

## Additional Information

Please direct all inquiries to  
**The University of Kansas**  
**Graduate Admissions Adviser**  
**Department of Chemical and Petroleum Engineering**  
**Learned Hall**  
**1530 W. 15th St., Room 4006**  
**Lawrence, KS 66045-7609**

Telephone: (785) 864-4965, E-mail: [cpeinfo@ku.edu](mailto:cpeinfo@ku.edu)  
Web site: [www.engr.ku.edu/cpe](http://www.engr.ku.edu/cpe)  
Online Graduate School application: [www.graduate.ku.edu](http://www.graduate.ku.edu)

Please send me information on the graduate program in chemical and petroleum engineering at the University of Kansas and material for admission and financial aid.

Please type or print and mail to the address above.

Name: (Mr.) \_\_\_\_\_  
(Ms.) \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_

State: \_\_\_\_\_ Zip: \_\_\_\_\_

Telephone: (\_\_\_\_\_) \_\_\_\_\_

E-mail address: \_\_\_\_\_

Institution: \_\_\_\_\_

Degrees granted: \_\_\_\_\_

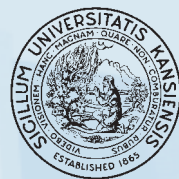
Graduation date: \_\_\_\_\_

Major: \_\_\_\_\_

Citizenship: \_\_\_\_\_

Probable starting date: \_\_\_\_\_

Cover photos by Sharon Hartbauer, Kelly Heese, Doug Koch, and David McKinney.  
Produced by the KU Office of University Relations and KU Printing Services, 2003.



THE  
UNIVERSITY  
OF KANSAS

**Graduate  
Study in  
CHEMICAL AND  
PETROLEUM  
ENGINEERING**



## Chemical and Petroleum Engineering

*The University of Kansas is a major educational and research institution with 29,000 students and 2,100 faculty members. KU includes the main campus in Lawrence; the Medical Center in Kansas City, Kansas; the KU Edwards Campus in Overland Park; a clinical campus of the School of Medicine in Wichita; and educational and research facilities throughout the state. Visit KU's Web site, [www.ku.edu](http://www.ku.edu) or the Graduate School's Web site, [www.graduate.ku.edu](http://www.graduate.ku.edu).*

*Research is an integral part of the university's educational process. KU has more than 40 special research facilities, in addition to those in individual departments and schools. KU receives more than \$243 million a year for research in science, technology, the social sciences, and humanities. The National Science Foundation classifies KU as a major university receiving substantial research support. The Carnegie Foundation classifies KU as a research-extensive doctoral institution, a classification given to the top research universities.*

*KU's main campus occupies 1,000 acres on and around Mount Oread in Lawrence, a community of more than 80,000 among the forested hills of eastern Kansas. Lawrence offers shopping areas, malls, restaurants, entertainment, and recreational facilities within easy walking distance of the campus or on bus routes. Near Lawrence, there are four lake resort areas for boating, fishing, and swimming. Metropolitan Kansas City with its international airport, professional sports, ballet, opera, concerts, night spots, galleries, museums, and festivals is about 45 minutes away by interstate highway.*

*The University of Kansas prohibits discrimination on the basis of race, color, religion, sex, national origin, age, ancestry, disability, veteran status, sexual orientation, marital status, and parental status.*

### Graduate Degrees

Undergraduate programs in chemical and petroleum engineering enable a graduate to pursue a professional engineering career. For those who want deeper academic understanding of these areas of engineering or who wish to work in research or development, graduate programs at the master's and doctoral levels are available. The department offers the M.S. degree in the fields of chemical engineering and petroleum engineering. The nonthesis M.S.

The University of Kansas

degree option is offered only in chemical engineering. In addition, the Ph.D. degree in the School of Engineering may be earned in either chemical or petroleum engineering.

