

Message From the Petroleum Engineering Department

The Petroleum Engineering Department at the Colorado School of Mines enjoys a worldwide reputation for excellence in petroleum engineering education and research. We attract well-qualified students from all over the world, which creates a healthy international atmosphere. The popularity of the program is reflected in the large number of applicants, the demand from industry for graduating students, and the high level of financial support from private sources.



All disciplines within the field of petroleum engineering are covered in depth in the classroom, the laboratory, and in research. Specific areas are drilling, formation evaluation, reservoir characterization, well completion and stimulation, well testing, production operations and artificial lift, reservoir engineering, supplemental recovery, economic evaluation of petroleum projects, fundamental fluid and rock behavior, and computer simulation of most of these topics.

A student in our program will enjoy geology, computer sciences, math, chemistry, physics, general engineering, the humanities, technical communication, including report writing and public speaking, and environmental issues. The breadth and depth of our program is unique; it is designed to prepare each graduate for a successful career with both technical competence and managerial ability. To maintain leadership in current and future technology, decision making, and management, the program has the latest facilities for laboratory instruction and experimental research.

Professionals in the petroleum industry are well-acquainted with our program; hence our students are first in line for jobs in the field. Recent graduates are working in production and operations, research, consulting, and university faculty positions. Many have branched out to geothermal and environmental engineering, law, business, and medicine.

We have deliberately planned enrollment for an optimum size to facilitate a personalized educational experience for each student. Class sizes range from five to twenty, and professors and students work together closely. We strive to help each student operate as independently as possible

And stress the need for professionalism, lifelong learning, and multidisciplinary teamwork.

Our program emphasizes multidisciplinary teams in classroom courses and on research projects. Professors and students from our department work closely with those from the departments of Geology, Geophysics, Mining, and Chemical Engineering. Some projects also include the Environmental Science and Engineering Department and other departments across campus. My own areas of emphasis and research cover multidisciplinary reservoir development and management projects, reservoir engineering, and simulation.

As Department Head, I have many administrative responsibilities, but I most enjoy teaching and working with students on research projects. One of the great pleasures I get from being a professor in our program is forming close ties with students, keeping in touch throughout their careers. I look forward to welcoming you to our petroleum engineering program here at the Colorado School of Mines.

Feel free to contact me any time for more information.

Craig W. Van Kirk,

Professor

Department of Petroleum Engineering

Colorado School of Mines

Golden, Colorado 80401

Phone: 303-273-3740

FAX: 303-273-3189

URL: <http://www.mines.edu/Academic/petroleum/>



Petroleum Engineering at CSM

Each generation of engineers must find new solutions to the problems that challenge the survival of the human race—food, shelter, and the energy to obtain them. While adequate food and shelter are essential to survival, energy is the currency of exchange. It is the job of petroleum engineers to extract the world's natural fuels in the most environmentally sound and economically efficient way - and that's what you learn in the Petroleum Engineering Department at Colorado School of Mines.

Petroleum engineering is not a narrowly focused engineering discipline. A petroleum engineer must have a good understanding of chemistry, physics, geology, economics, statics, thermodynamics, strength of materials, fluid behavior, rock behavior, the interaction between fluid and rock, and other fields. Graduate studies are an excellent avenue to investigate the relationships among these fields, and to gain a better understanding of the complexities of petroleum reservoirs.

Research Programs

Research in the Petroleum Engineering Department of CSM has a worldwide reputation for immediate usefulness in managing drilling, field development, operations, well stimulation, and other production and reservoir problems. Research work is now taking new interdisciplinary directions in dynamic rock mechanics, geostatistics, geochemistry, petrophysics, and instrumentation. New techniques of reservoir management provide new solutions to industry problems. These techniques include numerical simulation of reservoir performance, well completion, design optimization, fluid flow in porous media, multiphase flow in pipelines, and optimal drilling strategy.

New areas of study include methods to enhance oil and gas production more economically and effectively with CO₂, polymers, or alkaline fluids. Management and production from reservoirs in which gas hydrates exist or form are being studied. Research is in progress to better describe and simulate a reservoir so that its geologic, geochemical, and petrophysical character are more clearly recognizable. Such research will make wells more productive and increase the likelihood of producing all the oil and gas possible.

