PETROLEUM ENGINEERING

Anyone with an interest in subsurface energies and storage, including fossil fuels, carbon and hydrogen storage in subsurface, and geothermal energy, should consider the possibility of a career as a petroleum engineer. Petroleum engineers seek out oil and natural gas reservoirs beneath the earth's surface, design subsurface carbon capture projects, and are frequently involved in deep geothermal energy projects. They develop the safest and most environmentally friendly methods of bringing these energy resources to the market.

Many petroleum engineers travel the world or live in foreign countries - wherever their explorations take them to find and recover valuable petroleum reserves. Petroleum engineers also tend to quickly assume leadership roles, handling large projects with high levels of responsibility.

Because of the increasing demand for types of energy and carbon management beyond fossil fuels, there has been an accompanying increase in the demand for petroleum engineers in areas such as CO_2 sequestration and geothermal energy.

As a petroleum engineering student, you will study the technologies of oil and gas drilling, production, reserves estimation, oil and gas recovery improvement, the prediction of future production, and data mining. You will also study various techniques for evaluating the characteristics of subsurface formations and their fluid contents, which is crucial for all subsurface energy operations.

Petroleum Engineering is an independent degree program offered under the department of geosciences and geological and petroleum engineering.

Mission Statement

The petroleum engineering program at Missouri S&T educates engineers and prepares leaders for the worldwide petroleum industry, and performs meaningful research that advances oil and gas recovery. Students graduating from the petroleum engineering program will be prepared to serve the industry through their technical knowledge, ethical commitment and participation in professional societies. One particular strength of the S&T petroleum engineering program is that students are given strong grounding in geosciences.

Program Educational Objectives

Graduates of the program will exhibit proficiency and excellence in the following attributes:

1. Skills to use modern engineering tools and techniques to identify and solve technical problems associated with the production and management of oil and gas resources
2. Knowledgeable about the techniques and tools of mechanical earth modeling to solve petroleum engineering problems
3. Able to appreciate and function within economic, environmental, societal and ethical constraints
4. Able to create, assimilate, synthesize and communicate knowledge effectively
5. Able to work effectively in multi-disciplinary teams in diverse environments and who exhibit effective communication skills
6. Able to adapt to change through life-long learning

Student Outcomes

Graduates of the program will exhibit proficiency and excellence in the following attributes:

1. Able to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. Able to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. Able to communicate effectively with a range of audiences
4. Able to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. Able to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. Able to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. Able to acquire and apply new knowledge as needed, using appropriate learning strategies
8. Able to use Mechanical Earth Modeling tools and techniques to solve problems associated with drilling and production of oil and gas

Bachelor of Science Petroleum Engineering

For the Bachelor of Science degree in Petroleum Engineering a minimum of 129 credit hours is required. These requirements are in addition to credit received for algebra, trigonometry, and basic ROTC courses. A student must maintain at least two grade points per credit hour for all courses taken in Petroleum Engineering.

Each student's program of study must contain a minimum of 21 credit hours of course work in general education and must be chosen according to the following rules:

1. Six credit hours of English: All students are required to take ENGLISH 1120 (http://catalog.mst.edu/search/?P=ENGLISH%201120) and either ENGLISH 3560 (preferred) or ENGLISH 1160 or ENGLISH 1600.
2. Nine credit hours of basic humanities and social sciences: All students are required to take one history course, one economics course and one humanities course. The history course is to be selected from HISTORY 1200, HISTORY 1300, HISTORY 1310, or POL SCI 1200. The economics course may be either ECON 1100 or ECON 1200 . The humanities course selected must meet requirements as specified under "Engineering Degree Requirements" published in the current undergraduate catalog.
3. Three credit hours as a depth requirement. Three credit hours must be taken in humanities or social sciences at the 2000-level or above and meet requirements as specified under "Engineering Degree Requirements" published in the current undergraduate catalog. This course must have as a prerequisite one of the humanities or social sciences courses already taken. Foreign language courses numbered 1180 will be considered to satisfy this requirement. Students may

receive humanities credit for foreign language courses in their native tongue only if the course is at the 4000-level. All courses taken to satisfy the depth requirement must be taken after graduating from high school.

