Chemical engineering is a broad field of engineering and thus requires a diverse preparation in science and engineering. Distinguishing chemical engineering from other engineering disciplines is its use of chemical and biochemical reactions to produce products and materials for society. Traditionally, chemical engineers have provided leadership in the petrochemical, refining, chemical, polymer, and food processing industries. Because of strengths in the foundation sciences of mathematics, chemistry, physics and biology, as well as in engineering, this leadership role has now extended to the biochemical, biomedical, high-tech materials, semi-conductor and microelectronics, nanotechnology, environmental quality, safety, and a host of other areas. Chemical engineers have consistently commanded starting salaries among the highest of all college graduates because of the combined breadth and depth of their education.

The mission of the Artie McFerrin Department of Chemical Engineering at Texas A&M is to educate and prepare students for national and international leadership roles in industry, government, and academia; to attract top students to chemical engineering; to define and develop new directions in chemical engineering fundamentals and practices, and in chemical engineering education and curricula; to be a valuable resource and service base to the State and to industry; and to provide leadership in solving problems of social and economic importance.

Objectives of the chemical engineering program are that

1. graduates will have successful chemical engineering careers in industry, academia or government,
2. graduates will obtain, apply and transfer knowledge across disciplines and into emerging areas of chemical engineering and related fields,
3. graduates will communicate effectively, be leaders in their fields and work competently in interdisciplinary teams, and
4. graduates will be professionally responsible and ethical and engage in professional activities to impact the society on a global scale.

To supplement coursework, well-equipped laboratories provide our students with experiences in operating and analyzing a variety of unit operations and process control equipment and in the use of the modern computational tools and software used in chemical engineering. The department offers vibrant undergraduate research, co-op and study abroad programs that provide students with additional enrichment and experiential opportunities.

The undergraduate program in Chemical Engineering at Texas A&M University is accredited by the Engineering Accreditation Commission of ABET, www.abet.org, and compares favorably with the best in the nation.

Before commencing course work in the major, students must be admitted to the major or have the approval of the department.

Faculty

Akbulut, Mustafa, Associate Professor
Chemical Engineering
PhD, University of California, Santa Barbara, 2007

Alaniz, Robert, Assistant Professor
Chemical Engineering
PhD, University of Washington, 2015

Balbuena, Perla, Professor
Chemical Engineering
PhD, University of Texas, 1996

Baldwin, John, Senior Lecturer
Chemical Engineering
PhD, Texas A&M University, 1968

Chen, Zhilei, Assistant Professor
Chemical Engineering
PhD, University of Illinois, 2006

Cheng, Zheng, Associate Professor
Chemical Engineering
PhD, Princeton University, 1999

Dewan, Mohammad, Lecturer
Chemical Engineering
PhD, Washington State University, 2010

Duarte, Horacio, Visiting Associate Professor
Chemical Engineering
PhD, Texas A&M University, 1988

Economou, Ioannis, Professor
Chemical Engineering
PhD, Johns Hopkins University, 1993

El-Halwagi, Mahmoud, Professor
Chemical Engineering
PhD, University of California, Los Angeles, 1990

Elabd, Yossef, Professor
Chemical Engineering
PhD, John Hopkins University, 2001

Floudas, Christodoulos, Professor
Chemical Engineering
PhD, Carnegie Mellon University, 1986

Froment, Gilbert, Tees Research Professor
Chemical Engineering
PhD, Universiteit Gent, Belgium, 1957

Glover, Charles, Professor
Chemical Engineering
PhD, Rice University, 1975

Green, Micah, Associate Professor
Chemical Engineering
PhD, Massachusetts Institute of Technology, 2007

Hall, Kenneth, Professor
Chemical Engineering
PhD, University of Oklahoma, 1967
Hasan, M, Assistant Professor
Chemical Engineering
PHD, National University of Singapore, 2010

Holste, James, Professor
Chemical Engineering
PhD, Iowa State University, 1973

Holtzapple, Mark, Professor
Chemical Engineering
PhD, University of Pennsylvania, 1981

Isdale, Charles, Senior Lecturer
Chemical Engineering
MBA, Southern Illinois University, 1977

Jayaraman, Arul, Professor
Chemical Engineering
PhD, University of California, Irvine, 1998

Jeong, Hae-Kwon, Associate Professor
Chemical Engineering
PhD, University of Minnesota, 2004

Kakosimos, Konstantinos, Assistant Professor
Chemical Engineering
PHD, Aristotle University, 2009