In addition, nontraditional areas of petroleum engineering research are also incorporated. These areas include extraterrestrial drilling, specifically on Mars, ice coring operations primarily in Antarctica for paleoclimatic ice dynamics, cryobiology and carbon sequestration for global climatology.

These research topics, representing a few areas of interest in petroleum engineering at CSM, are dedicated to the discovery of knowledge about the development of new energy resources. As the activity of our faculty clearly demonstrates, discovery carries the obligation to transfer knowledge and understanding to others so that it can be utilized.

Some current research projects are:

- Multidisciplinary reservoir characterization
- Advanced drilling simulation
- Extraterrestrial drilling
- Ice coring drilling
- Advanced drilling
- Finite element modeling
- Reservoir simulation
- Improved oil recovery
- Phase behavior
- Dynamic rock mechanics
- Sand control
- Coalbed methane
- Economics and management
- Tight gas sand production
- Natural gas engineering.

Degree Programs:

At the master's level, the Petroleum Engineering Department offers students the choice between a Master of Science and Master of Engineering degree. For the Master of Science degree a thesis is required in addition to course work. No thesis is required for the Master of Engineering degree, but the course work requirement is greater. After admission to the graduate program, students may change from MS to ME or vice versa according to their needs and interests. A Doctorate of Philosophy is also offered. The department is also a participant in the Professional Master's in Petroleum Reservoir Systems (PMPRS) program as described below. New students are assigned a temporary advisor for assistance in planning their programs until a research advisor is selected.

Petroleum Engineering at CSM

The Master of Engineering Degree

Candidates for the non-thesis Master of Engineering degree must complete 36 hours of graduate course credit. At least 27 of the credit hours must be from the Petroleum Engineering Department. Up to 12 graduate credit hours can be transferred from another institution, and up to 9 credit hours of senior-level courses may be applied to the degree. All courses must be approved by a faculty advisor from the Petroleum Engineering Department. No graduate committee is required. For the ME degree, the student must demonstrate sound engineering thought and practice.

The Master of Science Degree

Candidates for the Master of Science degree must complete 24 graduate credit hours of course work and 12 hours of research credit. Each student conducts independent research and submits a thesis for oral examination by the advisor and committee members. Candidates for the non-thesis Master of Engineering degree must complete 36 hours of graduate course credit. Most students earn a Master's degree before pursuing the PhD, but could study directly for the PhD.

The Professional Master's in Petroleum Reservoir Systems

The Professional Master's in Petroleum Reservoir Systems (PMPRS) program is a non-thesis, one-year, interdisciplinary degree program, jointly administered by the departments of Geology and Geological Engineering, Geophysics, and Petroleum Engineering.

PMPRS is open to qualified individuals with undergraduate degrees in geological, geophysical, petroleum, or related engineering disciplines. Within the program requirements, students may individually tailor their program, which will include courses from each of the three major disciplines, as well as courses that combine the contributions of these disciplines.

The program consists of a minimum of 36 credit hours. Nine credit hours of core courses will include the following subjects:

- well log analysis and formation evaluation
- multidisciplinary petroleum studies
- integrated exploration and development.

In addition, students are encouraged to include courses in petroleum risk management, economics, and decisionmaking. Up to six hours may consist of independent study, including an industry project.

The Doctor of Philosophy Degree

The doctorate is a research degree and requires 90 hours beyond the bachelor's degree, including at least 30 master's credit hours. The student is required to take a minor of 12 credit hours as part of the total 90 hours. PhD students must take qualifying examinations before being admitted as degree candidates. Comprehensive oral and written examinations are required between the end of formal course work and the beginning of a research project, which consists of original work in approach or solution to a petroleum engineering problem. Each student submits and defends the research dissertation to the advisor and a committee.

Admissions & Financial Assistance

Students with a strong interest in furthering their petroleum engineering skills are encouraged to apply for admission to our graduate program. A grade point average of 3.0 on a 4.0 scale is generally required for students who have recently graduated from undergraduate programs.

Job performance and the ability to learn are more important for applicants with experience working in petroleum-related fields. All applicants must take the Graduate Record Examination (GRE). International students whose native language is not English must take an English proficiency examination (TOEFL).

Applicants must meet both Department and Graduate School requirements for admission and are formally admitted by the Graduate School upon recommendation from the Department.