### M.S. Degree Requirements

The master's programs in chemical and petroleum engineering are for students with baccalaureate degrees in chemical or petroleum engineering. Students with degrees in other branches of engineering or in mathematics, chemistry, physics, or other sciences may be admitted also and are encouraged to consider the programs. Such students usually must take some undergraduate course work to provide the necessary background for graduate courses.

The M.S. degree with thesis option requires 21 course credit hours and 9 research credit hours. The student is expected to write a thesis. The M.S. candidate, upon completion of the thesis, takes a final oral examination that may cover both course work and the thesis topic. Typical completion time is 16 to 18 months beyond the B.S. degree. An M.S. degree in the nonthesis option requires 33 credit hours of course work only, including submission of a written report of a 3-hour special project.

### Ph.D. Degree Requirements

Normally, students are admitted to the Ph.D. program after completing an M.S. degree. In rare cases, a student may be admitted to the Ph.D. program without the M.S. degree. Such admission normally is granted only if the applicant has clearly demonstrated exceptional performance in an undergraduate program and in any graduate work completed.

Students admitted to the Ph.D. degree program without an M.S. degree in chemical or petroleum engineering must take the M.S. degree core courses (15 credit hours) before they begin course work for the Ph.D. degree.

Qualification as a Ph.D. aspirant is based on evaluation of performance at the end of the student's first semester in the program. Measures of performance include graduate grade-point average and performance in any assigned research and teaching duties.

The Ph.D. degree normally requires 15 credit hours of course work and about 30 to 34 hours of research work beyond that required for an M.S. degree. Students must complete a Foreign Language or Other Research Skills (FLORS) requirement based on their areas of research specialization. Work done to fulfill this requirement should involve study in an area complementary to the selected research area and should enhance the student's ability to carry out the research. Students may satisfy the FLORS requirement by completing course work in the plan of study and/or demonstrating proficiency in the specialization. A three-member Ph.D. advisory committee designates components of the plan of study that meet the FLORS requirement.

The aspirant may undertake the comprehensive examination after completing a majority of the course work for the Ph.D. and all of the department, school, and Graduate School prerequisites for this examination, including the FLORS requirement. The examination consists of a written proposal for research and an oral examination based on, but not limited to, the research proposal. For the research proposal, the student is assigned a topic of current interest to the chemical and petroleum engineering profession. The oral examination is based on the research proposal but may also cover areas peripheral to it. Aspirants who receive grades of Honors or Satisfactory on the comprehensive examination are admitted to Ph.D. degree candidacy.

The doctoral dissertation, based on independent research conducted by the candidate, constitutes the final phase of doctoral work and must be completed within the time constraints of the Graduate School. After the advisory committee accepts the dissertation, the candidate defends the dissertation in a final oral examination. Typical completion time is four and one-half years beyond the B.S. degree.

## Course Listing

These courses are part of the undergraduate curricula. Remedial course work for students from other branches of engineering and science are chosen from this list.

**C&PE 511** Momentum Transfer (3)

**C&PE 512** Process Engineering Thermodynamics (3-4)

**C&PE 521** Heat Transfer (3)

**C&PE 522** Economic Appraisal of Chemical and Petroleum Projects (2)

**C&PE 523** Mass Transfer (4)

**C&PE 524** Chemical Engineering Kinetics and Reactor Design (3)

**C&PE 527** Reservoir Engineering II (4)

**GEOL 535** Petroleum and Subsurface Geology (4)

**C&PE 618** Waterflooding (3)

Following is a list of all advanced-standing and graduate courses offered in the department.