Kao, Katy, Associate Professor
Chemical Engineering
PhD, University of California, Los Angeles, 2005

Karim, Muhammad, Professor
Chemical Engineering
PhD, University of Manchester, 1977

Kravaris, Costas, Professor
Chemical Engineering
PhD, California Institute of Technology, 1984

Kuo, Yue, Professor
Chemical Engineering
PhD, Columbia University, 1980

Laird, Carl, Associate Professor
Chemical Engineering
DVM, Carnegie Mellon University, 2006

Lutkenhaus, Jodie, Associate Professor
Chemical Engineering
PhD, University of Notre Dame, 2003

Mannan, Mahboobul, Professor
Chemical Engineering
PhD, University of Oklahoma, 1986

Mashuga, Chad, Assistant Professor
Chemical Engineering
PhD, Michigan Technological University, 1999

Mentzer, Ray, Senior Lecturer
Chemical Engineering
PHD, Purdue University, 1980

Pishko, Michael, Professor
Chemical Engineering
PHD, University of Texas, 1992

Pistikopoulos, Efstratios, Professor
Chemical Engineering
PhD, Carnegie Mellon University, 1988

Rogers, William, Lecturer
Chemical Engineering
PhD, Ohio State University, 1976

Sachdeva, Sonny, Lecturer
Chemical Engineering
PHD, Indian Institute of Technology, Kanpur, India, 2008

Sernario, Jorge, Professor
Chemical Engineering
PhD, Southern Illinois University, 1987
MS, Souther Illinois University, 1984

Tamamis, Phanourios, Assistant Professor
Chemical Engineering
PHD, University of Cyprus, 2010

Ugaz, Victor, Professor
Chemical Engineering
PhD, Northwestern University, 1999

Vaddiraju, Sreram, Associate Professor
Chemical Engineering
PhD, University of Louisville, 2006

White, James, Senior Lecturer
Chemical Engineering
BS, Texas A&M University, 1978

Wilhite, Benjamin, Associate Professor
Chemical Engineering
PhD, University of Notre Dame, 2003

Wilson, Christin, Lecturer
Chemical Engineering
PHD, The Ohio State University, 2012

Wu, Hung-Jen, Assistant Professor
Chemical Engineering
PhD, Texas A&M University, 2006

Majors
• Bachelor of Science in Chemical Engineering

Minors
• Chemical Engineering Minor

Courses
CHEN 204 Elementary Chemical Engineering
Credits 3. 3 Lecture Hours. 0 Lab Hours.
Solution of elementary problems by application of mass balances, energy balances and equilibrium relationships.
Prerequisite: Admission to chemical engineering major or approval of instructor.
CHEN 205 Chemical Engineering Thermodynamics I  
Credits 3.3 Lecture Hours.  
First and second laws of thermodynamics; volumetric properties of pure fluids; heat effects; applications to flow processes, power cycles, refrigeration.  
Prerequisites: CHEN 204.

CHEN 285 Directed Studies  
Credits 1 to 4.1 to 4 Other Hours.  
Directed study of special projects or studies in chemical engineering processes or operations, for lower division students.  
Prerequisites: Freshman or sophomore classification; approval of department head.

CHEN 289 Special Topics in...  
Credits 1 to 4.1 to 4 Lecture Hours.  
Selected topics in an identified area of chemical engineering for lower division students. May be repeated for credit.  
Prerequisite: Approval of instructor.

CHEN 301 Engineering Workplace Writing  
Credits 3.3 Lecture Hours.  
Processes for preparing documents commonly developed by engineers in the workplace; database research; electronic collaboration; ethics, planning, drafting, revising, and editing reports, proposals, correspondence, instructions, procedures, and presentations for the engineering workplace; meets ABET communication requirements.  
Prerequisites: ENGL 104 or equivalent; junior or senior classification in chemical engineering or approval by CHEN.

CHEN 304 Chemical Engineering Fluid Operations  
Credits 3.3 Lecture Hours.  
Fundamentals of fluid mechanics with applications to design and analysis of process equipment.  
Prerequisites: CHEN 205; MATH 308.

CHEN 313 Chemical Engineering Materials  
Credits 3.3 Lecture Hours.  
Overview of materials science with particular emphasis on classes of materials relevant to chemical engineers.  
Prerequisite: CHEN 204, MATH 251 or registration therein, CHEN 205 or registration therein; or approval of instructor.

