

CHEMICAL ENGINEERING

Requirements Curriculum

The curriculum covers a breadth of fundamental principles so that the chemical engineering graduates have a working knowledge of advanced chemistry, material and energy balances applied to chemical processes; thermodynamics; heat, mass, and momentum transfer; chemical reaction engineering; separation operations, process design and control. The program provides students with appropriate modern experimental and computing techniques in unit operation laboratory and requires them to work in teams and submit written and oral reports on their laboratory projects. A capstone experience in senior year gives students an opportunity to integrate their knowledge. Also included is the study of health, safety, environmental and ethical issues in the chemical engineering profession.

Graduate work leading to the degrees of Master of Science in chemical engineering or Master of Chemical Engineering provides a more thorough understanding of the discipline and enhances a student's ability to handle complex problems. A thesis is required for the Master of Science degree, but not for the Master of Chemical Engineering degree. Most recent graduate students have chosen research topics in biotechnology, polymers, or automatic control, but other specialties also are possible.

The chemical engineering program is accredited by the Engineering Accreditation Commission of ABET, <https://www.abet.org>, under the commission's General Criteria and Program Criteria for Chemical, Biochemical, Biomolecular, and Similarly Named Engineering Programs.

Chemical Engineering

Depending on the students' schedules, elective courses may be taken in terms other than the ones designated.

Electives

Chemical Engineering students must complete 28 credits of electives in humanities and social sciences in addition to HUM H190 First-Year Writing Seminar and ENGL H290 Technical & Professional Communication. They are also required to take 24 credits of electives (8 credits of CHE electives, and 16 credits of free electives) in addition to the humanities and social sciences mentioned above. The courses listed below qualify as a CHE elective. In very specific circumstances, independent projects or other courses may qualify as a CHE elective if approved by the department.

Code	Title	Hours
CHE 310	Numerical Methods for Chemical Engineers	4
CHE 405	Introduction to MEMS: Fabrication & Applications	4
MDS 539	Advanced topics in MEMs	4
CHE 430	Petrochemical Processes	4
CHE 441	Polymer Engineering	4
CHE 460	Particle Technology	4
CHE 462	Membrane Separations	4
CHE 465	Energy and the Environment	4
CHE 470	Safety, Health, and Loss Prevention	4
CHE 502	Transport Phenomena	4
CHE 504	Advanced Reaction Engineering	4
CHE 513	Advanced Chemical Engineering Thermodynamics	4

CHE 515	Nanomaterials Science & Engineering	4
CHE 525	Process Analytics	4
CHE 530	Petrochemical Processes	4
CHE 540	Advanced Process Control	4
CHE 545	Introduction to Biochemical Engineering	4
CHE 546	Bioseparations	4
CHE 562	Advanced Wastewater Treatment	4
CHE 563	Advanced Water Treatment	4

Students are encouraged to use their electives to focus their studies in a particular subject area.

The chemical engineering profession is rapidly changing and knowledge of specialty areas has become essential in the real world. Technical elective courses are intended to provide an opportunity to introduce students to a specialty area in science and engineering and help them to expand their knowledge and expertise in new areas of chemical engineering. Although it is recommended that a minimum of eight credit hours be focused in one subject area, students are encouraged to focus most or all of the 24 credit hours of electives in a particular subject area. In many cases students can use their electives to take a package of courses toward an area minor such as biochemical engineering, chemistry, environmental engineering, modern languages, materials science and engineering, sustainability, toward a certificate in semiconductor materials and devices, or toward an area of concentration (see below).

Undergraduate students have the opportunity to work on a research project under the guidance of one of the departmental faculty members. Students who are interested in learning about research should talk to members of the faculty to define a project of mutual interest and then enroll in CHE 499 Directed Research, Directed Research. Credit hours of CHE 499 Directed Research can count toward an approved elective.

Areas of Concentration

Although it is not a requirement, students may pursue a concentration in one or more of the following areas. Students who complete the requirements of a concentration may receive, upon request, a letter from the Department Head that attests to the fact that the requirements have been completed. With proper planning, a student should be able to complete the requirements for an area of concentration without overload.

Advanced Chemical Engineering Analysis

Students need to take CHE 502 Transport Phenomena and 3 additional courses from the list below. Other courses may be substituted only with prior approval by the Department Head. No more than two courses with a MA prefix may be applied towards the concentration.

Code	Title	Hours
CHE 310	Numerical Methods for Chemical Engineers	4
or MA 332	Introduction to Computational Science	
CHE 499	Directed Research	4
CHE 504	Advanced Reaction Engineering	4
CHE 513	Advanced Chemical Engineering Thermodynamics	4
MA 336	Boundary Value Problems	4
MA 371	Linear Algebra I	4
or MA 373	Applied Linear Algebra for Engineers	
MA 438	Advanced Engineering Mathematics	4
or MA 538	Advanced Engineering Mathematics	

Energy Production and Utilization

Students need to take 4 courses from the list below. Other courses may be substituted only with approval of the Department Head.

Code	Title	Hours
CHE 465	Energy and the Environment	4
CHE 430/530	Petrochemical Processes ¹	4
ECE 204	AC Circuits ²	4
ECE 371	Conventional & Renewable Energy Systems ³	4
ME 407	Power Plants	4
ME 408	Renewable Energy	4
ME 411	Propulsion Systems	4
ME 450	Combustion	4
PH 265	Fundamentals of Nuclear Physics & Radiation	4

¹ At least one of these courses is required in order to earn the concentration.

² PH 113 Physics III is a prerequisite.

³ PH 113 Physics III and ECE 204 AC Circuits are prerequisites.

Industrial and Process Engineering

Students need to take CHE 470 Safety, Health, and Loss Prevention, either CHE 540 Advanced Process Control or CHE 525 Process Analytics, 2 courses from the Statistics and Modeling list below, and 1 course from the Engineering Management Electives list below. Other courses may be substituted only with approval of the Department Head.

Statistics and Modeling

Code	Title	Hours
EMGT E445	Quality Methods	4
EMGT E446	Statistical Methods in Six Sigma	4
MA 487	Design of Experiments	4
MA 444	Deterministic Models in Operations Research	4

Engineering Management Electives

Code	Title	Hours
EMGT E524	Production/Operations Management	4
EMGT E527	Project Management	4
EMGT 562	Risk Analysis and Management	4
EMGT E581	Multi-Objective Optimization	4
EMGT E586	Supply Chain Management	4
EMGT E589	Manufacturing Systems	4