

Master of Science in Chemical and Petroleum Engineering

Chemical and Petroleum Engineering

Chemical engineering has grown out of a combination of chemistry and engineering associated with industrial processes. Today, it comprises knowledge used in processes that change the physical state or composition of materials. Chemical engineers hold key roles in the design, development, production, and purification of materials considered essential to human life and well-being, such as food products, fuels and lubricants, pharmaceuticals, fertilizers, synthetic fibers, microelectronic components, and plastics. Chemical engineers are involved in reducing the use of energy to make products in a safe and sustainable way and minimizing environmental impacts. Areas of study in the Chemical Engineering Department include (but are not limited to):

Reaction Kinetics, Environmentally Beneficial Catalysis, Fuel Cells, Biofuels, Interfacial Phenomena, Biotherapeutics, Regenerative Micro-Tissue Engineering, Exploiting Supercritical and Gas-Expanded Liquids in Crystallization and Benign Chemicals Processing, Hydrothermal Liquefaction, Electrocatalysis, and Photoelectrocatalysis.

Petroleum engineering is concerned with the drilling, recovery, production, and distribution of petroleum and natural gas. Petroleum engineers use knowledge of fluid and rock properties in subsurface environments to produce oil and gas safely and economically. At the University of Kansas, the focus is on reservoir engineering and improving production from oil and gas reservoirs. Reservoir engineers use geological detection with computerized mathematical analysis to produce raw materials. Through such techniques, petroleum engineers continue to extract oil and gas from reservoirs considered uneconomical only a few years ago. Petroleum engineering is uniquely challenging in that the raw material must be recovered far from direct observation. Areas of study in the Petroleum Engineering Department include (but are not limited to):

Hydraulic fracturing and acidizing of unconventional reservoirs, Characterization and simulation of tight oil and gas reservoirs, Oilfield nanoparticles, CO₂ enhanced oil recovery and CO₂ storage, Phase behavior of reservoir fluids, Shale gas reservoir development, Anti-scaling and anti-waxing in oilfield, Kinetics of crude oil combustion, Polymer flooding, and Polymer Gels.

Graduate Admission

To qualify for study in any of the graduate programs in the Department of Chemical & Petroleum Engineering a student generally must have earned an accredited bachelor's degree in chemical or petroleum engineering. However, a student with good preparation in another engineering discipline or a related field, such as physics, may qualify by taking the appropriate prerequisite undergraduate courses. These courses are determined on a case-by-case basis by the Department's Graduate Admissions Committee/Director.

Application Deadlines

Fall Priority Deadline: December 15; final deadline March 1

Spring Priority Deadline: August 31; final deadline September 30

Applications will be accepted after the fall priority deadline listed above, but fellowships and assistantships may no longer be available at these later date. All application materials must be submitted by the final deadlines, March 1 for Fall semester and September 30 for Spring semester, to be considered for admission. See our Graduate Admissions (<http://cpe.engr.ku.edu/graduate-admissions>) page or the Graduate Studies website (<http://www.graduate.ku.edu>) for the application procedure and fees.

Application Materials

- Application (<http://graduate.ku.edu/application-process>) (online only)
- Statement of Purpose
- Resume or Curriculum Vitae
- Official transcript (<http://graduate.ku.edu/transcripts>)
- Three letters of recommendation
- GRE scores (school code 6871)
- TOEFL, PTE, or IELTS scores (international students)

The following documents are required only after a student has been admitted:

- Financial Statement (International students only if no department funding offered)
- One (1) Official Transcript sent directly from the applicant's university to the University of Kansas

*GRE Scores

- Institution Code – 6871
- Program Codes – 1001 (Chemical), 1611 (Petroleum)

*TOEFL Scores

- Institution Code – 6871
- Program Code – 64

Students admitted with baccalaureate degrees in chemical or petroleum engineering enroll in the graduate core courses listed in our Graduate Program Manual (<http://cpe.engr.ku.edu/sites/cpe.engr.ku.edu/files/docs/CPE%20Graduate%20Program%20Manual.pdf>). Up to 9 credit hours from an outside institution may be transferred into upon approval of both department and university offices. Students with degrees in other branches of engineering or in mathematics, chemistry, physics, or other sciences, usually takes undergraduate course work to provide the necessary background for the graduate courses, and are admitted provisionally. See the undergraduate prerequisite courses listed in the M.S. Degree Requirements (<http://cpe.engr.ku.edu/master-science-curriculum>) section. There are some restrictions to international students who do not qualify for regular admission. For more information, see the July 2016 policy (<http://cpe.engr.ku.edu/sites/cpe.engr.ku.edu/files/docs/New%20I-20%20Guidelines%20on%20Conditional%20Admission.pdf>) passed by the US department of Homeland Security.

All graduate applications must be submitted online (<http://www.graduate.ku.edu>).

Regular Status

For admission to regular status, the student must have an undergraduate grade point average of at least B (3.0 on a 4.0 scale). For students whose undergraduate GPA is below 3.0, admission on provisional status will be considered on a case-by-case basis. Graduate Record Examination scores are required.

Provisional Status

An applicant may be admitted as a provisional graduate student when either the quality or type of undergraduate preparation is deficient, i.e., the student's undergraduate grade-point average is below 3.0 on a 4.0 scale or the student has not met the prerequisite undergraduate courses to do graduate work in the department or program to which he or she has applied.

After completing the prerequisite courses as a provisional graduate student, the department reviews his or her performance and recommends that the student (1) be transferred to regular status, or (2) be dropped from the Graduate School.

