PETROLEUM ENGINEERING

M.S. in Petroleum Engineering (http://und-public.courseleaf.com/graduateacademicinformation/departmentalcoursesprograms/engineering/ petroleumengineering/ptre-ms)

M. Engr. in Petroleum Engineering (http://und-public.courseleaf.com/graduateacademicinformation/departmentalcoursesprograms/engineering/ petroleumengineering/ptre-meng)

Ph.D. in Petroleum Engineering (http://und-public.courseleaf.com/graduateacademicinformation/departmentalcoursesprograms/engineering/ petroleumengineering/ptre-phd)

COURSES

PTRE 501. Graduate Cooperative Education. 1-3 Credits.
This course is designed for graduate students to spend a period of time in industry and get field/laboratory experience. A written report, presentation and feedback from the industry advisor is necessary. Prerequisite: Advisor consent. F, S, SS.

PTRE 510. Practical Seismic Processing. 3 Credits.
This course is a modern introduction to seismic data processing EP for practical applications. The underlying physics and mathematics of the various seismic analysis methods are presented, to enable them for creating models of the sub-surface. It covers the topics of digital seismic data processing, seismic migration, and subsurface model building that are useful in both exploration geophysics and solid Earth geophysics. This course covers techniques for data handling and processing obtained from VSP, surface seismic, cross-well and etc. for imagery of subsurface or wellbore. Prerequisite: Department Consent Required. On demand.

PTRE 511. Advanced Petroleum Engineering Labs. 3 Credits.
Studying the major hi-tech research equipment for petroleum reservoir characterization, such as: X-Ray Diffraction, X-Ray Fluorescence, Scanning electron Microscope, Advanced Multifunctioning Tri-axial Cell, Servo-control Uniaxial Testing machine and Nuclear Magnetic Resonance core testing. The students will learn the concepts and physics behind the tool, the purpose of using the equipment and how to operate the machines individually. Prerequisite: Department Consent Required. S, odd years.

PTRE 512. Reservoir Rock Physics. 3 Credits.
The science of Rock Physics attempts to relate the elastic parameters of the rock that are measured in the lab or in the field through static or dynamic methods to other physical properties such as the mineralogy, porosity, pore shapes, size and distribution, pore fluids and their viscosity, pore pressures, permeability, stresses, organic content and maturity and overall embedded features in the rock including fractures and fine stratum. When elastic properties of the rock are collected, theoretical models will be developed to correlate them with the rock physical properties in a spatial sense also known as Rock Physics Templates (RPT). These correlations/models become important when one side of the data is missing exclusively for larger scale hydrocarbon reservoir characterizations. Prerequisite: Instructor or department consent. On demand.

PTRE 513. Seismic Geomechanics. 3 Credits.
This course will cover topics from exploration to production from unconventional reservoirs with a significant emphasis on using commercial modeling and simulation software. Prerequisite: Supervisor or instructor consent. On demand.

PTRE 515. Fundamentals of Shale Plays. 3 Credits.
This course will cover topics on shale and unconventional reservoirs. It will have a seminar component where students will be required to attend and participate daily. Prerequisite: Department consent. On demand.

PTRE 518. Applied Methods of Data Science in Petroleum Engineering. 3 Credits.
The course is an introduction to Data Science and Machine Learning for applications in oil and gas industry. The practical and theoretical aspects of the data science and machine learning for petroleum engineers are presented and make the students ready to solve different challenges in oil and gas through these techniques. It covers the topics of introduction to data science, mathematics and statistics for data science, introduction to Python programming, data preparation for oil and gas industry, introduction to supervised machine learning, applications of supervised ML in oil and gas industry, introduction to unsupervised machine learning, applications of unsupervised ML in oil and gas industry, deep learning and its applications, time series ML and final term project. Prerequisite: Instructor or advisor consent. On demand.

