

Wayne H. King Division of Chemical and Environmental Engineering

Chemical Engineering Program Educational Objectives

The Chemical Engineering Program seeks to prepare graduates who, after the first few years of their professional career, have:

- Established themselves either as practicing chemical engineers, or by gaining additional formal education through enrollment in either an engineering or business graduate school program.
- Adapted to ever-changing demands by updating their core knowledge and abilities through on-the-job training and continuing education courses.
- Functioned successfully in their professional responsibilities, which include safety, health, environmental, and ethical aspects.
- Established themselves as critical, flexible thinkers with demonstrated potential as further technology experts or technology managers in their professional and in society.

Environmental Engineering Program Educational Objectives

Within a few years of graduation, alumni of the TAMU-K undergraduate EVEN program will demonstrate achievement in the following areas:

- Graduates will practice in one of the areas appropriate to the interdisciplinary field of environmental engineering (water quality engineering, air quality engineering, water resource management, hazardous and solid waste management, ecological engineering, engineering management, and environmental data management).
- Graduates will demonstrate leadership qualities (such as career advancement, community service and professional society activity) and maintain high standards for professional and ethical behavior.
- Graduates will pursue continuing education opportunities to obtain and maintain professional licensure and board certification.

The department houses a minor in Environmental Engineering. Information on the requirements can be found in the "Degree Requirements" tab above.

Chemical Engineering (CHEN)

CHEN 2371 Conservation Principles I **3 SCH (3-0)**

Applications of the conservation laws of mass to the solution of chemical engineering problems. Prerequisites: CHEM 1312 or PHYS 2325/PHYS 2125.

CHEN 2372 Conservation Principles II **3 SCH (3-0)**

Applications of the conservation laws of energy to the solution of chemical engineering problems. Prerequisite: CHEN 2371.

CHEN 3305 Introduction to Chemical Engineering for Non-Chemical Engineering Majors **3 SCH (3-0)**

A comprehensive introduction to the basic principles and technologies used by chemical engineers in industry today. Includes an introduction to basic quantitative principles in the fundamental chemical engineering topics of mass and energy balances, fluid and heat transport, and thermodynamics. Credit for this course is not allowed if the student has declared chemical engineering as their major. This course is required for non-majors pursuing the Chemical Process Industries certificate. Pre-requisites: CHEM 1312, MATH 2414, and PHYS 2326.

CHEN 3310 Heat Transport Phenomena **3 SCH (3-0)**

Fundamentals of energy transport and system applications involving this operation including computer applications to heat exchanger design. Prerequisites: CHEM 3323, CHEN 3392 or NGEN 3392, CHEN 3347 or MEEN 3347.

CHEN 3315 Chem Process Design Economics **3 SCH (3-0)**

Basic principles and techniques of economic analysis and cost engineering with applications to problems in chemical process and equipment design. Prerequisites: CHEN 2372 and credit for or registration in CHEN 3310.

CHEN 3321 Process Simulation **3 SCH (3-0)**

Basic numerical methods used in chemical process simulation. An introduction to the use of commercial process simulators, with hands-on applications. Prerequisite: MATH 3320, credit or registration in CHEN 3310.

CHEN 3347 Chem Eng Thermodynamics I **3 SCH (3-0)**

Theory and applications of the first and second laws of thermodynamics to mechanical and chemical interactions for both reversible and irreversible processes. Pressure-Volume-Temperature relations and equations of state. Prerequisite: MATH 2414. Corequisites: PHYS 2326/PHYS 2126.

CHEN 3371 Chemical Thermodynamics II **3 SCH (3-0)**

Fundamental thermodynamic relations for property and phase equilibria calculations. Procedures for deciding when and to what extent chemical reactions and phase changes may be expected to occur according to the basic principles of physical chemistry and the laws of thermodynamics. Prerequisites: CHEM 3325/CHEM 3125, CHEM 3331, and CHEN 3347.

CHEN 3392 Fluid Transport Phenomena **3 SCH (3-0)**

Fundamentals of momentum transport, including fluid statics, flow of incompressible and compressible fluids, pumps, turbines, and compressors, with computer applications. Prerequisites: MATH 3320 and credit or registration in MEEN 2302 or MEEN 2355.