Foreign Student English Proficiency

The following are the acceptable means of verifying English proficiency for purposes of admitting non-native speakers of English to graduate studies. These guidelines also apply to U.S. citizens and permanent residents who are not native speakers of English; they are subject to change by official action of the appropriate governance bodies.

1. Receipt of an official copy (not student's copy) of an applicant's English proficiency standardized test scores (e.g., TOEFL, IELTS, or PTE) achieved not more than two years prior to the semester of first enrollment.
2. Graduation with a baccalaureate degree (or higher) earned in residence from an accredited English-medium U.S. college, university, or an institution of higher education or such an institution in the United Kingdom, Australia, New Zealand, Ireland, an English-speaking province of Canada, or an English-speaking Caribbean country, with instruction conducted in English. Degrees earned online may not be used to verify English proficiency.

Students who indicated English as a second language are required to check-in at the Applied English Center (<http://www.aec.ku.edu>) (AEC) upon arrival on campus for orientation. This process serves to confirm each student's level of English proficiency and determine whether English courses will be included as a requirement of the student's academic program (see eligibility requirements on the Graduate Studies website (<https://graduate.ku.edu/english-proficiency-requirements>)). The score requirements for the TOEFL, PTE, and IELTS exams can be found [HERE](http://graduate.ku.edu/english-proficiency-requirements) (<http://graduate.ku.edu/english-proficiency-requirements>).

Visit Us

Graduate program staff can assist prospective students in determining the fit between the student and the program. In order to determine this, we feel that visiting our campus in Lawrence is an important step. If you would like to schedule a visit, there are two main options:

The first, and most preferred, entails simply applying for admission to the program. All prospective students are welcome to attend our Open House in mid-October or mid-March. Eligible admitted students are invited to participate in Campus Visit Days in February (prior to the fall semester of your intended matriculation). These organized visits opportunities will

allow you to gather a great deal of first-hand information which we hope will help you in making a final decision about whether to attend KU.

The second option is making arrangements to visit us on your own, outside of organized events. With early notification, we will do our best to work with you to provide information and schedule appointments with faculty when possible.

Contact Information

Please contact the CPE Graduate Program Coordinator, cpegrad@ku.edu (cpe@ku.edu) or (785) 864-2900, if you would like to schedule a campus visit, or have questions about the program or the application process.

The University of Kansas

CPE Graduate Program

4132 Learned Hall

1530 W. 15th Street

Lawrence, KS 66045

M.S. Degree Requirements

M.S. in Chemical Engineering

Two degree options, Option A or Option B, are available for the M.S. degree in chemical engineering.

Option A requires a thesis, and students in Option A are considered for departmental research assistantships, teaching assistantships, and fellowships.

Option B does not require a thesis, but does require a written report on a 3-hour special project. Students in Option B are not eligible for departmental research assistantships and fellowships, but may be considered for teaching assistantships, although priority is given to students in Option A.

Once admitted, students may change from one option to the other only with the Graduate Standards Committee approval.

For an M.S. in chemical engineering, the undergraduate prerequisite courses are C&PE 511, C&PE 512, C&PE 521, C&PE 523, and C&PE 524. Depending on a student's academic background and proposed Plan of Study, additional undergraduate prerequisite courses may be required. Up to 3 credit hours of the undergraduate prerequisite courses (numbered 500 or above) may be counted toward the M.S. degree as elective hours.

The following tables represent typical plans of study that might be established by a student and their advisor. Rarely are exceptions in C&PE course work allowed.

M.S. in Chemical Engineering: Option A

Code	Title	Hours
Chemical Engineering Graduate Core Courses		
C&PE 701	Methods of Chemical and Petroleum Calculations	3
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
Electives		6

It is recommended that part of the elective hours be from other departments.

Research

C&PE 800	Seminar (or 1.5 credits C&PE 800 and 1.5 credit for another seminar series if mandatory for fellowship or academic center involvement, etc.)	3
C&PE 803	Research	6

Only the first 6 hours of enrollment in C&PE 803 meet degree requirements.

Includes the thesis and final oral defense or examination

Total Hours	30
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Includes the thesis and oral defense or examination

Total Hours	30
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M.S. in Chemical Engineering: Option B

Code	Title	Hours
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Chemical Engineering Graduate Core Courses

C&PE 701	Methods of Chemical and Petroleum Calculations	3
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

Electives	15
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No more than 2 elective courses numbered below 700.

No more than 3 elective courses in Engineering Management or Business or both.

Research

C&PE 825	Graduate Problems in Chemical and Petroleum Engineering	3
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Total Hours	33
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M.S. in Petroleum Engineering

For an M.S. in petroleum engineering, the undergraduate prerequisite courses are C&PE 511, C&PE 527, and C&PE 618.

Depending on a student's academic background and proposed Plan of Study, additional undergraduate prerequisite courses may be required. Up to 3 credit hours of undergraduate prerequisite courses (numbered 500 or above) may be counted toward the M.S. degree as elective hours. If a student has not completed an advanced-level, reservoir-related course in geology as an undergraduate, such a course must be taken as an elective. GEOL 535 Petroleum and Subsurface Geology is recommended.

The following table represents a typical plan of study that might be established by a student and his or her advisor.

Code	Title	Hours
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Petroleum Engineering Graduate Core Courses

C&PE 701	Methods of Chemical and Petroleum Calculations	3
C&PE 771	Advanced Reservoir Engineering	3
C&PE 790	Introduction to Flow in Porous Media	3
C&PE 795	Enhanced Petroleum Recovery	3

Electives	9
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It is recommended that part of the electives be from other departments.

Research

C&PE 800	Seminar (or 1.5 credits C&PE 800 and 1.5 credit for another seminar series if mandatory for fellowship or academic center involvement, etc.)	3
C&PE 803	Research	6