4. Three credit hours of elective humanities and social sciences must meet requirements as specified under "Engineering Degree Requirements" published in the current undergraduate catalog..
5. Special topics and special problems and honors seminars are allowed only by petition to and approval by the student's department chair.

The Petroleum Engineering program at Missouri S&T consists of a strong foundation in math, sciences and engineering fundamentals, plus strong content in the traditional Petroleum Engineering core areas of drilling, production and reservoir engineering. S&T Petroleum Engineering students are prepared to solve today's problems and tomorrow's. Students learn theory, have ample hands-on experiences in laboratories, and they learn many modern software packages used by the petroleum industry.

Students planning on majoring in petroleum engineering should take the following courses.

Freshman Year

First Semester	Credits	Second Semester	Credits
FR ENG 1100	1	MATH 1215[2]	4
CHEM 1310[1]	4	PHYSICS 1135	4
CHEM 1319	1	MECH ENG 1720	3
MATH 1214 or 1211[2]	4	GEO ENG 1150 or GEOLOGY 1110	3
HISTORY 1200, or 1300, or 1310, or POL SCI 1200	3	PET ENG 2510	3
ENGLISH 1120	3		
PET ENG 1120	1		
	17		**17**

Sophomore Year

First Semester	Credits	Second Semester	Credits
MATH 2222	4	MATH 3304	3
PHYSICS 2135	4	MECH ENG 2350	2
PET ENG 3320	3	CIV ENG 2210	3
HUMANITIES/SS ELECTIVES[4]	3	ECON 1100 or 1200	3
CIV ENG 2200	3	PET ENG 3520	3
		PET ENG 3330	3
	17		**17**

Junior Year

First Semester	Credits	Second Semester	Credits
CIV ENG 3330	3	PET ENG 4410	3
PET ENG 4210[3]	3	PET ENG 4631	3
CS PROGRAMMING ELECTIVE[6]	3	MECH ENG 2527	3
HUMANITIES/SS ELECTIVES[4]	3	GEOLOGY 5513	3
GEOLOGY 3310	3	ENGLISH 1160, or 1600, or 3560	3
GEOLOGY 3319	1		
	16		**15**

Senior Year

First Semester	Credits	Second Semester	Credits
PET ENG 4520	3	PET ENG 4097	3
PET ENG 5801	3	GEO ENG 4115	3
PET ENG Elective[3]	3	Hum/Soc Sci Elective[4]	3
PET ENG 4590	3	PET ENG 4531	3
PET ENG 4720	3	PET ENG 5050	3
	15		**15**

Total Credits: 129

1. All freshmen Petroleum Engineering students must enroll in CHEM 1100 (Intro to Lab Safety and Haz Mat).
2. MATH 1208 or MATH 1211 may be substituted for MATH 1214. MATH 1221 may be substituted for MATH 1215.
3. Select Petroleum Engineering electives in accordance with interest and availability of courses. Courses include secondary recovery of petroleum, advanced drilling technology, well completion design and artificial lift.
4. Humanities/Social Science electives are to be selected from a list of approved courses to be taken in accordance with the University policy. Petroleum Engineering students are especially encouraged to study foreign languages
5. All Petroleum Engineering students must take the Fundamentals of Engineering Examination prior to graduation. A passing grade on this examination is not required to earn a B.S. degree, however, it is the first step to becoming a registered professional engineer. This requirement is part of Missouri S&T assessment process as described in Assessment Requirements found elsewhere in this catalog. Students must sign a release form giving the University access to their Fundamentals of Engineering Examination score.
6. selection can be COMP SCI 1972 and COMP SCI 1982, or COMP SCI 2300, or be replaced by formal online program course credits.

The total number of credit hours required for a degree in Petroleum Engineering is 129.

Petroleum Engineering students must earn the grade of "C" or better in all Petroleum Engineering courses to receive credit toward graduation.

Accelerated BS/MS Program Option for Petroleum Engineering Majors

Missouri S&T Petroleum Engineering undergraduate students may opt to apply for an accelerated BS/MS program where a student can earn both the BS and MS degrees in Petroleum Engineering faster than if pursuing the degrees separately. The degrees awarded will be a BS & MS (non-thesis or thesis) in Petroleum Engineering.

