	fahalqahtani
13	Mohammed Almobarky	Assistant Professor	Reservoir Engineering	2B 84	mmobarky

Lecturers and Teaching Assistants

NO.	Name	Rank	Major	Office	email
1	Mohammed Al-Thehibey	Lecturer	Production Engineering	2B 80	malthehibey
2	AbdulRahman Z. Al-Amri	Teaching Assistant	Reservoir Engineering	2B 86	azalamri

Researchers and Technicians

NO.	Name	Rank	Major	Office	email
1	Kamal A. Haroon	Researcher	Drilling Engineering	1B 40	kharoon
2	Abdullah S. Al-Fayfi	Technician	Reservoir Engineering	2C 96	aalfayfi
3	Abdullah A. Al-Subaie	Technician	Petroleum Engineering	1B 35	subaie

Administrative Staff

NO.	Name	Rank	Major	Office	email
1	Abdulaziz H. Al-Thubaity	Secretary	Drilling Engineering	2B 70	thubaity

Typical PGED B.Sc. Plan

Level 1			
Course Code	Course Code	Course Code	Pre-/Co-requisite

ENGS 10x	English language	6(6,9,0)	
MATH 101	Differential Calculus	3(3,1,0)	
ENT 101	Entrepreneurship	1(1,0,0)	
CHEM 101	General Chemistry	4(3,0,2)	
ARAB 100	Writing Skills	2(2,0,0)	
Total		16	

Level 2			
Course Code	Course Code	Course Code	Pre-/Co-requisite
ENGS 11x	English	6(6,9,0)	
CUR 101	University Skills	3(3,0,0)	
CT 101	IT skills	3(0,0,6)	
STAT 101	Introduction to Statistics	3(2,2,0)	
EPH 101	Health & fitness	1(1,1,0)	
Total		16	

Level 3			
Course Code	Course Code	Course Code	Pre-/Co-requisite
IC 1xx	Optional Islamic course	2(2,0,0)	
PHYS 103	General Physics (1)	4(3,0,2)	
MATH 106	Integral Calculus	3(3,2,0)	MATH 101
MATH 107	Vectors & Matrices	3(3,2,0)	MATH 101
ENGL 109	Language & Communication	2(2,1,0)	
GE 104	Basics of Engineering Drawing	3(2,0,2)	
Total		17	

Level 4			
Course Code	Course Code	Course Code	Pre-/Co-requisite
PHYS 104	General Physics (2)	4(3,0,2)	PHYS 103
ENGL 110	Technical Writing	2(2,1,0)	ENGL 109
MATH 203	Differential and Integral Calculus	3(3,2,0)	MATH 106 MATH 107
GE 106	Introduction to Engineering Design	3(2,1,2)	GE 104
GE 201	Statics	3(3,1,0)	MATH 106; MATH 107
GE 203	Engineering and Environment	2(2,0,0)	CHEM 101; MATH 101
Total		17	

Level 5			
Course Code	Course Code	Course Code	Pre-/Co-requisite
IC 1xx	Optional Islamic course	2(2,0,0)	---
MATH 204	Differential Equations	3(3-2-0)	MATH 203 (Pre-)
ME 340	Mechanical Engineering for Petroleum Students	3(3-1-0)	GE 201 (Pre-)

CHE 312	Momentum Transport Operations for Petroleum and Natural Gas Engineering Students	3(3-1-0)	---
GE 209	Computer Programming	3(2-0-2)	---
PGE 251	Introduction to Petroleum & Natural Gas Engineering	2(2-1-0)	---
Total		16	

Level 6			
Course Code	Course Code	Course Code	Pre-/Co-requisite
PGE 361	Reservoir Rock Properties and Fluid Flow	2(2-1-0)	PGE 251 (Pre-)
CHE 304	Thermodynamics for Petroleum and Natural Gas Engineering Students	2(2-1-0)	---
PGE 362	Reservoir Fluid Properties	2(2-1-0)	PGE 251 (Pre-)
PGE 363	Reservoir Engineering Laboratory	2(1-0-2)	PGE 361 (Co-) PGE 362 (Co-)
PGE 391	Geologic Principles of Petroleum & Natural Gas Exploration	3(3-1-0)	PGE 251 (Pre-)
IC 1XX	Optional Islamic course	2(2,0,0)	---
MATH 254	Numerical Methods	3(3-2-0)	MATH 107 (Pre-)
GE 403	Engineering Economics	2(2,1,0)	
Total		18	

Level 7			
Course Code	Course Code	Course Code	Pre-/Co-requisite
IC 107	Professional Ethics	2(2,0,0)	---
GE 402	Engineering Projects Management	3(3-1-0)	---
PGE 490	Petroleum & Natural Gas Exploration -1-	3(3-1-0)	PGE 391 (Pre-)
PGE 460	Petroleum Reservoir Engineering	3(3-1-0)	PGE 362 (Pre-) PGE 363(Pre-)
PGE 366	Natural Gas Reservoir Engineering	2(2-1-0)	PGE 362 (Pre-) PGE 363 (Pre-)
PGE 471	Drilling Engineering -1-	2(2-1-0)	PGE 490 (Co-)
Total		15	

Level 8			
Course Code	Course Code	Course Code	Pre-/Co-requisite
PGE 492	Well Logging	3(3-1-0)	PGE 471 (Pre-)
PGE 474	Drilling Engineering -2-	3(3-1-0)	PGE 471 (Pre-) PGE 494 (Co-)
PGE 481	Production of Naturally Flowing Wells	3(3-1-0)	PGE 471 (Pre-)
PGE 464	Improved Oil Recovery	3(3-1-0)	PGE 460 (Pre-)

PGE 485	Petroleum Production Engineering Laboratory	2(1-0-2)	PGE 481 (Co-)
PGE 494	Petroleum & Natural Gas Exploration -2-	2(2-1-0)	PGE 490 (Pre-)
PGE 457	Computer Applications in Petroleum and Natural Gas Engineering	2(1-2-0)	PGE 460 (Pre-) PGE 366 (Pre-)
Total		18	

Level 9			
Course Code	Course Code	Course Code	Pre-/Co-requisite
PGE 455	Transportation & Storage of Petroleum and Natural Gas	2(2-1-0)	PGE 481 (Pre-)
PGE 476	Drilling Engineering Laboratory	2(1-0-2)	PGE 474 (Pre-)
PGE 493	Well Test Analysis	3(3-1-0)	PGE 460 (Pre-)
PGE 484	Natural Gas Production Engineering	3(3-1-0)	PGE 366 (Pre-)
PGE 482	Artificial Lift Methods and Surface Operations	2(2-1-0)	PGE 481 (Pre-)
PGE 450	Seminar	2(1-2-0)	PGE 496 (Co-)
PGE 496	Graduation Project -1-	2(2-0-0)	Complete successfully 129 credits hours and passing all courses in levels 1-7.
Total		16	

