The development and social well-being in today’s world is mostly based in the progress of science and technology. Each country is becoming increasingly aware of their need of having professionals and researchers with a sound academic training, able to collaborate in the generation of knowledge to address the demands of progress.

The Master Degree in Chemical Engineering and Science (MCIQ) seeks to train highly qualified professionals, capable of innovating and generating knowledge from a multidisciplinary approach and a critical vision of our national reality. Our graduates must be able to find solutions to frontier problems, making the best use of resources, focusing in process engineering, sustainable development of new materials or improving the properties of those currently on the market.
OBJECTIVES

General
To train competent specialists who can meet the scientific and technological challenges of Chemical Engineering in Mexico and worldwide, developing the necessary skills to undertake basic and/or applied research in Process and Materials Engineering, using a sustainability approach underscoring environmental care.

Specific
At the end of the Program, the student will be able to:

1. To participate in the development of Chemical Engineering research projects focusing in process engineering (biotechnology, environmental engineering, electrochemistry and energy systems) and/or materials engineering (polymers, biopolymers and nanomaterials).

2. To find research-based novel solutions chemical industry problems.

3. To apply research-based knowledge with ethical and social responsibility in order to contribute to improve productivity and competitiveness.

4. To develop in interdisciplinary research teams to enhance the outcomes of research projects and technological developments, in partnership with industries and other institutions.

5. To disseminate research outcomes in seminars, congresses and/or national and international publications.

LINKAGE

The program has formal and informal links with the following institutions:

• Cardiff University
• Centre National de la Recherche Scientifique, Laboratoires Internationaux Associés/Université Tolouse Ill-Paul Sabatier, México-Francia
• Centro de Investigación Tecnológica FQ, S. A. de C. V.
• Consejo Nacional de Ciencia y Tecnología
• Ge4 Association
• Industrias Polioles, S. A. de C. V.
• Instituto Químico de Sarrià
• Instituto Politécnico Nacional
• International Life Sciences Institute de México
• Laboratorios Griffith, S. A. de C. V.
• Nestlé Servicios Industriales, S. A. de C. V.
• Secretaría de Relaciones Exteriores
• Universidad Autónoma Metropolitana, Unidades Cuajimalpa e Iztapalapa
• Universidad del País Vasco
• Universidad Nacional Autónoma de México

APPLICANTS PROFILE

The candidate must hold a B.Sc. in Chemical Engineering or related field (Physical Engineering, Environmental Engineering, Food Engineering, etc.), have interest in conducting basic or applied research, have analytical and problem solving abilities, strong oral and written communication skills, knowledge of Mathematics, Thermodynamics, Process Engineering, and a high level English reading comprehension (standards of EXANI III-CENEVAL).

Skills and attitudes
Critical, creative, and responsible person, with social solidarity, team-working abilities and inclination toward research and development.

GRADUATES PROFILE

Knowledgeable of

• Theoretical bases and laws governing processes, materials and systems to address the scientific and technological challenges related to Chemical Engineering, particularly those involved in Process Engineering and Materials Engineering.
• Methodology to conduct research and to apply science and technology to solve problems in the different fields of Chemical Engineering.

Skills

• To recognize, analyze and solve scientific and technological developments issues with the best environmental-friendly alternatives based on the expertise of Engineering and Chemical Science.
• To offer novel and proactive solutions.
• To solve industrial problems based on processes development new trends, state-of-the-art science and technology, and patents.
• To investigate and assess process and materials engineering scientific and technological issues of the chemical engineering industry.
• To actively participate in inter and multi-disciplinary teams dealing with the scientific and technological issues of Chemical Engineering.
• Being able to write scientific papers.

Attitudes and Values

• To provide solutions to our country’s chemical engineering problems based on thorough understanding, using domestic scientific and technology resources.
• To conduct research based on social awareness, ethics and responsibility.
• Team-work in inter and multidisciplinary environments.
• Commitment to environmental and social well-being.
• Readiness to continuous learning in the field of Chemical Engineering and related areas.

FIELD OF WORK

Research and Teaching
At research centers and institutions, working with established researchers, providing services to industries and institutions, conducting requested projects or leading research groups.

Industry
As part of a specific industry or institution, participating in the comprehensive development of solutions to scientific or technological problems, responsible of the different stages of innovation projects.

Consultancy Firms
Working in professional teams giving integral support to industries.
FACULTY MEMBERS

Guillermo Fernández Anaya
Member of the National Research System (SNI) Level II
Ph.D. in Physics, M.Sc. in Physical Sciences and B.Sc. in Physics, Universidad Nacional Autónoma de México.

Research interests:

Recent Publications:

Contact: guillermo.fernandez@ibero.mx

Jorge Ibáñez Cornejo
Member of the National Research System (SNI) Level III
Ph.D. in Chemistry, University of Houston. (USA)

B.Sc. in Chemical Engineering, Instituto Tecnológico y de Estudios Superiores de Occidente. 

Research interests: Design and Performance of Simultaneous Electrochemical Reactions; Pollutants Degradation by Electro-chemical Methods; and Research in Teaching Microscale Chemistry.


Research interests:
Biorefining Processes; Microbial Metabolites Production; Design, Simulation and Bioprocesses Assessment.