CHEN 4120 Seminar in CHEN 1 SCH (1-0)

Seminar on contemporary issues in Chemical Engineering. Prerequisite: junior standing.

CHEN 4130 Service Learning in CHEN 1 SCH (1-0)

Service learning experience in a project that engages a community agency and raises awareness of chemical engineering professional issues. Prerequisite: junior standing.

CHEN 4278 Unit Operations Lab I 2 SCH (0-6)

Selected laboratory experiments on fluid flow and heat transfer. Prerequisite: CHEN 3310.

Fee: \$5.00

CHEN 4279 Unit Operations Lab II 2 SCH (0-6)

Selected laboratory experiments on heat and mass transfer. Prerequisites: CHEN 4278 and CHEN 4389.

Fee: \$5.00

CHEN 4311 Biochemical Engineering 3 SCH (3-0)

Principles involved in the processing of biological materials using biological agents such as cells, enzymes or antibodies. Prerequisites: CHEM 3325/ CHEM 3125.

CHEN 4316 Chemical Process Design I 3 SCH (3-0)

The application of chemical engineering principles to a sequence of design problems utilizing computer software, such as SIMSCI. Prerequisites: CHEN 3315, CHEN 3371 and CHEN 3310.

CHEN 4317 Chem Process Design II (WI) 3 SCH (3-0)

The application of chemical engineering principles, including economic criteria to a comprehensive design problem. Computer software is utilized as a design aid. Prerequisites: CHEN 4316, CHEN 4373, CHEN 4389 and credit for or registration in CHEN 4392.

CHEN 4335 Special Problems 1-3 SCH (1-3)

Individual solution of selected problems in chemical engineering conducted under direct supervision of a faculty member. May be repeated for up to six hours. Prerequisite: senior standing.

CHEN 4341 Chemical Process Safety 3 SCH (3-0)

A comprehensive overview of safety topics in the design, construction, startup, operation, and shutdown of chemical plants and refineries. Pre-requisite: CHEN 3310.

CHEN 4342 Chemical Process Sustainability 3 SCH (3-0)

A study of sustainability topics applied to the chemical process industry, focusing on energy conservation, process and utility water conservation, hazardous chemical replacement or minimization, and process substitution at chemical process plants and refineries. Pre-requisites: CHEN 3310.

CHEN 4343 Environmental Treatment of Chemical Processes 3 SCH (3-0)

A study of the different processes used to treat air, water, and solid waste streams associated with the chemical process industry and refineries. Pre-requisites: CHEN 3310 and CHEN 4389.

CHEN 4344 Data Analytics for Chem Eng 3 SCH (3-0)

Data analytics for chemical engineers with an emphasis towards trend identification and decision analysis for chemical processes, based upon chemical plant performance data. Prerequisites: CHEN 2371, IEEN 2310, and senior standing.

CHEN 4351 Biofuels/Biochemical Production Processes 3 SCH (3-0)

Basic principles and theory for the engineering design of large-scale biochemical processes for biofuel, food, and pharmaceutical production and waste treatment. Prerequisites: Either CHEN 2372 or CHEN 3305 and CHEN 4311.

CHEN 4352 Bioseparations 3 SCH (3-0)

Basic principles and theory for the engineering design of large-scale equipment used in the purification of biological products. Prerequisite: CHEN 3371.

CHEN 4353 Bioprocesses for Waste Treatment 3 SCH (3-0)

Basic principles and theory for the engineering design and operation of biological processes used for waste treatment (including air, water, and solid waste media) in the refinery, petrochemical, and related industries. Prerequisites: CHEM 4311 and CHEN 4389.

CHEN 4354 Biochemical Reaction Engineering 3 SCH (3-0)

This course provides the necessary knowledge on the fundamentals of reaction kinetics, reaction engineering and reactor process economic analysis as applied to biochemical, biomolecular, and biocatalytic processes. Prerequisites: Either BIOL 2421 or CHEM 4345 and CHEN 4311.