Level 10			
Course Code	Course Code	Course Code	Pre-/Co-requisite
PGE 491	Petroleum and Natural Gas Economics	2(2-1-0)	PGE 496 (co-)
PGE 486	Well Stimulation and Sand Production Management	3(3-1-0)	PGE 482 (Pre-)
PGE 478	Directional & Horizontal Drilling and Well Control	3(3-1-0)	PGE 474 (Pre-)
PGE 467	Reservoir Simulation	3(3-1-0)	PGE 460 (Pre-) MATH 204 (Pre-)
SC 1XX	Free College Course	2(2-x-0)	
PGE 497	Graduation Project – 2 -	2(2-0-0)	PGE 496
PGE 999	Practical Training	1 (NP)	Complete successfully 110 credits hours
PGE 998	Research Project	0 (NP)	Successful completion of 129 cr. hr
Total		16	

Brief Description of B.SC. Courses

Course NO.	Courses Description
ENGS 100: English language	This initial stage of the course is designed to give the students a strong foundation in the language, improving their command of English as well as improving their vocabulary, reading, writing, and communication skills. In the process of improving these skills, students will also develop their confidence in the language and also their presentation skills. These all contribute

Course NO.	Courses Description
	to the life skills of the student and help to prepare them for their future studies and careers beyond KSU. As the course progresses and students reach a higher level of English, the focus will switch to the academic side of the language. This will involve preparing students for the style of language they will need for their future studies.
MATH 101: Differential Calculus	Limits and Continuity: The Concept of Limit, Computation of Limits, Continuity and its Consequences, Limits Involving Infinity, and Formal Definition of the Limit. Differentiation: The Concept of Derivative, Computation of Derivatives (The Power Rule, Higher Order Derivatives, and Acceleration), the Product and Quotient Rules, The Chain Rule, Derivatives of Exponential and Logarithmic Functions, Implicit Differentiation and Inverse Trigonometric Functions, the Mean Value Theorem. Applications of Differentiation: Indeterminate Forms and L'Hopital's rule, Maximum and Minimum Values, Increasing and Decreasing Functions, Concavity and the Second Derivative Test, Optimization, and Related Rates. Textbook: Robert T. Smith, and Roland R. Minton, "Calculus, early Transcendental functions", Third Edition, 2007.
ENT 101 Entrepreneurship	
CHEM 101: General Chemistry	Stoichiometry: SI Units, chemical formulas, the mole, methods of expressing concentration, and Calculations based on chemical equations. Gases: laws, kinetic theory, deviation and van der Waals equation. Thermochemistry: Types of enthalpy changes, Hess Law and its applications, the first law of thermodynamics. Solutions: Type of solutions and laws related, colligative properties. Chemical kinetics: Law of reaction rate, reaction order, factors affecting the rates. Chemical Equilibrium: Relation between K_c & K_p , Le Chatelier's principle and factor affecting equilibrium. Ionic equilibrium: Acid and base concepts, pH calculations of acid, base and buffer solutions. Atomic Structure: emission spectrum, Bohr's theory de Broglie's hypothesis, quantum numbers, electronic configuration of elements, consequences of the periodic table.
ENGS 110: English	The final assessment for the course is the highly regarded International English Language Testing System (IELTS), which is used as a qualifying test for students wishing to attend university in many countries including the UK and Australia. Specialist material will be used to prepare students for this test with the aim of reaching an IELTS score of 5.0 by the end of the year.
CUR 101: University skills	Learning skills: Self-management for learning, learning tools, Reading strategies, Second language learning skills, Test administration. Thinking skills: Theory of Inventive Problem Solving (TRIZ), Rounding Thinking, Expanding perception, Creative thinking. Research skills: Problem determining, Searching for information strategies, Sites of sources, accessing this information, Using thin formation, Information construction, and Information evaluation.
CT 101: IT skills	Basic Concepts of Information Technology, Using a computer and Managing Files, Word Processing, Spreadsheets, Databases, and Presentation.
STAT 101: Introduction to Statistics	Descriptive statistics; Probability; Random variables and probability distribution functions; Statistical inference; Correlation and simple linear regression.
EPH 101: Health and Fitness	Subjects about general health and body and brain fitness.
MATH 106: Integral Calculus	The definite integral, the fundamental theorem of calculus, the indefinite integral, the change of variable, numerical integration. Area, volume of revolution, work, arc length. Differentiation and integration of inverse trigonometric functions. The logarithmic, exponential, hyperbolic, and inverse hyperbolic functions. Techniques of integration: substitution, by parts, trigonometric substitutions, partial fractions, and miscellaneous substitutions. Indeterminate forms, improper integrals. Polar coordinates.
MATH 107: Vectors and Matrices	Vectors in two and three dimensions, scalar and vector products, equations of lines and planes in space, surfaces, cylindrical and spherical coordinates. Vector-valued functions, their limits,

