The objectives of the graduate studies in the Chemical and Natural Gas Engineering programs are as follows.

1. To prepare students for successful careers and major contributions to the petroleum and chemical process industries by instilling in them fundamental concepts as well as practical knowledge of modern engineering to overcome current as well as future challenges of the industries.
2. To prepare students for doctoral study in petroleum/chemical or related disciplines.
3. To instill in students a sense of responsibility to their profession and to society in general.

The Wayne H. King Department of Chemical Engineering and Natural Gas Engineering offers programs in developing interdisciplinary specialties, as well as in the more traditional areas of Chemical and Natural Gas Engineering.

Several modern engineering buildings contain laboratories, including unit operations, process control, gas measurement and drilling facilities. Excellent computer facilities also are available.

**Degrees Offered**

- The Ph.D. degree is available in Sustainable Energy Systems Engineering.
- The Master of Science degree is available in Chemical and Natural Gas Engineering

**Faculty**

**Graduate Faculty**

Duarte, Horacio  
Associate Professor, Wayne H. King Department of Chemical and Natural Gas Engineering; B.S., Instituto Tecnologico Regional de Durango (Mexico); M.Eng., Instituto Tecnologico y de Estudios Superiores de Monterrey (Mexico); Ph.D., Texas A&M University.

Pilehvari, Ali  
Professor, Wayne H. King Department of Chemical and Natural Gas Engineering; Chair; B.S., Tehran Polytechnique (Iran); M.E., University of Tulsa; Ph.D., University of Tulsa.

**Associate Member**

Cabezas, Jose  
Professor of Practice, Wayne H. King Department of Chemical and Natural Gas Engineering; B.S., Escuela Superior Politécnica del Litoral (Ecuador); M.S., Texas A&M University-Kingsville; Ph.D., Texas A&M University-Kingsville.

Lopez Manriquez, Alberto  
Associate Professor, Wayne H. King Department of Chemical and Natural Gas Engineering; B.S., National University of Autonomos of Mexico (Mexico); M.Sc., National University of Autonomus of Mexico (Mexico); Ph.D., The University of Texas at Austin.

**Courses**

**Chemical Engineering (CHEN)**

CHEN 5303  Advance Topics in Chem Eng  1-3 SCH (1-3)  
One or more advanced topics. May be repeated for a maximum of 6 semester hours when topic changes.

CHEN 5305  Graduate Research Project  3 SCH (3)  
Designed for project option students and requires completion of research project. Prerequisite: departmental approval. May be repeated for a maximum of 6 semester hours.

CHEN 5306  Thesis  3 SCH (3)  
Designed for thesis option students. The course requires completion of thesis research. Prerequisite: departmental approval. May be repeated for maximum of 6 semester hours.

CHEN 5308  Transport Processes  3 SCH (3-0)  
An advanced and unified treatment of fluid mechanics and heat transfer, stressing the fundamental equations of momentum and energy transport and their applications in chemical engineering.
A basic understanding of the concepts underlying the solution, behavior and computation of separation processes is stressed. Both staged and continuous separation methods are considered. (Credit may not be obtained in both CHEN 5309 and NGEN 5309.)

A comprehensive treatment of process design problems with emphasis on the engineering economics of the chemical process industry.

Optimization techniques and their application in the chemical and petroleum industries. (Credit may not be obtained in both CHEN 5314 and NGEN 5314.)

Analytical and numerical techniques for the simulation and analysis of processes and equipment employed in the chemical and petroleum industries.

Analysis of various interactions between physical and chemical rate processes and their influences on the design and control of chemical reactors.

Kinetics of microbial growth and enzyme-catalyzed reactions, mass transfer in bioprocess systems, design and analysis of biological reactors and the recovery of products from such operations.

The study of non-Newtonian fluid flow behavior. Designed to provide a comprehensive understanding of theoretical as well as practical aspects of the flow of non-Newtonian fluids. (Credit may not be obtained in both CHEN 5336 and NGEN 5336.)

Study of the latest processes that are utilized in the natural gas industry. It includes analysis, design and optimization of various natural gas processes with considerations of economics, environmental and safety aspects. (Credit may not be obtained in both CHEN 5360 and NGEN 5360.)

Fundamentals of modern process control theory are covered and applied to control applications in the chemical and petroleum industries. (Credit may not be obtained in both CHEN 5361 and NGEN 5361.)

The general equations of multicomponent-multiphase systems, with application to phase equilibria and chemical reaction equilibria. Prerequisite: CHEN 3371.

Individual or group research on advanced problems conducted under the supervision of a faculty member. Maximum credit 8 semester hours.

One or more advanced topics. May be repeated for a maximum of 6 semester hours when topic changes.

Designed for project option students and requires completion of research project. Prerequisite: departmental approval. May be repeated for a maximum of 6 semester hours.

Designed for thesis option students. The course requires completion of thesis research. Prerequisite: departmental approval. May be repeated for maximum of 6 semester hours.

A basic understanding of the concepts underlying the solution, behavior and computation of separation processes is stressed. Both staged and continuous separation methods are considered. (Credit may not be obtained in both NGEN 5309 and CHEN 5309.)

The application of theoretical and practical principles for the evaluation of oil and gas properties and the qualification of risk and uncertainty in petroleum exploration through decision analysis.

The simultaneous flow of gases and liquid through vertical and horizontal conduits and through porous media. Special emphasis is placed on the applications encountered in the natural gas industry.

Methods of analysis of pressure transient data obtained from well testing for the purpose of determining in situ reservoir characteristics and conditions.

The theory and design of equipment for the production and handling of liquefied natural gas and other cryogenic materials.
NGEN 5314 Optimization of Chem Proc 3 SCH (3-0)
Optimization techniques and their application in the chemical and petroleum industries. (Credit may not be obtained in both NGEN 5314 and CHEN 5314.)

NGEN 5325 Nat Gas Prod and Distribution 3 SCH (3-0)
Theory, design and methods of gas well testing and production. Distribution topics include pipeline and compressor design and flow measurement. Prerequisite: NGEN 4375.

NGEN 5327 Nat Gas Drilling Engineering 3 SCH (3-0)
Drilling equipment and methods, drilling fluids, completion of wells including casing and cementing design. Prerequisite: NGEN 3393.

NGEN 5336 Rheology 3 SCH (3-0)
The study of non-Newtonian fluid flow behavior. Designed to provide a comprehensive understanding of theoretical as well as practical aspects of the flow of non-Newtonian fluids. (Credit may not be obtained in both NGEN 5336 and CHEN 5336.)

NGEN 5360 Advanced Nat Gas Processes 3 SCH (3-0)
Study of the latest processes that are utilized in the natural gas industry. It includes analysis, design and optimization of various natural gas processes with considerations of economics, environmental and safety aspects. (Credit may not be obtained in both NGEN 5360 and CHEN 5360.)

NGEN 5361 Adv Process Dynamics and Contr 3 SCH (3-0)
Fundamentals of modern process control theory are covered and applied to control applications in the chemical and petroleum industries. (Credit may not be obtained in both NGEN 5361 and CHEN 5361.)

NGEN 5363 Advanced Reservoir Engineering 3 SCH (3-0)
Phase relations of hydrocarbon systems, material balance methods, flow in reservoirs and displacement of gas. The application of computers to reservoir engineering.

NGEN 5387 Quantitative Well Log Analysis 3 SCH (3-0)
Theory of special well-logging techniques and applications.

NGEN 5401 Advanced Probs in Nat Gas Engi 1-4 SCH (1-4)
Individual or group research on advanced problems conducted under the supervision of a faculty member. Maximum credit of 8 semester hours.