

# Wayne H. King Department of Chemical Engineering and Natural Gas Engineering

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## Contact Information

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

- 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.
- To prepare students for doctoral study in petroleum/chemical or related disciplines.
- 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

## Department Faculty

**Alexander, Matthew L** Associate Professor, Wayne H. King Department of Chemical and Natural Gas Engineering; B.S., Trinity University; M.S., Georgia Institute of Technology; Ph.D., Purdue University.

**Amaya, Joseph** Assistant Professor of Practice, Wayne H. King Department of Chemical and Natural Gas Engineering; B.S., Texas A&M University-Kingsville; M.S., Texas A&M University-Kingsville; Ph.D., Texas A&M University-Kingsville.

**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.

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

**Fan, Zhaoqi** Associate Professor, Wayne H. King Department of Chemical and Natural Gas Engineering; B.Sc., China University of Petroleum (China); Ph.D., China University of Petroleum (China); Ph.D., University of Regina (Canada).

**Mills, Sr., Patrick** Professor, Wayne H. King Department of Chemical and Natural Gas Engineering; B.S., Tri-State University; M.S., Washington University in St. Louis; D.Sc., Washington University in St. Louis.

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

**Xiao, Chongwei** Associate Professor, Wayne H. King Department of Chemical and Natural Gas Engineering; B.A., Hubei University (China); M.E., Beijing Institute of Technology (China); Ph.D., University of Wyoming.

## 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.

**CHEN 5309 Separation Process 3 SCH (3-0)**

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.)

**CHEN 5331 Simulatn and Analy of Chem Eng 3 SCH (3-0)**

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

**CHEN 5333 Chem and Catalytic Reaction En 3 SCH (3-0)**

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

**CHEN 5334 Biochemical Engineering 3 SCH (3-0)**

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.

**CHEN 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 CHEN 5336 and NGEN 5336.)

**CHEN 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 CHEN 5360 and NGEN 5360.)

**CHEN 5361 Advd Proc Dynamics and Control 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 CHEN 5361 and NGEN 5361.)

**CHEN 5371 Adv Chem Eng Thermodynamics 3 SCH (3-0)**

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

**CHEN 5401 Advance Probs in Chem Eng 1-4 SCH (1-4)**

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

## Natural Gas Engineering (NGEN)

**NGEN 5303 Advncd Topics in Nat Gas Engin 1-3 SCH (1-3-0)**

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

**NGEN 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.

**NGEN 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.

**NGEN 5309 Separation Process 3 SCH (3-0)**

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.)

**NGEN 5312 Pressure Transient Analysis 3 SCH (3-0)**

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

**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 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.

## Master's Programs in Chemical Engineering

### Master's Program in Chemical Engineering- Thesis Option I

Code	Title	Semester Credit Hours
<b>Core Requirements</b>		<b>15</b>
CHEN 5303	Advance Topics in Chem Eng	
CHEN 5308	Transport Processes	
CHEN 5309	Separation Process	
CHEN 5333	Chem and Catalytic Reaction En	
CHEN 5371	Adv Chem Eng Thermodynamics	
<b>In addition to the above, the course below must be taken twice for a total of six (6) semester credit hours</b>		<b>6</b>
CHEN 5306	Thesis	
<b>Elective Courses</b>		<b>9</b>
<b>TOTAL</b>		<b>30</b>
		Credits

### Master's Program in Chemical Engineering- Project Option II

Code	Title	Semester Credit Hours
<b>Core Requirements</b>		<b>15</b>
CHEN 5303	Advance Topics in Chem Eng	
CHEN 5308	Transport Processes	
CHEN 5309	Separation Process	
CHEN 5333	Chem and Catalytic Reaction En	
CHEN 5371	Adv Chem Eng Thermodynamics	
<b>Graduate Research Program</b>		
CHEN 5305	Graduate Research Project	3
<b>Elective Courses</b>		<b>18</b>
<b>TOTAL</b>		<b>36</b>
		Credits

### Chemical Engineering Electives

Code	Title	Semester Credit Hours
CHEN 5331	Simulatn and Analy of Chem Eng	3
CHEN 5334	Biochemical Engineering	3
CHEN 5401	Advance Probs in Chem Eng	1-4
CHEN 5336	Rheology	3

CHEN 5360	Advanced Nat Gas Processes	3
CHEN 5361	Advd Proc Dynamics and Control	3

## Master's Programs in Natural Gas Engineering

### Master's Program in Natural Gas Engineering - Thesis Option I

Code	Title	Semester Credit Hours
<b>Core Requirements</b>		<b>15</b>
NGEN 5325	Nat Gas Prod and Distribution	
NGEN 5327	Nat Gas Drilling Engineering	
NGEN 5336	Rheology	
NGEN 5360	Advanced Nat Gas Processes	
NGEN 5363	Advanced Reservoir Engineering	
<b>In addition to the above, the course below must be taken twice for a total of six (6) semester credit hours</b>		
NGEN 5306	Thesis	
<b>Elective Courses</b>		<b>9</b>
<b>TOTAL</b>		<b>30</b>
		<b>Credits</b>

### Master's Program in Natural Gas Engineering - Project Option II

Code	Title	Semester Credit Hours
<b>Core Requirements</b>		<b>15</b>
NGEN 5325	Nat Gas Prod and Distribution	
NGEN 5327	Nat Gas Drilling Engineering	
NGEN 5336	Rheology	
NGEN 5360	Advanced Nat Gas Processes	
NGEN 5363	Advanced Reservoir Engineering	
<b>In addition to the above</b>		
NGEN 5305	Graduate Research Project	3
<b>Elective Courses</b>		<b>18</b>
<b>TOTAL</b>		<b>36</b>
		<b>Credits</b>

## Natural Gas Engineering Electives

Code	Title	Semester Credit Hours
NGEN 5303	Advncd Topics in Nat Gas Engin	1-3
NGEN 5309	Separation Process	3
NGEN 5312	Pressure Transient Analysis	3
NGEN 5387	Quantitative Well Log Analysis	3
NGEN 5401	Advanced Probs in Nat Gas Engi	1-4