The benefits for undergraduate students admitted to the program are:

- Undergraduate and graduate courses may be chosen with greater flexibility,
- Up to nine hours of 5000-level or above Petroleum Engineering coursework may apply to both the BS and MS requirements,
- The classes taken for shared BS/MS credit may be taken at the lower undergraduate tuition rate,
- The GRE is not required for admission,
- Other graduate courses can be taken any time after entering the program as a dual enrolled student,
- Work on a thesis project may begin before the BS requirements are completed.

To be eligible for the accelerated BS/MS Petroleum Engineering program, a Petroleum Engineering undergraduate must be at or beyond the junior level standing with a minimum of 48 credit hours. They must have

successfully completed the Chemistry and Math requirements and have completed 21 credit hours of Petroleum Engineering courses at Missouri S&T with at least a 3.2 GPA in the Petroleum Engineering courses. To be admitted, the student must complete the program application and non-thesis MS students must have the recommendation of a Petroleum Engineering faculty member, while thesis MS students must have the recommendation of a Petroleum Engineering faculty member who agrees to serve as the graduate thesis advisor. All other MS degree requirements remain the same. The program may be combined with existing honors research, emphasis areas, and certificate options.

The Accelerated Program application must be completed within one semester after shared-credit courses are completed. Courses taken for shared credit will be identified on the application form. These courses will also be listed on the student's Graduate Form 1 to be submitted after the student enters the graduate program. The nine hours of shared-credit coursework, to be taken as undergraduate credit, must be approved by the academic advisor, and may not be undergraduate research, special problems, or transfer courses. An additional six credit hours of coursework for graduate credit (beyond the shared BS/MS credits) can be taken while in the undergraduate program by applying for dual undergraduate/graduate enrollment. Taking additional courses for graduate credit as a dual enrolled student will require formal application to the graduate program. Upon application, acceptance to the Petroleum Engineering MS degree from the Accelerated Program is automatic so long as the student remains in good standing (GPA above 3.0 and B's or better in all graduate courses) within the program. To remain in the Accelerated Program, the student must meet Petroleum Engineering graduate student academic performance requirements and must maintain continuous enrollment at Missouri S&T. If the student exits the program before completion of the MS degree requirements, or fails to maintain continuous enrollment at Missouri S&T, the shared-credit courses may not apply toward graduate requirements in the event of future readmission.

It is the student's responsibility to check on how dual-enrollment status and graduate coursework affects scholarships and other financial aid. As a graduate student, you **are not** eligible for Federal Pell Grants. You are still eligible for Federal Financial Aid. You may be eligible for fellowships and teaching/research assistantships. It is the International student's responsibility to check with international affairs during completion of an accelerated BS/MS to ensure immigration status will be maintained throughout the program.

Minor Curriculum in Petroleum Engineering

The petroleum industry employs not only petroleum but also civil, electrical, chemical, geological, mechanical and other engineers. A petroleum engineering minor, therefore, enhances the academic credentials of a student and broadens their employment choices. A minor in petroleum engineering requires 15 hours of Missouri S&T credit to include the following:

PET ENG 3520	Petroleum Reservoir Engineering	3
PET ENG 4210	Drilling and Well Integrity	3
PET ENG 4410	Production Engineering	3
Two elective courses*		6
Total Credits		**15**

*The two elective courses are to be chosen from any petroleum engineering course and/or Petroleum Geology (GEOLOGY 5513) .

Baojun Bai, Professor and Lester R. Birbeck Chair
PHD New Mexico Institute of Mining and Technology

David Carpenter, Associate Teaching Professor[1]
BSME University of Missouri, Columbia

Shari Dunn Norman, Associate Professor Emeritus
PHD Heriot-Watt University

Andreas Eckert, Associate Professor
PHD University of Karlsruhe

Ralph E Flori Jr, Associate Professor Emeritus
PHD University of Missouri-Rolla

Mingzhen Wei, Associate Professor
PHD New Mexico Tech

PET ENG 1120 Introduction to Subsurface Energy and Carbon Storage (LEC 1.0)
This course provides an overview of oil and gas upstream activities, a brief introduction to geothermal energy and carbon storage in geological reservoirs.

PET ENG 2000 Special Problems (IND 1.0-3.0)
Problems or readings on specific subjects or projects in the department. Consent of instructor required.