Course NO.	Courses Description
	continuity, derivatives and integrals. The motion of a particle in space, tangential and normal components of acceleration. Functions in two or three variables, their limits, continuity, partial derivatives, differentials, chain rule, directional derivatives, tangent planes, and normal lines to surfaces. Extrema of functions of several variables, Lagrange multipliers. Systems of linear equations, matrices, determinants, the inverse of a matrix, and Cramer's rule.
MATH 203: Differential & Integral Calculus	Infinite series, convergence and divergence of infinite series, integral test, ratio test, root test, and comparison test. Conditional convergence and absolute convergence, alternating series test. Power series, Taylor and Maclaurin series. Double integral and its applications to area, volume, moments and center of mass. Double integrals in polar coordinates. Triple integral in rectangular, cylindrical and spherical coordinates and applications to volume moment and center of mass. Vector fields, line integrals, surface integrals, Green's theorem, the divergence theorem, and Stoke's theorem.
MATH 204: Differential Equations	Various types of first-order equations and their applications. Linear equations of higher order. Systems of linear equations with constant coefficients, reduction of order. Power series methods for solving second-order equations with polynomial coefficients. Fourier series, Fourier series for even and odd functions. Complex Fourier series. The Fourier integral.
PHYS 103: General Physics (1)	Introduction (Vectors), Motion in one dimension with constant acceleration, Motion in two dimensions with application to projectile motion and circular motion, Newton's Laws of Motion, Work and Energy, Potential Energy and the law of conservation of Energy, Linear Momentum and Collisions, Rotation of the rigid object about a fixed axis.
PHYS 104: General Physics (2)	Electricity and Magnetism: Coulomb's law, electric fields, Gauss' Law, electric potential, potential energy, capacitance and dielectric, currents and resistance, electrical energy and power, direct current circuits, Kirchhoff's rules, magnetic fields, motion of charged particle in a magnetic field, sources of the magnetic field, Ampere's law, Faraday's law of induction, self-inductance, energy in a magnetic field, mutual inductance, alternating current circuits, the RLC series circuit, power in an A.C. circuit, and resonance in RLC services circuit.
ENGL 109 –Language and Communication	ENGL 109 includes English for Specific Purpose (ESP) units that cover terminology and expressions, in various engineering disciplines. The course is designed to improve the communication and reading skills of engineering students. It equips the student with essential linguistic expertise for his engineering study and prospective professional career.
ENGL 110 –Technical Writing	English 110 is intended to enhance technical writing skills. It equips students with writing basics and techniques required for constructing clear and persuasive presentations of their ideas, in various forms including reports, presentations, worksheets, CVs' and memos. The course highlights effective writing features including focus, organization, support & elaboration, style, and conventions. It emphasizes observing ethical norms in writing.
GE 104: Basics of Engineering Drawing	The course includes the drawing of Orthographic and isometric projections. Other topics include scaling, sectioning, dimensioning and blue print reading. The course is taught using free hand, AutoCAD and AutoDesk Inventor.
GE 106: Introduction to Engineering Design	Engineering profession, jobs, and disciplines; Elements of engineering analysis; Introduction to engineering design and team formation; Engineering problem definition; Engineering system Architecture and physical function decomposition; Human factor, environment, and safety issues in design; Generation of alternative concepts; Evaluation of alternatives and selection of a concept, Design defense, performance evaluation, and reporting; Engineering ethics.
GE 201: Statics	Force systems; vector analysis, moments and couples in 2D and 3D. Equilibrium of force systems. Analysis of structures; plane trusses and frames. Distributed force system; centroid of simple and composite bodies. Area moments of inertia. Analysis of beams. Friction.
GE 203: Engineering and Environment	This course introduces the impact of engineering and industrial activities on the environment. The lectures cover the basics of ecosystems, environmental balance, types of pollution, and types, sources, and limits of pollutants; in addition to fundamentals of Environmental Impact

Course NO.	Courses Description
	Assessment (EIA). Pollution control technologies and examples of pollution from various engineering and industrial sectors are also covered.
GE 402: Engineering Projects Management	This course introduces techniques that provide rational solutions to a range of project management decisions encountered in engineering projects. Students are expected to gain a detailed understanding of some of the techniques, tools and processes available and their application in starting, planning, managing and finishing engineering projects; The course covers project management fundamentals including projects life cycle, project planning and scheduling techniques, cash flow forecasting, performance evaluations, estimating and cost control; project organizations; Introduction to risk management.
GE 403: Engineering Economy	This course is being offered to the students who enroll in the College of Engineering to give them fundamental knowledge and understandings on Cost concepts, Time value of money operations, measuring the worth of investments, Comparison of alternatives, Depreciation, and Economic analysis of public projects
GE 209: Computer Programming	To introduce computer programming for solving engineering problems in MATLAB environment
MATH 254: Numerical Methods	Various numerical methods for solving nonlinear equations. Direct and iterative methods for solving systems of linear equations along with error estimate. Polynomial interpolation with error formula. Numerical differentiation and integration with error terms. An introduction to the numerical solution of ordinary differential equations.
PGE 251-Introduction to Petroleum and Natural Gas Engineering	The importance and history of petroleum and natural gas. Origin, formation, migration, and accumulation of petroleum and natural gas. Introduction to the chemistry of petroleum. Classification of petroleum and natural gas. Introduction to petroleum and natural gas reservoirs geology, rocks, and fluids properties. Introduction to petroleum and natural gas exploration and well drilling engineering. Introduction to natural gas engineering. Petroleum and natural gas reserves estimation. Introduction to petroleum production engineering, transportation, and refining of petroleum. Offshore pollution by petroleum.
PGE 361 -Reservoir Rock Properties and Fluid Flow	Porosity, Permeability, Fluid flow in porous media, Fluid saturations, Capillary pressure, Wettability, surface tension, and Relative permeabilities.
PGE 362 -Reservoir Fluid Properties	Properties of gases, Phase behavior of liquids, Qualitative phase behavior of hydrocarbon systems, Quantitative phase behavior, and Reservoir fluid characteristics.
PGE 363 -Reservoir Engineering Laboratory	Firstly: Determinations of physical properties of reservoir rock: absolute and effective porosity, gas and liquid permeability and Klinkenberg effect, capillary pressure curves and pore size distribution, fluid saturation. Secondly: measurements of PVT characteristics of reservoir fluids: bubble-point pressure, oil formation volume factor, gas solubility, gas formation volume factor, compressibility factor, oil, gas and water viscosities.
PGE 366 -Natural Gas Reservoir Engineering	Introduction to natural gas. Physical properties of natural gases. Types of natural gas. Characteristics of gas and gas-condensate reservoirs. Estimation of gas reserves (for normally and abnormally pressured) using different forms of the general material balance equation. Prediction of gas reservoir performance subjected to water drive. Derivation of the basic flow equations for real gas and their solutions in terms of pressure, pressure squared and pseudo function and applications for analyzing gas well testing design and analysis. Production forecasting and decline curve analysis. Gas field development including reservoir deliverability.
PGE 391 –Geologic Principles of Petroleum& Natural Gas Exploration	Structure of the earth: (plate tectonics, depositional basins). Geological time (relative time, absolute time, stratigraphic classifications). Rocks and minerals: (minerals identification, rocks classification, rock cycle). Land and marine erosion and deposition. The subsurface environment: (subsurface waters, earth pressures, earth temperatures, impact on hydrocarbon exploration). Structural geology: (factors controlling the behavior of materials, reservoir traps, folds: types, recognition and causes, faults: types and recognition, salt domes: origin and structural evolution). Examples of Saudi Aramco oil field geology: (introduction, total