**C&PE 655** Introduction to Semiconductor Processing (3)

**C&PE 656** Introduction to Biomedical Engineering (3)

**C&PE 701** Methods of Chemical and Petroleum Calculations (3)

**C&PE 710** Subsurface Methods of Formation Evaluation (3)

**C&PE 715** Topics in Chemical and Petroleum Engineering (1-4)

**C&PE 721** Chemical Engineering Thermodynamics (3)

**C&PE 722** Kinetics and Catalysis (3)

**C&PE 731** Convective Heat and Momentum Transfer (3)

**C&PE 732** Advanced Transport Phenomena II (3)

**C&PE 765** Corrosion Engineering (3)

**C&PE 771** Advanced Reservoir Engineering (2-3)

**C&PE 778** Organization of Engineering Designs (3)

**C&PE 795** Enhanced Petroleum Recovery (3)

**C&PE 929** Advanced Topics in Chemical and Petroleum Engineering (1-4)

**C&PE 933** Heat and Mass Transport in Porous Media (3)

**C&PE 934** Heat Transport with Phase Change (3)

**C&PE 936** Industrial Separation Processes (3)

**C&PE 937** Applied Rheology (3)

**C&PE 940** Data Analysis in Engineering and Natural Sciences (3)

## Research Areas

Current areas of research include the following:

- Batteries and Fuel Cells
- Catalytic Reaction Engineering
- Controlled Drug Delivery
- Corrosion
- Electronic Materials Processing
- Enhanced Oil Recovery Processes
- Fluid Phase Equilibria and Process Design
- Molecular Design and Process Optimization
- Supercomputer Applications
- Supercritical Fluid Applications

## Faculty

**Kenneth A. Bishop.** Professor, Ph.D., Univ. of Oklahoma, 1965. Research interests: High performance computer applications in chemical and petroleum engineering. Specifically, transient performance evaluation of non-adiabatic, non-isothermal tubular chemical reactor designs involving heterogeneous models for solid catalyzed, vapor-phase, partial oxidation reactions and transient performance evaluation of chemical reactor.

**Kyle Camarda.** Assistant Professor, Ph.D., Univ. of Illinois, 1997. Research interests: Molecular design using combinatorial optimization and the solution of chemical engineering optimization problems using parallel computers.

**Stevin H. Gehrke.** Professor, Ph.D., Univ. of Minnesota, 1986. Research interests: Biomolecular engineering, especially the synthesis and characterization of biomimetic materials and hydrogels. Synthesis techniques cover both synthetic polymer chemistry and biosynthesis of protein polymers through recombinant DNA technology. Characterization focuses on the thermodynamics, mass transfer, and mechanical performance properties. Applications of these materials in drug delivery, biomedical engineering, tissue engineering, bioseparations, and superabsorbents.

**Don W. Green.** Deane E. Ackers Distinguished Professor, Co-Director of Tertiary Oil Recovery Project, Ph.D., Univ. of Oklahoma, 1963. Research interests: Enhanced oil recovery methods of increasing recovery from petroleum reservoirs. Techniques include polymer flooding, application of gelled polyacrylamide polymers for flow control, and carbon dioxide miscible flooding.

**Colin S. Howat.** Associate Professor and John E. and Winifred E. Sharp Professor, Director of Kurata Thermodynamics Laboratory, Ph.D., Univ. of Kansas, 1983. Research interests: Plant performance analysis, process simulation and phase equilibria thermodynamics. Recent emphasis has been interpreting formalistically plant performance data, developing statistically the relationship between process design and data base uncertainties, and determining experimentally the phase equilibria of mixtures of dissimilar molecules.

**Jenn-Tai Liang.** Associate Professor, Ph.D., Univ. of Texas (Austin), 1988. Research interests: Improved techniques for water shutoff and fluid diversion in oil and gas recovery processes. CO<sub>2</sub> sequestration in geologic formations. CO<sub>2</sub> direct capture and separation techniques. Enhanced coal bed methane (CBM) recovery. Environmental impact of CBM-produced water.

**Carl E. Locke.** Professor, Ph.D., Univ. of Texas, 1972. Research interests: Corrosion of steel in concrete. Study of pore solution composition and its effect on corrosion electrochemistry of embedded steel.