Applicants who do not hold a petroleum engineering degree from an accredited university are required to take appropriate deficiency courses. For engineering majors other than petroleum engineering, a number of geology and petroleum engineering courses are required. Geology majors usually have deficiencies in mathematics and petroleum engineering courses. Specific deficiencies are determined after a review of the applicant's transcript and work experience.

For more information, see [Graduate Admissions Requirements](#) and [on-line application](#).

Applicants seeking financial support should submit a financial aid application with the admission packet. Support may be in the form of teaching assistantships (TAs), research assistantships (RAs), fellowships or

Petroleum Engineering at CSM

or work study. Students are encouraged to apply for financial support, but there is no guarantee of assistance. The longer a student is in the program, the more likely financial assistance will be granted.

Western Regional Graduate Program

The Petroleum Department programs are participants in the Western Regional Graduate Program (WRGP), which allows students who are residents of one of the 14 western states to enroll at CSM with resident tuition. WRGP is one of the programs established by WICHE, the Western Interstate Commission for Higher Education, to promote the sharing of higher education resources. Students applying to the Petroleum Department who are residents of participating WICHE states may enroll as WRGP students. Applicants do not have to meet specific financial criteria, but they must meet all admissions requirements and deadlines set by

CSM. For more information about WRGP see <http://www.wiche.edu/SEP/WRGP>.

For more information, see [Financial Aid](#).

For more information, contact Denise Winn-Bower,

Administrative Assistant at: dwinnbow@mines.edu or write:

Department of Petroleum Engineering
Colorado School of Mines
Golden, CO 80401
Phone: 303-273-3740 or 1-800-446-9488, Ext. 3740
FAX: 303-273-3189
URL: <http://www.mines.edu/Academic/petroleum/>

Petroleum Engineering Faculty

Alfred W. Eustes III, Associate Professor. BS Louisiana Tech; MS University of Colorado; PhD Colorado School of Mines. Wave propagation and vibrations in drillstrings; bit vibrations and design; drillstring buckling; directional drilling; fuzzy logic control systems; air and underbalanced drilling; extraterrestrial drilling.

John R. Fanchi, Professor. BS University of Denver; MS University of Mississippi; PhD University of Houston. Applied reservoir simulation; computer modeling of fluid flow in porous media; integrated flow modeling; multidisciplinary reservoir characterization; improved/enhanced oil recovery.

Ramona M. Graves, Professor. BS Kearny State College; PhD Colorado School of Mines. Reservoir characterization; dynamic and static mechanical rock properties; in-situ stress evaluation; sand control; subsidence control; fluid flow in porous media; integration of multidisciplinary teams.

John R Fanchi Professor. BS University of Denver; MS University of Mississippi; PhD University of Houston. Applied reservoir simulation; computer modeling of fluid flow in porous media; integrated flow modeling; multidisciplinary reservoir characterization; improved/enhanced oil recovery.

Hossein Kazemi, Professor. Chesebro' Distinguished Chair in Petroleum Engineering. BS, PhD The University of Texas, Austin. Transient testing in wells; petroleum reservoir simulation; improved/enhanced oil recovery.

Mark G. Miller, Lecturer. BS. PhD Colorado School of Mines. Numerical simulation; drilling; air drilling; directional drilling; artificial lift; phase behavior; field automation; computer software design.

Jennifer L. Miskimins, Assistant Professor. BS Montana College of Mineral Science and Technology; MS, PhD Colorado School of Mines. Completions and stimulation engineering; hydraulic fracturing; rock mechanics; low permeability reservoir characterization; economics and risk analysis; multidisciplinary integration and design.

Erdal Ozkan, Professor. BS, MS Istanbul Technical University; PhD University of Tulsa. Modeling and solution of transient flow problems in porous media; development of computational algorithms; well test analysis; horizontal well technology management; multidisciplinary teams.

Craig W. Van Kirk, Professor. Head of Department. BS, MS University of Southern California; PhD Colorado School of Mines. Reservoir engineering and simulation; optimizing reservoir development; integration of multidisciplinary teams.

Turhan Yildiz, Associate Professor. BS Istanbul Technical University; MS, PhD Louisiana State University. Natural gas engineering; integrated surface facility/production network/reservoir simulation; production optimization; advanced intelligent/multilateral well design; reservoir flow modeling.