CHEN 4355 Frontiers in Biochemical Processes 3 SCH (3-0)

Select topics in biochemical processes, focusing on advances that have allowed for improved production and recovery of biochemicals over the last couple of decades. Focus will also be on those processes that offer greater sustainability as compared to fossil-fuel based chemicals. Prerequisites: Either BIOL 2421 or CHEM 4345 and CHEN 4311.

CHEN 4373 Chemical Reactor Engineering 3 SCH (3-0)

Chemical reaction rates and design of chemical reactors. Applications of computers to chemical kinetics and the design of chemical reactors. Prerequisites: CHEM 3332, CHEN 3310, CHEN 3321 and CHEN 3371.

CHEN 4386 Air Pollution Control 3 SCH (3-0)

A fundamental approach to air pollution testing, control and design of control systems. Introduction to dispersion modeling via computer. Prerequisite: CHEN 3392 and senior standing.

CHEN 4389 Mass Transport Phenomena 3 SCH (3-0)

Fundamentals of mass transport, including gas/liquid absorption/desorption, extraction, membrane separation, binary and multicomponent distillation. Prerequisites: CHEM 3331, CHEN 3321, CHEN 3371 and credit or registration in CHEN 3310.

CHEN 4399 Internship in CHEN 1-3 SCH (1-3)

Internships in industry, government, or consulting companies in career-based practical activities to broaden the skills obtained through curricular education. Prerequisite: junior standing.

CHEN 4492 Process Dynamics and Control 4 SCH (0-3-0-3)

Basic operating theory of control systems and their application to industrial chemical processes. Applications of computers to process control. Prerequisites: CHEN 4373 and CHEN 4389.

Environmental Engineering (EVEN)**EVEN 2304 Computer Methods for EVEN 3 SCH (3-0)**

Basic computer methods useful for environmental engineering analysis and design. Introduction to programming, analysis and application software, with hands-on applications. Applications of structured, object-oriented and event-driven programming and relational databases for environmental problems.

EVEN 2310 Intro to Environmental Engineer 3 SCH (3-0)

Science basics, law and regulations, protection of human health and the environment from air, water, solid/hazardous and product pollution. Structure of the environmental industry.

EVEN 2311 Env. Engr. Ethics & Policy 3 SCH (3-0)

Recognition and formulation of ethical questions and issues in engineering professional practice with topics linking environmental policy and economics with philosophical and cultural considerations, along with the U.S. experience of environmental policy, economics and regulation.

EVEN 2372 Environmental Sustainability 3 3 SCH (3-0)

This course focuses on current global environmental issues including environmental pollution, climate change, energy and sustainability. It also discusses the interactions between human behavior and environment crisis, studies the impact of global environmental issues, and evaluates the prospect of changing lifestyle for promoting sustainable development.

EVEN 3320 Chemical Principles for EVEN 3 SCH (3-0)

Fundamental chemical principles for determination of the source, fate, and transformation of chemical compounds in natural and polluted environments. Climate change, air pollution, stratospheric ozone depletion, pollution and treatment of water sources, and the utilization of insecticides and herbicides. Prerequisite: CHEM 1312, CHEM 1112.

EVEN 3321 Environmental Engineering Lab 3 SCH (0-1-0-4)

Overview of contaminant transport and partitioning processes, chemical processes, biological processes, and particle dynamics and separations processes. Design and performance of experiments to generate data for environmental engineering design. Statistical analyses and interpretation of experimental data. Prerequisites: CHEM 1312/CHEM 1112.

Fee: \$30.00

EVEN 3328 Environ Engi Process Fundamntl 3 SCH (3-0)

Physicochemical fundamentals and applications using mass and energy balances for the design of water treatment systems with consideration of water characteristics, reaction kinetics, and process reactors. Fundamental principles are used in environmental engineering processes for water and air quality applications. Prerequisite: EVEN 2310.