**Trung V. Nguyen.** Associate Professor and Graduate Adviser, Ph.D., Texas A&M, 1988. Research interests: Fuel cells and batteries and mathematical modeling of electrochemical systems. Current focus is on interfacial phenomena at the electrode/membrane and membrane/membrane interfaces; theoretical and experimental studies of two-phase transport and spatiotemporal behavior in porous electrodes; heat, gas, and water management in PEM fuel cells; and electrode and membrane fabrication processes.

**Karen Nordheden.** Associate Professor, Ph.D., Univ. of Illinois, 1988. Research interests: Developing and implementing new plasma etch processes for semiconductor device improvement. Current projects include the development of processes for the fabrication of optoelectronic devices based on GaN.

**Russell D. Ostermann.** Associate Professor, Ph.D., Univ. of Kansas, 1980. Research interests: Phase behavior, kinetics, displacement studies, and economic evaluation.

**Marylee Z. Southard.** Associate Professor, Ph.D., Univ. of Kansas, 1989. Research interests: Drug transport and bioavailability enhancement, mathematical modeling of physiological transport, and characterization of controlled release devices for pharmaceutical and agricultural products.

**Bala Subramaniam.** Dan F. Servey Distinguished Professor, Ph.D., Univ. of Notre Dame, 1984. Research interests: Near-critical processing, kinetics and catalysis, and mathematical modeling. Current projects include exploiting near-critical reaction media in solid-catalyzed reactions such as alkylation and hydrogenations, and pharmaceutical processing with near-critical carbon dioxide.

**Shapour Vossoughi.** Professor and Graduate Admissions Adviser, Ph.D., Univ. of Alberta, Canada, 1976. Research interests: Enhanced oil recovery, polymer flooding and in-situ gelation. Rheology with emphasis on polymer solutions and petroleum gels. Thermogravimetric analysis (TGA) and differential scanning calorimetry (DSC) techniques applied to the combustion of crude oil. Computer simulation for oil and gas reservoirs.

**G. Paul Willhite.** Ross H. Forney Distinguished Professor and Chair, Co-Director of Tertiary Oil Recovery Project, Co-Director of Energy Research Center, Ph.D., Northwestern Univ., 1962. Research interests: Enhanced oil recovery processes involving the study of processes that have the potential of displacing oil from petroleum reservoirs. Research projects range from fundamental studies of displacement mechanisms to numerical simulation of process performance. Transport processes in porous media.

**Susan M. Stagg-Williams.** Assistant Professor, Ph.D., Univ. of Oklahoma, 1999. Research interests: Production of synthesis gas utilizing membrane reactors and solid acid catalysts as alternatives for fine chemical production.

## Professors Emeriti

**John C. Davis.** Professor Emeritus, Ph.D., Univ. of Wyoming, 1967.

**James O. Maloney.** Professor Emeritus, Ph.D., Pennsylvania State Univ., 1941.

**Russell B. Mesler.** Professor Emeritus, Ph.D., Univ. of Michigan, 1955.

**Floyd W. Preston.** Professor Emeritus, Ph.D., Pennsylvania State Univ., 1957.

**Harold F. Rosson.** Professor Emeritus, Ph.D., Rice Univ., 1958.

**George W. Swift.** Professor Emeritus, Ph.D., Univ. of Kansas, 1959.

**Stanley M. Walas.** Professor Emeritus, Ph.D., Univ. of Michigan, 1941.

## Research Facilities

Excellent facilities are available for research and instruction. Extensive equipment and shop facilities are available for research in such areas as enhanced oil recovery processes, fluid phase equilibria, supercritical fluid applications, catalytic kinetics, controlled drug release, and electrochemical research. A network of Sun workstations and Pentium PCs support computational and graphical needs.

## Financial Aid

Financial aid is available in the form of fellowships and research and teaching assistantships (\$15,000 to \$20,000 a year, plus tuition).