CHEN 320 Numerical Analysis for Chemical Engineers  
Credits 3.3 Lecture Hours.  
Applications of numerical analysis techniques to mathematical models of processes common to chemical and associated industries; computational methods and software for analysis of chemical engineering processes.  
Prerequisites: CHEN 205, MATH 308 or approval of instructor.

CHEN 323 Chemical Engineering Heat Transfer Operations  
Credits 3.3 Lecture Hours.  
Heat transfer operations.  
Prerequisite: CHEN 304.

CHEN 354 Chemical Engineering Thermodynamics II  
Credits 3.3 Lecture Hours.  
Applications of thermodynamics to pure and mixed fluids; phase equilibria and chemical reaction equilibria.  
Prerequisites: CHEN 205; CHEN 320 or registration therein; MATH 308; or approval of instructor.

CHEN 382 Bioprocess Engineering  
Credits 3.3 Lecture Hours.  
Application of engineering principles to design of biocatalysts and bioprocesses.  
Prerequisite: Grade of C or better in CHEN 204 and CHEN 205; junior or senior classification.

CHEN 409 Mathematical Models of Chemical Processes  
Credits 3.3 Lecture Hours.  
Development of the mathematical models of chemical and physical processes common to the petroleum processing, chemical and associated industries.  
Prerequisite: CHEN 424.

CHEN 414 Chemical Engineering Laboratory I  
Credit 1.3 Lab Hours.  
Laboratory work based on CHEN 304 and CHEN 323.  
Prerequisites: CHEN 304; CHEN 323 or registration therein with approval of instructor; CHEN 301 or ENGL 210.

CHEN 422/BAEN 422 Unit Operations in Food Processing  
Credits 3.2 Lecture Hours. 2 Lab Hours.  
Design of food process engineering systems; basic concepts of rheology and physical properties of foods; fundamentals of heat and mass transfer and process control.  
Prerequisites: CHEN 205 and CHEN 304, or ENGR 214.  
Cross Listing: BAEN 422/CHEN 422.

CHEN 424 Chemical Engineering Mass Transfer Operations  
Credits 3.3 Lecture Hours.  
Introduction to mass transfer operations with applications to design and analysis of process equipment.  
Prerequisites: CHEN 323 or registration therein; CHEN 354; or approval of instructor.

CHEN 425 Process Integration, Simulation and Economics  
Credits 3.2 Lecture Hours. 3 Lab Hours.  
Integration, simulation, and economic methods involved in the design of chemical processes and equipment.  
Prerequisite: CHEN 320, CHEN 323 or registration therein; CHEN 354.

CHEN 426 Chemical Engineering Plant Design  
Credits 3.1 Lecture Hour. 6 Lab Hours.  
Integration of material from other chemical engineering courses with applications to the design of plants and processes representative of the chemical and related process industries.  
Prerequisites: CHEN 424 and CHEN 425; graduating senior or approval of instructor.

CHEN 430/SENG 430 Risk Analysis in Safety Engineering  
Credits 3.3 Lecture Hours.  
Concepts of risk and risk assessment, which uses all available information to provide a foundation for risk-informed and cost-effective engineering practices; examples and exercises are drawn from a variety of engineering areas.  
Prerequisite: Junior or senior classification.  
Cross Listing: SENG 430/CHEN 430.

CHEN 433 Chemical Engineering Laboratory II  
Credit 1.3 Lab Hours.  
Laboratory work based on CHEN 424, CHEN 461 and CHEN 464.  
Prerequisites: CHEN 414 and CHEN 424; CHEN 464 or registration therein.
CHEN 440 Introduction to Transport Phenomena
Credits 3.3 Lecture Hours.
Unifying principles and analytical description of phenomena of momentum transport (viscous flow), energy transport (heat conduction and convection) and mass transport (diffusion) in continuous media; similarities and differences in these phenomena.
Prerequisite: Senior classification or approval of instructor.

CHEN 450 Microfabrication and Microfluidics Technology
Credits 3.3 Lecture Hours.
Micro Electro Mechanical Systems (MEMS) technology; study the fundamentals of fluidics, heat and mass transfer, surface chemistry, and electrochemical interactions.
Prerequisite: Junior or senior classification.

CHEN 451 Introduction to Polymer Engineering
Credits 3.3 Lecture Hours.
Fundamentals of polymer reaction kinetics, morphology, chemical and rheological properties with applications to polymer synthesis, production and processing operations.
Prerequisite: Senior classification in chemical engineering or approval of instructor.