Course NO.	Courses Description
	petroleum systems in Ghawwar field). Geological maps: (structure contours, isopach maps, cross-sections, measurements of strike and dip).
PGE 450 –Seminar	This course assists students to improve their oral presentation skills through, material preparation, proper training, and sufficient presentation practice. The students will attend professional seminars delivered by the department staff and distinguished speakers for the oil industry. Also, in this course, students will learn the guidelines of technical report writing in the field of petroleum engineering.
PGE 455 -Transportation & Storage of Petroleum and Natural Gas	Single phase flow equations, friction factor, increasing the capacity of the pipelines, hydraulic gradient for pipelines, selecting the booster pump stations, storage tanks (types, design calculations, testing, gauging, and corrosion control), the components of underground gas storage, and characteristics of underground storage.
PGE 457 -Computer Applications in Petroleum and Natural Gas Engineering	Computing techniques emphasizing solutions to problems encountered in higher-level courses in petroleum and natural gas engineering.
PGE 460 -Petroleum Reservoir Engineering	Classification of reservoirs, oil in place, recovery factor, the material balance equation for oil reservoirs, performance prediction techniques, and water influx calculations.
PGE 464-Improved Oil Recovery	Fractional flow, displacement mechanisms, flood patterns, displacement and areal sweep efficiency, peripheral and all pattern flooding, the effect of gas saturation on flooding performance, calculation of injection rate at the water flooding stages, displacement in stratified reservoirs, calculation of the vertical sweep efficiency by different models, calculations of the reservoir performance by using Dykstra-Parsons model, CGM model, water treatment and preparation for water-flooding applications, improved water flooding by chemical and thermal methods.
PGE 467 -Reservoir Simulation	Overview of reservoir simulation. Introduction to elementary mathematics. Properties of reservoir rocks and fluids, Rock-Fluid interaction properties. Reservoir Flow Equations: Single-phase and multi-phase flow in porous media (incompressible and compressible). Finite Difference Approximations for one, two and three-dimensional reservoirs, the Crank-Nicholson method, and Thomas' algorithm. Solutions of systems of linear equations. Applications using a black oil simulator.
PGE 471 -Drilling Engineering -1-	System of units, calculation of pressure and temperature gradients. Rotary drilling, rig components, well planning, Drill string design of conventional drilling, stress analyses (yield strength, collapse and burst calculations and biaxial stresses. Hoisting system, draw-works, blocks, drilling lines, ton-mile calculation and design factor. Drilling tools, Bit design and selection. Drilling fluids, mud types, functions, Circulating system hydraulics, pressure losses, and optimization of bit hydraulics. Co-requisites: PGE490
PGE 474 -Drilling Engineering -2-	Types, origins, and methods of estimating pore pressure, formation fracture pressure and methods of its calculations, types, selection, and calculations of drilling fluids, casing seat selection, casing design, cementing, well completion, factors affecting rate of penetration, hole problems, fishing, basics of directional drilling, rig contracts.
PGE 476-Drilling Engineering Laboratory	For Drilling Fluids: density, viscosity, gel strength, filtration, HPHT filter loss, lubricity, solids content, oil content, sand content, pH and filtrate chemical analysis. For Cement: density, viscosity, filtration, thickening time, setting time, and compressive strength.
PGE 478 -Directional and Horizontal Drilling and Well Control	Introduction to directional drilling. Steps in designing well profile (kick-off point and build-up rate), Directional planning (purpose, considerations and calculations). Kick-off tools (purposes and functions), Horizontal drilling (design of BHA, max. dog-leg severity, fatigue, pipe sticking, miss target, etc.), Survey tools (MWD) and practices, well profile calculations, Well control, hydrostatic pressure vs. formation pressure, formation integrity test, and causes of underbalanced situations, Kick causes, detection and warning signs, shut-In procedures and

Course NO.	Courses Description
	collection of data, Calculating drill string and annular volume, kill methods, Well control equipment, Ram-type blowout preventer.
PGE 481 -Production of Naturally Flowing Wells	The performance of production formations. Factors influencing the shape of IPR, Vertical lift performance, Flow of single and multiphase fluid flow in vertical pipes (Poettman, Gilbert, Hagedorn and Brown), Choke performance, The principles of a gas lift, Production decline analysis using exponential, harmonic, and hyperbolic decline curves, Well-head equipment.
PGE 482 -Artificial Lift Methods and Surface Operations	Surface operations: Oil and gas gathering at oil fields, Oil and gas separators, Dehydration, desalting and stabilization, Heater theater design, Artificial lift methods: introduction, sucker rod pumping, Hydraulic pumping, Electric submersible centrifugal pumps, Gas lift valves and string design, Introduction to other artificial lift methods.
PGE 484 -Natural Gas Production Engineering	Introduction to gas properties. Gas reservoir performance: well deliverability tests, transient testing, and reservoir limit test, well completion effect on gas reservoir performance. Piping system performance: flow equations, and flow in pipelines. Gas compression: types and design of compressors. Total system analysis: tubing and flow line size, separator pressure effect, subsurface safety valve selection, separator pressure effect, and gas condensate reservoir. Field operation problems and gas processing. Gas measurement systems.
PGE 485 -Petroleum Production Engineering Laboratory	A laboratory study of certain basic ASTM petroleum tests; distillation, flash point, pour point, vapor pressure, cloud point, viscosity, specific gravity, water content and sediments, and salt content of crude oil.
PGE 486 –Well Stimulation and Sand Production Management	Well stimulation by hydraulic fracturing: mechanics of fracturing, fracturing fluids and additives. Frac job design, Propping the fracture, Acidizing: acid types and reactions, Carbonate and sandstone acidizing techniques, Causes of sand production and methods of control, Gravel-pack design criteria, Nodal analysis applied to gravel-packed wells, Production of horizontal wells.
PGE 490 -Petroleum and Natural Gas Exploration -1-	Origin of petroleum: (source rocks, kerogen formation and maturation, estimation of generated petroleum), Petroleum migration: (expulsion and accumulation, different concepts), Petroleum reservoirs: (reservoir characteristics, parameters controlling the petroleum reservoirs), Oil in place and reserve calculation.
PGE 491 -Petroleum and Natural Gas Economics	History and legislations of oil in Saudi Arabia, Oil pricing methods, Economical resources, Swing producer, inflation, cartel and market clearing price, Historical data for oil prices development, OPEC, OAPEC and International Energy Agency, Basic engineering economy terms, Simple and Complex interests, Nominal and Effective and combined interest rates, Deterioration and sinking fund factor, Screening yardsticks for economical projects: Formulas for continuous and lump sum flow of fund, Net present value, Rate of return, Accounting rate of return, the Growth rate of return, Discounted and undiscounted Payout time, Profit-to-Investment ratio, Benefit-Cost ratio.
PGE 492 -Well Logging	Fundamentals, SP-log, electric resistivity logs, sonic logs, density logs, neutron logs, radioactivity logs (natural and induced gamma ray, neutron), production logs (TDT, Temp., RFT), log interpretation.
PGE 493 -Well Test Analysis	Diffusivity equations, derivation and solutions, superposition pressure drawdown test analysis, transient and semi-steady state, variable rate tests, pressure buildup test analysis, average reservoir pressure, finite and infinite reservoirs, flow barriers, well interference, pulse testing, and pressure analysis in anisotropic and fractured reservoirs.
PGE 494 -Petroleum and Natural Gas Exploration -2-	Geophysical methods: (surface and subsurface prospecting for oil and gas, geo-electrical surveying, seismic surveying, gravity surveying, basic principles, equipment, data processing, analysis, geological interpretation, and hydrocarbon trap detection). Remote sensing and geographic information systems: basic principles.
PGE 496 -Graduation Project -1-	The aim of this part (PGE 496) is to train students on how to solve a specific petroleum engineering problem considering all constraints mentioned in the program educational outcomes, i.e. performing a typical research. Enrolled students are divided into groups if possible (enough number of enrolled students), and then a special petroleum design problem

