PETROLEUM AND NATURAL GAS ENGINEERING (PNG)

PNG 501: Flow in Porous Media
3 Credits
This course provides students with fundamental skills to formulate problems of fluid flow in porous media in the context of reservoir engineering applications. Emphasis is placed on description of petrophysical properties, characterization methods, formulation of the equations that govern flow in porous media, and analytical solutions to steady-state flow problems.

PNG 502: Unsteady Flow in Porous Media
3 Credits
The formulation and analytical solution of the transient fluid flow in porous media.
Prerequisite: PNG 501

PNG 511: Numerical Solution of the Partial Differential Equations of Flow in Porous Media
3 Credits
Differencing schemes for the partial differential equations of single-phase flow; application to flow of gas and mixing in porous media.

PNG 512: Numerical Reservoir Simulation
3 Credits
Mathematical analysis of complex reservoir behavior and combination drives; numerical methods for the solution of behavior equations; recent developments.

PNG 518: Design of Miscible Recovery Projects
3 Credits
Theory and design of miscible methods of oil recovery, current field applications, including hydrocarbon, CO2, micellar/polymer, alkaline, and inert gas.

PNG 520: Phase Relations in Reservoir Engineering
3 Credits
Phase relations as applied to condensate and retrograde condensate reservoirs and to other problems in petroleum production.

PNG 526: Well Stimulation
3 Credits
Causes and identification of oil and gas wells with low productivity and or recovery; design and evaluation of well stimulation methods.

PNG 530: Natural Gas Engineering
1-3 Credits/Maximum of 3
Flow in producing or storage reservoirs; gas well testing; transmission systems; storage cycle; current developments.

PNG 555: Unconventional Resources Analysis
3 Credits
This course provides an in-depth analysis of the technical aspects of unconventional oil and gas reservoirs, such as geochemistry, geomechanics, storage mechanisms, and transport processes. The course is designed to contribute to the student's ability to advance the frontiers of knowledge about the characteristics and development of unconventional reservoirs. The course presents conceptual knowledge and mathematical models necessary for exploration, characterization, reserve estimation, and performance analysis of unconventional oil and gas reservoirs. This content is critical for the student given that conventional hydrocarbon resources are known not to be able to meet growing demand for energy to fuel worldwide economic growth, which has triggered the developments of unconventional resources such as Marcellus Shale.

PNG 566: Reservoir Characterization
3 Credits
This course focuses on the quantitative characterization of oil and gas reservoirs, principally through analysis of seismic survey data, well logs, and by employing geostatistics. Emphasis is placed on the use of seismic surveys in the oil and natural gas industries, including interpretation, inversion, rock physics, and ties to well logs. One major goal of this course is to expose the student to a variety of advanced analytical tools used to quantitatively interpret seismic data. The tools we will talk about are specifically geared towards characterizing petroleum and natural gas reservoirs, but may be adapted for other purposes.

PNG 577: Production and Completions Engineering
3 Credits
In petroleum and natural gas engineering, production and completion operations are critical components of field development operations. This course presents a high-level treatment of modern petroleum production engineering, including well deliverability from vertical and horizontal wells and diagnosis of well performance including production logging. In this course, the function of the production engineer is envisioned in the context of well design, stimulation, and artificial lift.

PNG 590: Colloquium
1-3 Credits/Maximum of 3
Continuing seminars that consist of individual lectures by faculty, students or outside speakers on energy and mineral engineering issues. Cross-listed with: EME 590
PNG 596: Individual Studies
1-9 Credits/Maximum of 9
Creative projects, including nonthesis research, which are supervised on an individual basis and which fall outside the scope of formal courses.

PNG 597: Special Topics
1-9 Credits/Maximum of 9
Creative projects, including nonthesis research, which are supervised on an individual basis and which fall outside the scope of formal courses.

PNG 598: Special Topics
1-9 Credits/Maximum of 9
Formal courses given on a topical or special interest subject which may be offered infrequently; several different topics may be taught in one year or semester.

PNG 600: Thesis Research
1-15 Credits/Maximum of 999
No description.

PNG 601: Ph.D. Dissertation Full-Time
0 Credits/Maximum of 999
No description.

PNG 610: Thesis Research Off Campus
1-15 Credits/Maximum of 999
No description.