CHEN 455/SENG 455 Process Safety Engineering
Credits 3.3 Lecture Hours.
Applications of engineering principles to process safety and hazards analysis, mitigation, and prevention, with special emphasis on the chemical process industries; includes source modeling for leakage rates, dispersion, analysis, relief valve sizing, fire and explosion damage analysis, hazards identification, risk analysis, accident investigations.
Prerequisite: Senior classification in any engineering major.
Cross Listing: SENG 455/CHEN 455.

CHEN 458 Fundamentals of Environmental Remediation Processes
Credits 3.3 Lecture Hours.
Fundamental approach to various remediation technologies; topics in environmental thermodynamics and mass transfer; adsorption, desorption, ion exchange, air stripping extractions, chemical oxidation, biodegradation.
Prerequisites: CHEN 354 and CHEN 424.

CHEN 459 Gas and Petroleum Processing
Credits 3.3 Lecture Hours.
Design and operation of petroleum and gas processing facilities including hydrate suppression, dehydration, sweetening, sulfur recovery, LPG and liquid recovery, refining operations; analysis of the design and operations involving a large degree of process simulation.
Prerequisites: CHEN 323 and approval of instructor.

CHEN 460/SENG 460 Quantitative Risk Analysis in Safety Engineering
Credits 3.3 Lecture Hours.
Fundamental concepts, techniques, and applications of risk analysis and risk-informed decision making for engineering students; practical uses of probabilistic methods are demonstrated in exercises and case studies from diverse engineering areas.
Prerequisite: Senior or graduate classification.
Cross Listing: SENG 460/CHEN 460.

CHEN 461 Process Dynamics and Control
Credits 3.3 Lecture Hours.
Analysis of process dynamics and methods for the design of automatic control systems for chemical process plants.
Prerequisite: CHEN 320.

CHEN 463 Systems Biology
Credits 3.3 Lecture Hours.
Experimental and computational techniques in systems biology; includes high throughput experiments, data analysis, modeling and simulation; discussed in the context to specific applications such as signal transduction.
Prerequisite: CHEN 382 or approval of instructor.

CHEN 464 Kinetics and Reactor Design
Credits 3.3 Lecture Hours.
Introduction to kinetics of reactions and application of fundamental principles to design and operation of commercial reactors.
Prerequisites: CHEN 320, CHEN 323, CHEN 354 or approval of instructor.

CHEN 469 Chemical Engineering Car Design
Credit 1.1 Lecture Hour.
Application of chemical, physical and engineering principles in design process, idea generation and development of design concepts, economic, safety and performance analysis. May be taken four times for credit.
Prerequisites: CHEN 204, CHEN 205; junior or senior classification or approval of instructor.

CHEN 470/BMEN 470 Introduction of Biomedical Optics
Credits 3.3 Lecture Hours.
Fundamentals of biomedical optics; basic engineering principles used in optical therapeutics, optical diagnostics and optical biosensing.
Prerequisites: MATH 308; PHYS 208.
Cross Listing: BMEN 470/CHEN 470.

CHEN 471/BAEN 471 Bioreactor Engineering
Credits 3.3 Lecture Hours.
Fundamentals of microbial and enzyme kinetics; basic biochemical reaction theory and reactor systems; heterogeneous reactions and transport considerations in enzyme and cell reactors, and immobilized systems; bioreactor design considerations in bioprocessing.
Prerequisite: CHEN 282 or CHEN 382 or BAEN 302; junior or senior classification in engineering or approval of instructor.
Cross Listing: BAEN 471/CHEN 471.

CHEN 475 Microelectronics Process Engineering
Credits 3.3 Lecture Hours.
State-of-the-art process engineering principles on microelectronics, especially for the fabrication of very large scale integrated circuits (VLSICs); fundamental unit processes, such as thin film deposition, thermal growth, lithography, etching and doping, material structures and properties, and basic device operation principles.
Prerequisites: CHEN 354 and CHEN 464 or approval of instructor; CHEN 322.

CHEN 481 Seminar
Credit 1.2 Lab Hours.
Preparation of oral and written reports on selected topics from recent technical publications.
Prerequisites: Senior classification in chemical engineering, ENGL 210 or ENGL 301.

CHEN 485 Directed Studies
Credits 1 to 5.1 to 5 Other Hours.
Work covers one or more problems in chemical engineering processes or operations.
Prerequisite: Approval of department head.
CHEN 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of chemical engineering. May be repeated for credit.
Prerequisite: Senior classification in chemical engineering or approval of instructor.

CHEN 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in chemical engineering. May be repeated 2 times for credit.
Prerequisites: Junior or Senior classification and approval of instructor.