Course NO.	Courses Description
	<p>is assigned for each group to be studied using theoretical and/or experimental approaches. Additionally, each group is requested to share their finding with the other groups, submit a fully comprehensive report, and present and defend their work by the end of the semester. The grading system will be as follows: 40 points for the coursework, and 60 points for the final report, oral presentation, and defense (Q&A). A timetable is announced at the beginning of each semester showing supporting lecture schedules and reports submission dates. Student must attend at least 75% of the scheduled lectures, submit a final report approved by the advisor, and defend his work through an oral presentation; otherwise considered failed in the course and given a grade "F". Pre-requisite: Complete successfully 129 credits hours and passing all courses in levels 1-7.</p>
<p>PGE 497 -Graduation Project -2-</p>	<p>A capstone design course (PGE 497) is to prepare students for engineering practice through a curriculum culminating in a major design experience based on the knowledge and skills acquired earlier course work and incorporating appropriate engineering standards and multiple realistic constraints. Groups of students are provided with real data from an oil or gas reservoir, similar to that which would be available to an operator prior to a development decision. Through this exercise, students gain valuable insight into the use of imperfect and incomplete data, the integration of the various taught components of the course and problems of group interaction. A typical design project includes several of the following components of petroleum engineering: geological and reservoir characterization, reserves estimation, reservoir modeling and simulation, drilling and well completion design, casing design, cement job design, production optimization, pipeline design, surface facilities design, economics and impact on society and environment. Students are grouped as follows:</p> <ul style="list-style-type: none"> • Group I: Geology and Formation Evaluation Requirements. • Group II: Drilling Engineering Requirements. • Group III: Production Engineering Requirements. • Group IV: Reservoir Engineering Requirements. <p>Students have access to state-of-the-art computer technology, industry-standard software, and SPE OnePetro (https://www.onepetro.org) database. Reports must be submitted according to the set time schedule.</p>
<p>PGE 998: Research Project</p>	<p>The course is designed to serve the research needs of the students. The course is not required for graduation, so students may opt to register it or otherwise. The consent of the faculty member with whom the student might work is essential. (this is an optional elective course with no credit hours: not required for the B.Sc. degree in PGE)</p>
<p>PGE 999: Practical Training</p>	<p>Students in the department are required to complete a 10 weeks summer training requirement in an area related to Petroleum and Natural Gas Engineering. Prior to undertaking the summer training program, the student must obtain the approval of the department and he must have completed, successfully, at least 110 credit hours including the CFY (or 78 credit hours excluding the CFY). Students enrolling in the summer training program are not allowed to take simultaneously any course or projects.</p> <p>Prerequisite: Successful completion of 110 credit hours</p>
<p>CHE 304 - Thermodynamics for Petroleum and Natural Gas Engineering Students</p>	<p>Basic concepts of thermodynamics. Properties of pure substances. The first law of thermodynamics is for closed systems and for open systems. The second law of thermodynamics. Power cycles. Refrigeration.</p>
<p>CHE 312 -Momentum Transport Operations for Petr. and N. Gas Eng. Students</p>	<p>Fluid statics. Fluid dynamics. Flow around submerged bodies. Flow through porous media. Flow in Fluidized Beds. Flow metering devices. Pumps and Fluid moving machinery. Non-Newtonian fluids. Dimensional analysis. Piping design.</p>

Course NO.	Courses Description
ME 340 -Mechanical Engineering for Petroleum and N. Gas Eng. Students	Stress and strain; compatibility of displacement; mechanical properties of materials; generalized Hook's law; torsion of circular cross-sectional beams; the relation between load, shear force and bending moment; pure bending of beams; transverse shear; shear flow; combined loadings; analysis of plane stresses; stress transformation, Mohr's circle-plane stress; thin and thick-walled pressure vessels; deflection of beams; buckling.

Graduation Project

The plan contains two courses for the graduation project. In the first project course (496 PGE), under the supervision of a member or group of members in the department, the student conducts an individual laboratory or theoretical study of one of the technical problems in petroleum and natural gas engineering, tests a group of possible solutions to solve it, compares them, and makes a decision to determine the optimal method based on considerations of security, environmental safety, and cost. . In the second project course (497 PGE), students obtain comprehensive data for one of the oil fields. The students are divided into work groups, where each group completes a comprehensive study of the oil field, starting with exploration, then drilling, then production, and studying the properties of the oil reservoir. This course is distinguished by the ability to measure the extent to which students understand what they have learned while studying previous courses, the mechanisms for applying them, and the level they have reached in the field of specialization. The solutions proposed in the project should be based on new ideas, innovative solutions and decision-making through scientific-based planning. Graduation project courses are considered among the basic requirements for obtaining the degree. In order for the student to be able to register the graduation project, the following must be achieved:

1. The number of successfully completed hours must be no less than 129 credit hours.
2. Passing all seventh level courses and below.

Paper and electronic copies of all previously completed graduation projects are available in the department's library, where the student can borrow them from the department's graduation projects supervisor.

Summer Training

If the student has completed 110 academic hours, he/she has the right to apply for a practical training opportunity in one of the petroleum companies to gain practical experience through training and complete it as a basic requirement for graduation. Practical training aims to deepen students' understanding of the academic sciences they have received in their study of courses related to the field of specialization, contribute to guiding students to take responsibility, adhere to deadlines, adhere to professional work ethics, and enable students to deal and communicate with members of the community outside the university. When a student obtains a training opportunity in a company, the student also receives housing and a monthly financial reward as a result of his training and completion of the tasks assigned to him. In order for the student to be able to register for the practical training course (999 PGE), the following are required:

1. Completion of 110 academic hours.
2. Fill out the form (An opportunity outside the available opportunities for training) available on the College Vice Deanship for Educational Affairs website ([Link](#)), save it in PDF format and send it to the training body with the academic record.
3. The student can also follow the application portals on the companies' websites on the Internet to find out the application dates and fill out the application form.