PET ENG 2001 Special Topics (IND 1.0-3.0)
This course is designed to give the department an opportunity to test a new course. Variable title.

PET ENG 2002 Cooperative Work Training (IND 1.0-3.0)
On-the-job experience gained through cooperative education with industry, with credit arranged through departmental cooperative advisor. Grade received depends on quality of reports submitted and work supervisor's evaluation.

PET ENG 2510 Properties Of Hydrocarbon Fluids (LEC 3.0)
Physical properties of petroleum fluids; chemical components of petroleum fluids. Elementary phase behavior; calculations of the physical properties of gases, liquids, and gas-liquid mixtures in equilibrium. Prerequisite: Chem 1310.

PET ENG 3000 Special Problems (IND 1.0-3.0)
Problems or readings on specific subjects or projects in the department. Consent of instructor required.

PET ENG 3001 Special Topics (LAB 0.0 and LEC 0.0)
This course is designed to give the department an opportunity to test a new course. Variable title.

PET ENG 3320 Petrophysics (LAB 1.0 and LEC 2.0)
Properties of petroleum reservoir rocks, including lithology, porosity, absolute permeability, pore surface area, relative and effective permeability, fluid saturations, rock wettability, capillary characteristics, acoustic properties, and electrical properties. Darcy's law for single phase linear horizontal, tilted and radial flow. Prerequisites: Preceded or accompanied by Physics 1135.

PET ENG 3330 Formation Evaluation (LAB 1.0 and LEC 2.0)
An introduction to the electrical, nuclear, and acoustic properties of rocks: theory and interpretation of well logs. Prerequisites: Physics 2135 or 2111; Pet Eng 3320.

PET ENG 3520 Petroleum Reservoir Engineering (LEC 3.0)
Properties of reservoir formations and fluids; reservoir volumetrics, reservoir statics, reservoir dynamics. Darcy's law and the mechanics of single and multiphase fluid flow through reservoir rock, capillary phenomena, material balance, reservoir drive mechanisms. Prerequisite: Accompanied or preceded by Pet Eng 2510, Pet Eng 3320.

PET ENG 3529 Petroleum Reservoir Laboratory (LAB 1.0)
Core analysis determination of intensive properties of crude oil and its products; equipment and methods used to obtain petroleum reservoir information. Prerequisite: Accompanied or preceded by Pet Eng 3520.

PET ENG 4000 Special Problems Special Problems Special Problems (IND 0.0)
Problems or readings on specific subjects or projects in the department. Consent of instructor required.

PET ENG 4001 Special Topics (LAB 1.0 and LEC 2.0)
Problems or readings on specific subjects or projects in the department. Consent of instructor required.

PET ENG 4010 Ethics and Professionalism (LEC 1.0)
Topics related to Ethics and Professionalism. Lifelong learning, teamwork and discussion of current events. (Course cannot be used for graduate credit). Prerequisite: Senior standing in Pet Eng.

PET ENG 4097 Capstone Design (LEC 3.0)
Senior capstone design project(s) based on industry data. Application of reservoir engineering: drilling and production engineering principles to evaluate and solve an industry problem such as a new field development, evaluation of an existing reservoir asset, or analysis of field re-development. Prerequisites: Pet Eng 3520 and senior standing.

PET ENG 4099 Undergraduate Research (IND 0.0-6.0)
Designed for the undergraduate student who wishes to engage in research. Not for graduate credit. Not more than six credit hours allowed for graduation credit. Subject and credit to be arranged with the instructor.

PET ENG 4109 Field Studies (LAB 1.0)
Field trip, which studies different aspects of petroleum engineering like reservoirs, caprocks and traps, drilling rigs, petroleum production facilities, refineries and petroleum engineering research facilities. This course takes the students for one week to petroleum operations and geological outcrops in Oklahoma and Texas to expose students to field work.

PET ENG 4111 Fundamental Digital Applications In Petroleum Engineering (LEC 3.0)
Applications of Windows-based Visual Basic solutions to engineering problems including selected topics in fluid flow, PVT behavior, matrices in engineering solutions, translating curves to computer solutions, predictor-corrector material balance solutions, and graphical display of results. Prerequisite: Junior Standing.