EVEN 3336 Environmental Microbiology 3 SCH (3-0)

Use and control of microorganisms in engineered systems and the effects of microorganisms on the environment and on human activity, health, and welfare. Microbial structure, function, growth, metabolism, and diversity, as well as microbial involvement biogeochemical cycling and in water and waste treatment, waterborne diseases, and pollution control. Prerequisite: CHEM 1311.

EVEN 3399 Nuclear Environment Protection 3 SCH (3-0)

Nuclear fuel cycle and associated environmental impacts and safety concerns related to nuclear chemistry, nuclear physics, health physics, and environmental engineering. Prerequisite: junior standing.

EVEN 4102 Environ Engineering Design I 1 SCH (1-0-1)

Application of the scientific, engineering, technical and communications skills to develop engineering alternatives and economics analysis for an environmental engineering design topic. Students will meet one hour per week with an additional hour of recitation period to present ideas and proposal work products to the instructor. Corequisites: CEEN 3392, EVEN 3320, EVEN 3328.

EVEN 4105 Engineering Management 1 SCH (1-0)

Principles and fundamentals of engineering management and leadership. Prerequisite: junior or senior standing.

EVEN 4303 Environmental Engineering Design II (WI) 3 SCH (3-0)

The application of environmental engineering principles, including sustainability and economic criteria to a comprehensive air pollution control design problem. Computer software is utilized as a design aid. Prerequisites: EVEN 4102.

EVEN 4304 Water Res. & Adv. Comp. Meth. **3 SCH (3-0-1)**

Application of advanced computer techniques and methods for numerical analysis and solution of complex environmental engineering problems including geospatial analysis, mathematical model development and numerical solutions to non-linear differential equations, and their applications to water resources problems. Prerequisite: EVEN 2304 or equivalent.

EVEN 4306 Solid & Hazard Waste Fundamntl **3 SCH (3-0)**

Solid and hazardous waste engineering and planning. Landfill technology development and design. Waste to energy concepts and technology development, and resource conservation and recovery perspectives. Prerequisite: Senior standing in engineering

EVEN 4308 Wastewater Treatment **3 SCH (3-0)**

Engineering analysis and design of water and wastewater treatment processes focused principally on biological treatment systems. Water quality evaluation and design and operation of biological and other wastewater treatment systems; design of facilities for wastewater treatment. Prerequisite: Senior standing in engineering.

EVEN 4336 Selected Topics **1-3 SCH (1-3)**

One or more topics of environmental engineering. May be repeated when topic changes. Prerequisite: senior standing.

EVEN 4386 Air Pollution Control **3 SCH (3-0)**

A fundamental approach to air pollutants classification, sources and effects; theories of air quality, air pollution control and atmospheric science; control technologies of particulate and gaseous air pollutants, and process design variables; introduction to air pollution meteorology and dispersion modeling. Prerequisites: Senior standing in engineering. (Credit may not be obtained in both CHEN 4386 and EVEN 4386.)

EVEN 4399 Internship in Env. Engineering **1-3 SCH (1-3)**

Internships in industry, government or consulting companies, designed to broaden the skills obtained through curricular education. Prerequisite: junior or senior standing.

Natural Gas Engineering (NGEN)

NGEN 3122 Reservoir Engineering Lab **1 SCH (0-3)**

Experimental study of various petroleum reservoirs properties including, porosity, permeability, pore pressure, rock compressibility, rock resistivity, and capillary pressure. Prerequisite: Junior standing in engineering. Credit for or current registration in NGEN 3322.

NGEN 3193 Drilling Engineering Lab **1 SCH (0-3)**

Standard laboratory testing of drilling fluids including density, marsh viscosity, rheology, retort kit separation, API filter press-static filtration, lubricity and electrical stability. Prerequisite: Junior standing in engineering. Credit for or current registration in NGEN 3393 required.

NGEN 3322 Fund of Reservoir Engineering **3 SCH (3-0)**

Physical properties of petroleum reservoir rocks, lithology, porosity, fluid saturations, permeability and capillary characteristics as they relate to the production of oil and gas. Properties of hydrocarbon systems. Material balance methods. Flow of fluids in porous media. Prerequisites: CHEM 3323 and GEOL 4307. Credit or registration in NGEN 3392.