Master of Science Program

Petroleum and natural gas engineering involves the application of earth sciences and physical sciences to the evaluation and exploitation of natural hydrocarbon resources. In the practical field, the development of reservoirs under increasingly adverse conditions poses new engineering problems. This requires skilled engineers capable of producing engineered solutions to current problems. It is clear that the future exploitation of oil reservoirs in Saudi Arabia, for a secondary and tertiary crop of oil, requires intensive research over a long period. This calls for a steady output of highly trained petroleum engineering graduates.

The graduate courses are planned to emphasize the type of subject matter that addresses the petroleum production problems in Saudi Arabia. Additional courses may be added as the program progress. These include future courses on drilling, natural gas storage and utilization, and well logging. The program maintains a balance between basic state-of-the-art technology and the particular needs of Saudi Arabia.

Admission Requirements

✓ Applicants for the Master's degree must hold a Bachelor of Science (B.Sc.) degree from King Saud University or an equivalent degree from another accredited university with the minimum grade of "Very Good". It is possible, upon the recommendation of the departmental Council, the approval of the College of Engineering Council and the Dean of Graduate Studies, to provide a conditional acceptance to a student with a grade of "Good". The admission is considered final only after the student had completed two semesters and attained a grade point average not less than "Very Good".

✓ It is possible to accept students holding Bachelor of Science degrees in (Chemical, Electrical, and Mechanical) Engineering, Geophysics and Petroleum Geology branches. In this case, the department

may require additional complementary courses which applicants must take and pass their exams with a minimum grade of "Very Good".

✓ Students will be enrolled on a full-time basis. Exceptions may be made for part-time upon the recommendation of the Department Council and with the approval of the College Council and the College of Graduate Studies Council.

Areas of Specialization

- ✓ Petroleum and Natural Gas Reservoir Engineering.
- ✓ Petroleum and Natural Gas Well Drilling Engineering.
- ✓ Petroleum and Natural Gas Production Engineering.

Program Structure

The structure of the PGED M.Sc. is composed of 27 Credit hours as shown in Table 1.

Table 1: PGED M.Sc. Program Structure

Number & Type of Courses	Credit Hours
2 Courses of Mathematical	6
3 Mandatory Common Courses	9
3 Specialized Courses	9
1 Research Plan	1
1 Thesis	1
1 Graduate Seminar	1
Total	27

Courses Plan

Details of MSc courses plan in Petroleum & Natural Gas engineering are shown below:

First Year				
First Level				
#	Course Code	Name	No. of Study Units	Pre-requisite
1	MATH ...	Mathematics Courses (1) from list of Mathematics Courses	3 (3,0,0)	
2	MATH ...	Mathematics Courses (1) from list of Mathematics Courses	3 (3,0,0)	
Total			(6) study Units	
Second Level				
#	Course Code	Name	No. of Study Units	Pre-requisite
1	PGE 510	Theory of fluid flow through porous media	3 (3,0,0)	
2	PGE 520	Advanced oil well drilling engineering	3 (3,0,0)	
Total			(6) study Units	

Third Level				
#	Course Code	Name	No. of Study Units	Pre-requisite
1	PGE 530	Advanced petroleum production engineering	3 (3,0,0)	
2	PGE ...	Core Course (1) from list of Core Courses	3 (3,0,0)	
Total			(6) study Units	

Second Year				
Fourth Level				
#	Course Code	Name	No. of Study Units	Pre-requisite
1	PGE ...	Core Course (2) from list of Core Courses	3 (3+0)	
2	PGE ...	Core Course (3) from list of Core Courses	3 (3+0)	
Total			(6) study Units	

Fifth Level				
#	Course Code	Name	No. of Study Units	Pre-requisite
1	PGE 546	Graduate seminar	1 (1+0)	
2	PGE 596	Thesis Research proposal	1	
Total			(2) study Units	

Sixth Level				
#	Course Code	Name	No. of Study Units	Pre-requisite
1	PGE 600	Thesis project	1	
Total			(1) Study Units	

Third Year				
Seven Level				
#	Course Code	Name	No. of Study Units	Pre-requisite
1	PGE 600	Thesis project	1	
Total			(1) study Units	

Eighth Level				
#	Course Code	Name	No. of Study Units	Pre-requisite
1	PGE 600	Thesis project	1	
Total			(1) Study Units	

Ninth Level				
#	Course Code	Name	No. of Study Units	Pre-requisite
1	PGE 600	Thesis project	1	
Total			(1) Study Units	
The General total			study units (26)	

List of Courses

Table 2: PGED M.Sc. Courses

Mathematics Courses			
1	Mathematics Courses	MATH 503	Probability and mathematical statistics
2		MATH 505	Numerical linear algebra
3		MATH 506	Ordinary and Partial Differential Equations
4		MATH 507	Advanced operations research
Core Courses			
Track 1 - Petroleum and Natural Gas Reservoir Engineering			
1	Core Courses	PGE 512	Water flooding

2		PGE 513	Tertiary oil recovery
3		PGE 515	Reservoir simulator development
4		PGE 516	Advanced natural gas technology
5		PGE 518	Advanced well test analysis
6		PGE 543	Advanced petroleum economics
7		PGE 545	Advanced topics in petroleum engineering
Track 2 - Petroleum and Natural Gas Production Engineering			
1	Core Courses	PGE 516	Advanced natural gas technology
2		PGE 531	Advances Well Stimulation Technology
3		PGE 532	Multiphase Flow in Conduits
4		PGE 542	Reservoir Evaluation
5		PGE 543	Advanced petroleum economics
6		PGE 545	Advanced topics in petroleum engineering
Track 3 - Petroleum and Natural Gas Well Drilling Engineering			
1	Core Courses	PGE 521	Advanced drilling fluids engineering
2		PGE 531	Advanced well stimulation technology
3		PGE 541	Oil exploration
4		PGE 543	Advanced petroleum economics
5		PGE 544	Rock mechanics
6		PGE 545	Advanced topics in petroleum engineering