PTRE 521. Advanced Production Engineering. 3 Credits.
Using nodal analysis for design, evaluation, and optimization of petroleum production systems, artificial lift, surface separation, and treating facilities. It also covers: Formation damage control and evaluation, skin effects and calculation, well stimulation and well performance. Prerequisite: Department Consent Required. F, odd years.

PTRE 522. Petroleum System Evaluation. 3 Credits.
This course will cover topics from exploration to production from unconventional reservoirs with a significant emphasis on using commercial modeling and simulation software. Prerequisite: Supervisor or instructor consent. On demand.

PTRE 531. Reservoir Geomechanics. 3 Credits.
Various ranges of applications of geomechanics related to reservoir engineering will be covered in this course. This will include the depletion and injection, induced stresses and their effects on both reservoir and surrounding rocks, the impact of production on compaction, subsidence, and reactivation of faults and, sand production and casing collapse, and the process of hydraulic fracturing. Prerequisite: Department Consent Required. S, even years.

PTRE 532. Advanced Topics in Reservoir Engineering. 3 Credits.
This course will cover topics from exploration to production from unconventional reservoirs with a significant emphasis on using commercial modeling and simulation software. Prerequisite: Supervisor or instructor consent. On demand.

PTRE 541. Data Mining in Petroleum Engineering. 3 Credits.
This course will provide students with the fundamentals of data mining and soft computing methodologies and their applications in the petroleum industry. Students will become familiar with data mining system architecture, concepts and tasks such as data processing, data integration and classification techniques. Special emphasis will be given to presenting common knowledge discovery tools. Prerequisite: Department Consent Required. S, odd years.

PTRE 544. Advanced Topics in Reservoir Geomechanics. 3 Credits.
With the significant increase in the number of graduate students and considering the new coming graduate students, the department feels that more graduate level courses that are in line with faculty research focus are required. Prerequisite: Supervisor or instructor consent. On demand.

PTRE 545. Advanced Topics in Drilling Engineering. 3 Credits.
This course will cover topics from exploration to production from unconventional reservoirs with a significant emphasis on using commercial modeling and simulation software. Prerequisite: Supervisor or instructor consent. On demand.

PTRE 555. Pressure Transient Analysis. 3 Credits.
Diffusivity equation and solutions for slightly compressible liquids; dimensionless variables; type curves; applications of solutions to buildup, drawdown, multi-rate, interference, pulse and deliverability tests; extensions to multiphase flow; analysis of hydraulically fractured wells. Prerequisite: Department Consent Required. F, even years.

PTRE 561. Natural Gas Engineering. 3 Credits.
Estimation of gas properties for well test or production data analysis using accurate correlations and laboratory data, development of material balance analyses for gas reservoir calculation, production and reservoir characteristics of gas and gas-condensate reservoirs. Prerequisite: Department Consent Required. S, odd years.

PTRE 562. Graduate seminar. 1 Credit.
In This course, graduate students should present their biweekly progress in their research for the classroom. In addition, different topics other than the thesis/dissertation will be presented by the graduate students. Finally, several lectures will be given by guest speakers on petroleum related topics mostly. Prerequisite: Department consent. Repeatable to 3 credits. S/U grading. On demand.

http://und-public.courseleaf.com/graduateacademicinformation/departmentalcoursesprograms/engineering/petroleumengineering/ptre-phd)
PTRE 563. Quantitative Seismology. 3 Credits.
This course will cover topics from exploration to production from unconventional reservoirs with a significant emphasis on using commercial modeling and simulation software. Prerequisite: Supervisor or instructor consent. On demand.

PTRE 571. Petroleum Geostatistics. 3 Credits.
A review of classical statistics and its applications in petroleum engineering is discussed. The fundamentals of spatial statistics is presented followed by the concept of variogram and its different models, estimation variance, different interpolation methods including Krigging and how they differ from each other. Practical example are presented with the real data from petroleum industry. Prerequisite: Department Consent Required. F, even years.