Fee: \$5.00

NGEN 3373 Nat Gas Property Evaluation **3 SCH (3-0)**

The course is designed to give an overview on the definition of resources/reserves, formation evaluation (production forecast and reserves estimate), and petroleum economics. The students acquire the background of basic economics in evaluating an oil and gas property. The requirement also includes the engineering calculations that are needed for estimating cost and profit associated with a project. Prerequisite: NGEN 3392.

NGEN 3392 Fluid Transport Phenomena **3 SCH (3-0)**

Fundamentals of momentum transport including fluid statics, flow of compressible and incompressible fluids, pumps, turbines, and compressors, with computer applications. Prerequisites: MATH 3320; credit or registration in MEEN 2355.

NGEN 3393 Fundamentals of Drilling Engg **3 SCH (3-0)**

Introduction to drilling equipment and methods, drilling fluids, casing and drill string design, bit selection, and cementing of wells. Application of computers to the drilling of wells. Contemporary methods of well completion. Prerequisites: CEEN 3311, NGEN 3322 and NGEN 3392.

NGEN 4178 Hydrocarbon Measurements Lab **1 SCH (0-3)**

Experimental study of hydrocarbon gas and liquid properties and flow rates measurements under different conditions. Several of the experiments are gas flow studies through pipes made of different materials, various types of valves and fittings. Experiments also include Heat Exchanges, Distillation Column, and Gas-Liquid Absorption. Prerequisite: Credit or registration in NGEN 4378.

NGEN 4297 Capstone Design I **2 SCH (2-0)**

Principles of design from conception to completion, and various constraints of designs including, economics, safety, ethics, and environment. The economics will cover cost estimation, time value of money and its application to oil and gas property evaluation. Prerequisites: CHEN 3321 and credit or registration in NGEN 4396.

NGEN 4375 Natural Gas Transmission and Distribution **3 SCH (3-0)**

Pipeline and compressor station design. Pipeline integrity and environmental issues associated with pipeline placement and design. Prerequisites: CHEN 3321 or NGEN 3392.

NGEN 4378 Hydrocarbon Flow Measurement 3 SCH (3-0)

Theory and practice of hydrocarbon properties, and flow measurement through orifice, turbine, ultrasonic, and Coriolis flow meters, and flow meter design. Prerequisite: NGEN 4375.

NGEN 4382 Natural Gas Cryogenics and Storage 3 SCH (3-0)

This course provides a comprehensive technical review of the compressed and Liquefied Natural Gas (LNG) industry. The course objectives are to describe - the cryogenic processes of natural gas, LNG specific properties, equipment and technical processes, hazards associated with operations, hazard prevention and mitigation measures, LNG storage, loading/offloading and transportation. Use of computer aided simulation and economic evaluation of LNG facilities design. Prerequisite: NGEN 4389.

NGEN 4383 Natural Gas Processes 3 SCH (3-0)

The study of principles of operation, design, simulation, and economics of processing natural gas and the associated liquids. Use of computer aided design and economic evaluation of facility designs. Prerequisite: NGEN 4389 and NGEN 4375.

NGEN 4387 Well-Logging 3 SCH (3-0)

Theory of well-logging techniques and applications, electrical resistivity, radioactive and acoustic properties of rocks. Interpretation of resistivity, spontaneous potential, gamma-ray, neutron, and sonic logs. Prerequisite: NGEN 3393 and GEOL 4307.

NGEN 4389 Separation Processes 3 SCH (3-0)

Fundamentals of separation processes in petroleum industry, including sedimentation, filtration, centrifugation, thermodynamic phase equilibrium flash calculations, gas absorption, and distillation with computer design applications. Pre-requisites: CHEN 3310 and CHEN 3321.

NGEN 4396 Natural Gas Production 3 SCH (3-0)

Theory, design and methods of gas production, well testing and production forecasting. Estimating the value of gas and oil properties. Environmental issues and professional responsibility. Prerequisites: NGEN 3393.