Brief Description of Master Courses

Course NO.	Courses Description
PGE 510 (Theory of Fluid Flow Through Porous Media)	Development of basic equations of fluid flow (Continuity equation, energy equation, and Darcy's law) in Cartesian and polar coordinate systems for single phase and multiphase flow. Diffusivity equation for compressible and incompressible flow. Applications of fluid flow equations to various oil recovery processes. Solutions of the diffusivity equation and applications to transient analysis. Introduction to reservoir simulation.
PGE 512 (Water flooding)	Buckley-Leverett theory. Well patterns. Sweep efficiency and conformance. Crossflow. Approximate design methods. Surface equipment. Water treatment. Selective plugging and profile control.
PGE 513 (Tertiary Oil Recovery)	Chemical flooding methods, using surfactants, polymer, carbon dioxide, caustic, etc. Theories of oil entrapment and mobilization. Basic equations, theories and models. State-of-the-art and field experience. Economics.
PGE 515 (Reservoir Simulator Development)	Finite difference schemes. Time and distance discretization. Stability criteria. Applications to petroleum reservoir flow equations: IMPES and simultaneous solution. Development of a multi-dimensional, multi-phase reservoir simulator.
PGE 516 (Advanced Natural Gas Technology)	Phase relations of natural gas systems (ternary diagrams). Mathematical representation of phase behavior. Gas analysis by spectrometry and chromatography. Design of gas pipelines. Advanced technology of underground storage of natural gas.
PGE 518 (Advanced Well Test Analysis)	The diffusivity equation, line source solution and applications, van Everdingen and Hurst solution, effect of skin and wellbore storage, finite reservoirs and shape factors, use of pressure derivatives in well test analysis, pulse testing, the use of nonlinear regression in well test analysis, well testing in horizontal wells.
PGE 520 (Advanced Oil Well Drilling Engineering)	Drilling problems, blowout control, loss circulation, solids controlled equipment, prediction of fissures and vugs pressure, directional drilling, horizontal drilling, complete well planning, and corrosion problems in drilling engineering.

Course NO.	Courses Description
PGE 521 (Advanced Drilling Fluids Engineering)	Equipment and procedures for evaluating drilling fluids performance, clay mineralogy and colloid chemistry of drilling fluids, rheology of drilling fluids, filtration properties of drilling fluids, surface chemistry of drilling fluids, drilling problems related to drilling fluids, completion, workover and packer fluids.
PGE 530 (Advanced Petroleum Production Engineering)	Inflow performance relationships, reservoir considerations, well completions, completion and workover fluids, vertical flow by intermittent slugs, problems in well analysis, surface and separation facilities for oil, water and gas, and choice of optimal production system.
PGE 531 (Advanced Well Stimulation Technology)	Acidizing and well stimulation. Well diagnosis and workover. Deformations, and their effect on well productivity. Fracturing theory and applications.
PGE 532 (Multiphase Fluid Flow in Conduits)	Introduction. Mathematical and physical bases for pressure loss calculations in multiphase flow. Vertical multiphase flow. Horizontal multiphase flow. Multiphase flow in inclined pipes, and in directionally drilled wells.
PGE 541 (Petroleum Exploration)	Land and marine gravity, and land and airborne magnetometer surveys. Interpretation. Modern methods of seismic surveying and data interpretation. Seismic maps and sections. Remote sensing.
PGE 542 (Reservoir Evaluation)	Elements of evaluation and economic systems governing value. Reservoir tools and their use to determine value. Geological input to evaluation. Principles of risk and uncertainty.
PGE 543 (Advanced Petroleum Economics)	Exhaustible and renewable energy sources, international oil and gas market, oil and gas supply and demand, oil and gas prices, energy modeling and forecasting, competition and switching between fuels, the role of strategic oil inventory, risk analysis, and uncertainty.
PGE 544 (Rock Mechanics)	Analysis of stress and infinitesimal strain, friction, elasticity and strength of rock, Linear elasticity, Laboratory testing, Fluid pressures and flow in rocks, The behavior of ductile materials, Further problems in elasticity, Crack phenomena and the mechanisms of fracture, The stage of stress underground, Strain waves.
PGE 545 (Advanced Topics in Petroleum Engineering)	The department will select a newly developing area in petroleum engineering for the offering.
PGE 546 (Graduate Seminar)	Each participating student will present one of the subjects in petroleum engineering and discussion will be initiated by the participating students, faculty members, and audience.

JOB OPPORTUNITIES

1. Saudi Aramco in Dhahran (<https://www.aramco.jobs>)
2. Al-Khafji Joint Operations (<https://www.agoc.com.sa/#/career>)
3. Ministry of Energy (<https://www.moenergy.gov.sa>)
4. Schlumberger (<https://careers.slb.com>)
5. Halliburton Company for Petroleum Services (<https://jobs.halliburton.com>)
6. Arabian Drilling Company (<https://www.arabdrill.com/ar>)
7. Taqa Company (<https://www.taqa.com.sa/careers>)
8. King Abdulaziz City for Science and Technology (<https://www.kacst.gov.sa>)
9. Baker Hughes Company (<https://www.bakerhughes.com>)
10. Saudi Authority for Intellectual Property (<https://www.saip.gov.sa>)

DEPARTMENT FACILITIES

Students SPE Chapter

The SPE-KSU chapter was established in the year 2000 to involve students of the department in various oil and gas industry activities such as field trips to the offshore and onshore activities of various oil and gas companies. SPE-KSU chapter members participate in the SPE-SAS chapter annual technical symposium, annual young professional symposium and SPE-SAS sand rose publication. SPE-KSU chapter won the “Outstanding Award” two times in a row, 2012 & 2013 by the SPE-SAS. Also, won the “SPE International Gold Standard Award” two times, 2011 & 2014 among the top 20 winners worldwide.

PGED Student’s Club

The PGED students club is established to provide the department students with facilities and a place to spend extra time. The students club works in conjunction with the SPE chapter to fulfill the student’s extracurricular activities.

Department Libraries

The Department of Petroleum and Natural Gas Engineering has two libraries, one of which contains many of the main scientific references for courses, and its contents are updated periodically by purchasing copies of the scientific references required for academic programs, and the other contains an archive that includes many postgraduate theses and graduation projects that were previously completed in the Department of Petroleum Engineering.

LABORATORIES

The petroleum and natural gas engineering department has many laboratories that are used for both teaching and research.

PVT Laboratory

Is used for the understanding of the behavior of hydrocarbon fluid under different pressure and temperature conditions as well as the rate of change of basic fluid properties with the change of pressure and temperature.

Reservoir Rock Properties Laboratory

It is equipped with instruments to measure the physical properties of reservoir rocks. Also, experiments are designed to conduct research projects toward a better physical understanding of enhanced oil recovery processes as well as the production mechanisms of horizontal and vertical wells for improving production.

Production Engineering Laboratory

It is designed to test crude oil properties depending on API specifications and recommendations and to find out the optimum condition for the production, transportation, and storage of crude oils.