PTRE 572. Advanced Numerical Reservoir Simulation. 3 Credits.
This course will cover topics from exploration to production from unconventional reservoirs with a significant emphasis on using commercial modeling and simulation software. Prerequisite: Supervisor or instructor consent. On demand.

PTRE 575. Advanced Stimulation Techniques. 3 Credits.
Introduction to well problems including causes and remediation; near wellbore formation damage mechanism, control and prevention; sand and water production mechanisms; control and management; scale deposition removal and prevention; corrosion control and prevention; principles and practices of well workover and intervention operations; an overview of production logging tools and their various applications including production log interpretation, familiarization with new technology and reservoir stimulation by fracturing with emphasis on design and estimation; stimulation to improve productivity. Prerequisite: Instructor Consent. On demand.

PTRE 579. Advanced Topics in Petrophysics. 3 Credits.
Advanced Topics in Petrophysics: this course covers new advancements and techniques to quantify and characterize physical properties of unconventional reservoirs, in particular, by using new analytical equipment. The properties that will be investigated would be mostly porosity, permeability and other reservoir properties that influence productivity of the formation. The studies focuses on fine scale analysis from nano to micro mostly. Advanced Well Logging: this course covers recently developed well logging tools including sonic scanner, geomechanics logs, NMR, electromagnetic logs that can provide us with more detailed understanding of the reservoir. We study those properties of unconventional reservoir that require extensive laboratory analysis and can be analyzed using recent logging equipment. Prerequisite: Supervisor or instructor consent. On demand.

PTRE 581. Reservoir Geophysics. 3 Credits.
This multidisciplinary course addresses different topics in exploration workflow in implemented in the petroleum industry for oil and gas discovery. Various exploration techniques for locating hydrocarbon reservoirs and estimating their sizes is discussed. Prerequisite: Department Consent Required. S, even years.

PTRE 587. Advanced Well Logging. 3 Credits.
Advanced Well Logging: this course covers recently developed well logging tools including sonic scanner, geomechanics logs, NMR, electromagnetic logs that can provide us with more detailed understanding of the reservoir. We study those properties of unconventional reservoir that require extensive laboratory analysis and can be analyzed using recent logging equipment. Prerequisite: Supervisor or instructor consent. On demand.

PTRE 589. Applied MDS in Petroleum Engineering. 3 Credits.
This course will cover topics from exploration to production from unconventional reservoirs with a significant emphasis on using commercial modeling and simulation software. Prerequisite: Supervisor or instructor consent. On demand.

PTRE 593. Selected Topics in Petroleum Engineering. 1-6 Credits.
Detailed study of selected topics in Petroleum Engineering. Includes laboratory if applicable. Prerequisite: Consent of instructor. Repeatable to 12 credits. On demand.

PTRE 595. Design Project. 3-6 Credits.
Design project is for non-thesis based Master's students. Prerequisite: Department Consent Required. Repeatable to 6 credits. F.

PTRE 598. Enhanced Oil Recovery. 3 Credits.
Fundamentals and theory of enhanced oil recovery; polymer flooding, surfactant flooding, miscible gas flooding and steam flooding; application of fractional flow theory; strategies and displacement performance calculations. Prerequisite: Instructor's consent. S.

PTRE 599. Research. 1-15 Credits.
Analysis, planning, and detailed study of definite problems; individual laboratory work on some selected problems in the field of Petroleum Engineering to develop the power of independent investigation. Prerequisite: Department or advisor consent. Repeatable to 30 credits. F,S,SS.

PTRE 996. Continuing Enrollment. 1-12 Credits.
Continuing Enrollment. Repeatable to 12 credits. S/U grading. F,S,SS.

PTRE 998. Thesis. 1-9 Credits.
Development and documentation of scholarly activity demonstrating proficiency in Petroleum Engineering at the master's level. Repeatable to 9 credits. F,S,SS.

PTRE 999. Dissertation. 1-18 Credits.
Development and documentation of scholarly activity demonstrating proficiency in Petroleum Engineering at the doctoral level. Repeatable to 18 credits. F,S,SS.