PET ENG 4210 Drilling and Well Integrity (LAB 1.0 and LEC 2.0)
This course covers drilling fluids, including mixing and analysis of rheological properties; pressure loss calculations; casing design; well cementing; pore pressure and geomechanical considerations in drilling; completion equipment; and completion design. Prerequisite: Preceded or accompanied by Civ Eng 2200.

PET ENG 4211 Advanced Drilling Technology (LEC 3.0)
In-depth study of directional well planning and drilling. The course covers the bottom hole assembiles and operational techniques used in drill directional drilling as well as the limiting factors and hole problems related to horizontal wells. Prerequisites: Pet Eng 4210.

PET ENG 4311 Reservoir Characterization (LEC 3.0)
The integration and extrapolation of Geologic, Geophysical, and Petroleum Engineering data for flow model construction. Prerequisites: Pet Eng 3520 and Pet Eng 3330.

PET ENG 4410 Production Engineering (LAB 1.0 and LEC 2.0)
Introduction to the producing wellbore system; inflow performance relationships, effect of formation damage on well flow, nodal systems analysis; perforating methods and their effect on inflow; stimulation treatments to enhance well performance. Introduction to well completions, diagnostics and well servicing. Overview of production systems. Prerequisite: Preceded or accompanied by Pet Eng 3520.

PET ENG 4421 Artificial Lift (LEC 3.0)
This course is a study of artificial lift methods used to produce liquids (oil/water) from wellbores. Methods covered include sucker rod (piston) pumps, electric submersible pumps, gas lift, hydraulic lift and plunger lift. Prerequisite: Pet Eng 4410.

PET ENG 4431 Well Completion Design (LEC 3.0)
An overview of the hardware, fluids and processes employed in completing oil and gas wells. Examination of types of well completions and considerations in their design. Introduction to downhole mechanics and tubing movement and stress calculations. Prerequisite: Pet Eng 4410.

PET ENG 4441 Well Stimulation (LEC 3.0)
This course reviews fundamentals of hydraulic fracturing and builds on the basic theory through the use of STIMPLAN software and hands on industry examples. The course teaches the methods used to plan, execute and evaluate hydraulic fracturing treatments. Students may not earn credit for both Pet Eng 4441 and Pet Eng 6441. Prerequisites: Pet Eng 3520 and Pet Eng 3330.

PET ENG 4511 Applied Petroleum Reservoir Engineering (LEC 3.0)
Quantitative study of oil production by natural forces, gas cap, water influx, solution gas, etc.; material balance equations, study of gas, non-retrograde gas condensate, and black oil reservoirs. Predictive calculations of oil recovery from different reservoir types. Prerequisites: Pet Eng 3520.

PET ENG 4520 Well Test Analysis (LAB 1.0 and LEC 2.0)
Causes of low well productivity; analysis of pressure buildup tests, drawdown tests, multi-rate tests, injection well fall off tests, and open flow potential tests; design of well testing procedures. Prerequisite: Pet Eng 3520.

PET ENG 4531 Natural Gas Engineering (LEC 3.0)
This course will cover basic and fundamental knowledge for a future natural gas engineer, including natural gas properties, natural gas underground storage estimates, natural gas exploration/drilling/and completion, natural gas productivity and deliverability estimates, natural gas related processing after it reaches the surface. Prerequisite: Pet Eng 2510.

PET ENG 4590 Subsurface Energy Economics (LEC 3.0)
Uncertainty in the estimation of oil and gas reserves; tangible and intangible investment costs; depreciation; evaluation of producing properties; federal income tax considerations; chance factor and risk determination. Petroleum economic evaluation software is introduced. Prerequisites: Pet Eng 3520, Econ 1100, or Econ 1200.

PET ENG 4611 Secondary Recovery Of Petroleum (LEC 3.0)
Oil recovery by water injection. Effects of wettability, capillary pressure, relative permeability, mobility ratio on displacement, sweep, and recovery efficiencies. Piston-like and Buckley-Leverett models. Fractional flow and frontal advance equation. Oil recovery prediction methods for linear and pattern waterfloods in single and multi-layered reservoirs. Prerequisites: Pet Eng 3520.