NGEN 4398 Capstone Design II (WI) 3 SCH (3-0)

In teams, students complete significant design projects that include two or more aspects of natural gas engineering. Prerequisite: NGEN 4297 and credit or registration in NGEN 4383, NGEN 4387, and NGEN 4378.

Majors

- Chemical Engineering, B.S.
- Environmental Engineering, B.S.

Minors

- Biochemical Engineering Minor
- Environmental Engineering, Minor

Certificates

- Chemical Process Industry, Academic Certificate

Planned Course Offerings

This section provides a comprehensive list of courses offered by the Division of Chemical Engineering and Environmental Engineering, along with a three-year schedule indicating when each course is expected to be available. Please note that course offerings and scheduling are subject to change based on faculty availability and student demand. It is recommended that students consult with their academic advisor to plan their course schedule accordingly.

Chemical Engineering (CHEN)

Course	Fall 2026	Spring 2027	Fall 2027	Spring 2028	Fall 2028	Spring 2029
CHEN 2371	X	X	X	X	X	X
CHEN 2372		X		X		X
CHEN 3305	X		X		X	
CHEN 3310	X	X	X	X	X	X
CHEN 3315		X		X		X
CHEN 3321	X	X	X	X	X	X
CHEN 3347	X	X	X	X	X	X
CHEN 3371		X		X		X
CHEN 3392	X	X	X	X	X	X
CHEN 4120	X		X		X	
CHEN 4130		X		X		X

CHEN 4278	X		X		X	
CHEN 4279		X		X		X
CHEN 4311	X		X		X	
CHEN 4316	X		X		X	
CHEN 4317		X		X		X
CHEN 4335	X		X		X	
CHEN 4341	X		X		X	
CHEN 4342		X				
CHEN 4343				X		X
CHEN 4351			X		X	
CHEN 4352			X		X	
CHEN 4353		X				
CHEN 4354		X				
CHEN 4355	X					
CHEN 4373	X		X		X	
CHEN 4386				X		X
CHEN 4389	X		X		X	
CHEN 4399						
CHEN 4492		X		X		X

Environmental Engineering (EVEN)

Course	Fall 2026	Spring 2027	Fall 2027	Spring 2028	Fall 2028	Spring 2029
EVEN 2304		X		X		X
EVEN 2310	X		X		X	
EVEN 2311		X		X		X
EVEN 2372	X		X		X	
EVEN 3320		X		X		
EVEN 3321	X		X			
EVEN 3328		X		X		
EVEN 3336		X	X	X		
EVEN 3399	X		X			
EVEN 4102	X		X		X	
EVEN 4105		X		X		X
EVEN 4303		X		X		X
EVEN 4304		X		X		X
EVEN 4306		X		X		X
EVEN 4308		X		X		X
EVEN 4336	X					
EVEN 4386		X		X		X
EVEN 4399 ¹						

Natural Gas Engineering (NGEN)

Course	Fall 2026	Spring 2027	Fall 2027	Spring 2028	Fall 2028	Spring 2029
NGEN 3122	X		X		X	
NGEN 3193		X		X		X
NGEN 3322	X		X		X	
NGEN 3373		X		X		
NGEN 3392	X	X	X	X	X	X
NGEN 3393		X		X		X

NGEN 4178		X		X		X
NGEN 4297	X		X		X	
NGEN 4375	X		X		X	
NGEN 4378		X		X		X
NGEN 4382		X		X		
NGEN 4383		X		X		X
NGEN 4387		X		X		X
NGEN 4389	X		X		X	
NGEN 4396	X		X		X	
NGEN 4398		X		X		X

Marketable Skills

Texas A&M University-Kingsville is committed to preparing students for success beyond the classroom by helping them develop marketable skills. These are the interpersonal, cognitive, and applied abilities that today's employers value most. Our academic programs are designed to help students build these essential competencies through a blend of academic coursework, hands-on learning, research opportunities, internships, and extracurricular involvement.

Below are the marketable skills provided by each of the division's academic programs.

Chemical Engineering

- Effective communication
- Teamwork and collaboration
- Computer and digital technology
- Processing and design

Environmental Engineering

- Knowledge-based skills
- Problem-solving skills
- Professional skills