Drilling Engineering Laboratory

It is equipped with apparatuses to determine drilling fluid properties at atmospheric and high pressure high temperature conditions by direct measurements. These properties include rheological, filtration, density, thermal stability, lubricity, resistivity, pH, etc.

Cement and Rock Mechanics Laboratory

It is equipped with the necessary tools for testing cement used to support casing string and borehole sides. These tests include thickening time at atmospheric and high pressure high temperature conditions, compressive strength under uniaxial and triaxial loadings, shear strength, failure criteria, mechanical and elastic properties of reservoir rocks and set cement.



Core Analysis Laboratory



Production Laboratory



Drilling Fluids Laboratory



Rock Mechanics and Cement Laboratory

Computer Laboratory

The PGED department has dedicated a computer laboratory that is equipped with computers with the software necessary for the learning process and with an internet connection for students to access web resources. The students could also connect to the internet using the KSU student wireless access points. Students also have access to the COE computer center.

RESEARCH ACTIVITIES

Research in the Petroleum and Natural Gas Engineering Department at KSU involves activities that have immediate usefulness in managing drilling, field development, operations, well stimulation, and other production and reservoir problems. In addition to the EOR research chair activities, some other ongoing research projects include miscible and immiscible gas-oil displacement, sand production management, oily water treatment, oily water re-injection, wettability alteration, new enhanced oil recovery physical methods, drilling fluids design from local clays, formation damage, production optimization, gas hydrates, environmental issues, and CO₂ capture, storage and utilization in EOR.

ALUMNI IN PRESTIGIOUS POSITIONS


NO.	Name	Degree/Job Position
1	Mohammed Saud AlBLEhed Professor	Ph.D., Southern California, USA, Previous faculty member and the CEO of Seder Group, Riyadh Saudi Arabia.
2	Mansour Saleh AlMalik Associate Professor	Ph.D., Texas A&M University, USA, Previous faculty member and the CEO of AlMalik Group, Riyadh Saudi Arabia.
3	Ali A. AlSogaiyer Assistant Professor	Ph.D., Heriot-Watt University, UK, Previous faculty member and the CEO of Seder Group, Riyadh Saudi Arabia.
4	Musaed N. J. Al-Awad Professor	Ph.D., Heriot-Watt University, UK, Previous Dean of KSU-College of Engineering, and Faculty member at PGED-KSU, Riyadh, Saudi Arabia.
5	Omar A. AlMisned Associate Professor	Ph.D., Oklahoma University, USA, KACST, Riyadh Saudi Arabia. Part-time Faculty member.
6	Emad S. AlHomadhi Associate Professor	Ph.D., Heriot-Watt University, UK, Faculty member at PGED-KSU, Riyadh Saudi Arabia.
7	Mohammed A. AlSaddique Assitant Professor	Ph.D., Texas A&M University, USA, Previous faculty member and the CEO of AlAilm Company, Riyadh Saudi Arabia.
8	AbdulRahman A. AlQuraishi Associate Professor	Ph.D., Colorado School of Mines University, USA, KACST, Riyadh Saudi Arabia. Part-time Faculty member.
9	Abdullah I. AlZaraah Associate Professor	Ph.D., Penny State University, USA, Research Scientist, KACST, Riyadh Saudi Arabia.
10	Naif AlQahtani Associate Professor	Ph.D., Colorado School of Mines, USA, Research Associate Professor of Petroleum Engineering, and Director of the National Center for Carbon Management Technology, King Abdulaziz City for Science and Technology, Riyadh, Saudi Arabia.
11	Ali S. AlNtaifi Assistant Professor	Ph.D., New South Wales University, Australia, Faculty member at PGED-KSU, Riyadh Saudi Arabia.
12	Mohammed A. AlMobarky Assistant Professor	Ph.D., Texas A&M University, USA, Chairman and Faculty member at PGED-KSU, Riyadh, Saudi Arabia.
13	Fahd M AlQahatani Assistant Professor	Ph.D., Norwegian University of Science and Technology, Norway, Faculty member at PGED-KSU.
14	Faisal Altawati Assistant Professor	Ph.D., Texas Tech University, USA, Faculty member at PGED-KSU.
15	Faisal AlReshaidan	Ph.D., University of Calgary, Canada, Advisor at the Saudi Data and AI Authority, Riyadh, Saudi Arabia.
16	Mohammed Bajiry	Ph.D., University of Missouri of Science and Technology, Drilling Fluids Specialist at New Park Drilling Fluids Company
17	AbdulRhaman AlAmri	M.Sc., University of Calgary, Canada, Lecturer at PGED-KSU and Ph.D. candidate.
18	Mohammed AlThuhaibi	M.Sc., University of Calgary, Canada, Lecturer at PGED-KSU and Ph.D. candidate.

NO.	Name	Degree/Job Position
19	Saud AlAkresh	B.Sc., Saudi Aramco, Scientist, Expec-Arc Advanced Research Center.
20	Saud AlOtibi	B.Sc., Saudi Aramco, Supervisor, Petroleum Engineering, Saudi Aramco, Riyadh, Saudi Arabia.
21	Saud AlRabiah	B.Sc., Saudi Aramco, Supervisor, Riyadh Refinery, Saudi Aramco, Riyadh, Saudi Arabia.
22	Bader AlSoamit	B.Sc., Ministry of Petroleum and Mineral Resources, Supervisor, Riyadh Refinery, Saudi Aramco, Riyadh, Saudi Arabia.
23	Musaed AlMubarak	B.Sc., Ministry of Petroleum and Mineral Resources, Minister consultant, Riyadh Refinery, Saudi Aramco, Riyadh, Saudi Arabia.
24	Musaed AlZahrani	B.Sc., Ministry of Petroleum and Mineral Resources, Minister consultant, Riyadh Refinery, Saudi Aramco, Riyadh, Saudi Arabia.
25	Mohammed H. AlOtaibi,	B.Sc. Supervisor of Simulation Section at Al Khafji Joint Operations (KJO), Khafji, Saudi Arabia.
26	Naif AlDandeni	B.Sc., Director of Sales and Account Management, Oilfield Equipment, Baker Hughes, Dhahran, Saudi Arabia.
27	Salman S. AlSarami	B.Sc. Supervisor, Planning and Support Unit at Refinery Department, Saudi Arabia Oil Company (Aramco), Riyadh, Saudi Arabia.
28	Yahya Quwaidi	B.Sc., Schlumberger, Chief Engineer.
29	Yahya AlYami	M.Sc., Schlumberger, Chief Engineer.
30	Salman AlThagafi	B.Sc., Khafji Joint Operations Company, Chief Engineer, Riyadh, Saudi Arabia.

DEPARTMENT CONTACT INFORMATION

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