PET ENG 4621 Fundamentals Of Petroleum Reservoir Simulation (LEC 3.0)
An introduction to petroleum reservoir simulation. Fundamentals of finite difference approximation of the partial differential equations of flow through porous media. Discussion of various simulation schemes, data handling, boundary conditions. Use of a dry gas and black oil simulators. Prerequisite: Pet Eng 3520.

PET ENG 4631 Applied Reservoir Simulation (LAB 1.0 and LEC 2.0)
Simulation of reservoir problems using field and individual well models to determine well spacing, production effects of secondary and enhanced recovery processes, future rate predictions and recovery, coning effects, and more. The lab focuses on learning computer simulation models, including practice using the software and data analyses techniques. Prerequisite: Pet Eng 3520.

PET ENG 4710 Finite Element Analysis with Applications in Petroleum Engineering (LAB 1.0 and LEC 2.0)
This course introduces finite element analysis (FEA) methods and applications of FEA in subsurface engineering. The course is intended to provide a fundamental understanding of FEA software and experience in creating meshes for petroleum reservoirs or other subsurface features. Prerequisites: Pet Eng 3520, Geology 3310, and Math 3304.

PET ENG 4720 Reservoir Geomechanics (LAB 1.0 and LEC 2.0)
This course introduces the work process necessary to create the Mechanical Earth Model's principal components, formation in situ stress and strength. 1-D modeling methods are reviewed and extended to 3-D, and the integration of MEM with well design is shown. An MEM model will be created and compared to actual field results. Prerequisites: Pet Eng 3330, Geology 3310, and Geology 3319.

PET ENG 4811 Offshore Petroleum Technology (LEC 3.0)
An introduction to the development of oil and gas fields offshore, including offshore leasing, drilling, well completions, production facilities, pipelines, and servicing. Subsea systems, and deepwater developments are also included. This course is suitable for mechanical, electrical and civil engineering students interested in ultimately working offshore. Prerequisites: Pet Eng 3520.

PET ENG 4821 Environmental Petroleum Applications (LEC 3.0)
This course is a study of environmental protection and regulatory compliance in the oil and gas industry. The impact of various environmental laws on drilling and production operations will be covered. Oilfield and related wastes and their handling are described. Federal, state and local regulatory agencies are introduced, and their role in permitting and compliance monitoring is presented. Legal and ethical responsibilities are discussed. Prerequisite: Chem 1310.

PET ENG 5000 Special Problems (IND 0.0-6.0)
Problems or readings on specific subjects of projects in the department. Consent of instructor required.

PET ENG 5001 Special Topics (LEC 0.0-6.0)
This course is designed to give the department an opportunity to test a new course. Variable title.

PET ENG 5010 Seminar (RSD 0.0-6.0)
Discussion of current topics.

PET ENG 5040 Oral Examination (IND 0.0)
After completion of all other program requirements, oral examinations for on-campus M.S./Ph.D. students may be processed during intersession. Off-campus M.S. students must be enrolled in oral examination and must have paid an oral examination fee at the time of the defense/ comprehensive examination (oral/ written). All other students must enroll for credit commensurate with uses made of facilities and/or faculties. In no case shall this be for less than three (3) semester hours for resident students.

PET ENG 5050 Carbon Storage (LEC 3.0)
This course provides an overview of CO2 storage in subsurface from fundamental to applications. The topics include importance of store CO2 in subsurface, CO2 phase behavior, geologic reservoir storage, CO2 enhanced oil recovery, CO2 leakage monitoring and control, and field case studies.

PET ENG 5085 Internship (IND 0.0-15)
Students working toward a doctor of engineering degree will select, with the advice of their committees, appropriate problems for preparation of a dissertation. The problem selected and internship plan must conform to the purpose of providing a high level engineering experience consistent with the intent of the doctor of engineering degree.

PET ENG 5099 Research (IND 0.0-12)
Investigations of an advanced nature leading to the preparation of a thesis or dissertation. Consent of instructor required.

PET ENG 5801 Petroleum Data Analytics (LAB 1.0 and LEC 2.0)
This course provides a general introduction to fundamental data analytics methods including basic statistical analysis, regression analyses and their applications in petroleum engineering, and their implementation using python, the most popular interpreted computer language. Prerequisites: Comp Sci 1500 and at least Junior standing.