Recent Publications:

Contact: lorena.pedraza@ibero.mx

Ruth Pedraza Islas
Member of the National Research System (SNI), Level II
Ph.D. in Chemical Sciences and B.Sc. in Chemical Farmaceutical Biology, Universidad Nacional Autónoma de Mexico.
M.Sc. in Food Science and Technology, Universidad Iberoamericana.

Research interests:
Microencapsulation of Bioactive Ingredients; Functional Properties of Emulsified Polymeric Solutions as Active Coatings of Mexican Regional Fruit Exports; Protein-Polyasaradacharide Interactions for the Production of Fat Substitutes.

Recent Publications:

Iván Rafael Quevedo Partida
Member of the National Research System (SNI), Level I
Ph.D. in Chemical Engineering, McGill University. M.Sc. in Environmental Systems and B.Sc. in Chemical Engineering and Administrator, Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM) Campus Monterrey.

Research interests:
Transport and Distribution of Pollutants in the Environment; Environmental and Health Risks of Emerging Technologies; Innovative Technologies to Improve Water Quality.

Recent Publications:

Contact: ivan.quevedo@ibero.mx
Jesús Alberto Quezada Gallo
Ph.D. and M.Sc. in Food Science, Universidad de Bourgogne. (France)
B.Sc. in Biochemistry Engineering, Universidad Autónoma de Aguascalientes.

Research interests: Microencapsulation of Bioactive Ingredients; Study of the Properties of Emulsified Polymeric Solutions as Active Coatings of Mexican Regional Fruit Exports; Protein-Polyascarbamide Interactions for the Production of Fat Substitutes.


Esther Ramírez Meneses
Member of the National Research System (SNI), Level I
Ph.D. in Science in Transition Elements Physical Chemistry, Universidad Paul Sabatier. (France)
M.S. in Metallurgical Engineering and B.S. in Industrial Chemistry Engineering, Instituto Politécnico Nacional.


Rubén C. Vázquez Medrano
Member of the National Research System (SNI), Level I
Ph.D. in Physics, M.Sc. in Physical Sciences and B.Sc. in Physics, Universidad Nacional Autónoma de México.


Martin Rivera Toledo
Ph.D. in Engineering, M.Sc. in Chemical Engineering (Processes) and B.Sc. in Chemical Engineering, Universidad Nacional Autónoma de México.

Research interests: Mathematical Modeling of Chemical Processes; Simulation and Optimization of Chemical Processes in Permanent and Dynamic Systems.


Alberto Ruiz Treviño
Member of the National Research System (SNI), Level II
Ph.D. in Science (Modification of Gas Separation Membrane Materials by Antiplasticization), University of Texas. (USA)
M.S. in Chemical Engineering, Universidad Autónoma Metropolitana, Unidad Iztapalapa.
B.S. in Chemical Engineering, Universidad Autónoma de Nuevo León.

Research interests: Synthesis and/or Modification of Polymer Properties Used as Separation Media, Purification or Sequestration of Industrial Gas, Pollutants, and Corrosive Materials.


Alberto Ruiz Treviño
Member of the National Research System (SNI), Level II
Ph.D. in Science (Modification of Gas Separation Membrane Materials by Antiplasticization), University of Texas. (USA)
M.S. in Chemical Engineering, Universidad Autónoma Metropolitana, Unidad Iztapalapa.
B.S. in Chemical Engineering, Universidad Autónoma de Nuevo León.

Research interests: Synthesis and/or Modification of Polymer Properties Used as Separation Media, Purification or Sequestration of Industrial Gas, Pollutants, and Corrosive Materials.


Rubén G. Vázquez Medrano
Member of the National Research System (SNI), Level I
Ph.D. in Physics, M.Sc. in Physical Sciences and B.Sc. in Physics, Universidad Nacional Autónoma de México.


SYLLABUS

First semester
- Advanced Mathematics: 16 credits
- Advanced Thermodynamics: 8 credits

Second semester
- Transport Phenomena: 20 credits
- Chemical Reaction Engineering: 8 credits
- Research Seminar I: 4 credits

Third semester
- Elective I: 12 credits
- Research Seminar II: 8 credits

Fourth semester
- Elective II: 12 credits
- Research Project: 4 credits

Graduation credits: 20 credits
Total: 64 credits

ELECTIVE SUBJECTS
- Process engineering
- Processing systems engineering
- Electrochemical engineering
- Environmental electrochemistry
- Functional properties of hydrocolloids
- Advanced topics in food chemistry
- Polymer science
- Polymer processing
- Biotechnology
- Biotechnological processes
- Risk assessment and environmental impact
- Effluent treatment technologies
- Synthesis of nanomaterials
- Materials characterization
- Advanced topics in chemical engineering

LINES OF RESEARCH

1) PROCESS ENGINEERING

The objective of this area is to develop experimental activities and/or mathematical modeling, optimization, control of processes and development of new technologies in the fields of energy systems, bio-engineering, treatments of pollutants, and environmental risk analysis and assessment.

2) MATERIALS

This area focuses on the systematic scientific study of the relation between structure/properties of materials, and the relations between processing/functional properties of engineering materials. Its emphasis is on the development and formulation of functional materials with potential applications in: i) Polymers, ii) Biopolymers with functional properties in food industry and iii) Synthesis of nanomaterials with diverse applications.

ADMISSION PROCEDURES

The applicant must meet the following requirements:

1. Hold a Bachelor’s degree and a professional license in Chemical Engineering or related field
2. B.Sc. minimum GPA of 8.0/10
3. Curriculum Vitae
4. Interview with the program coordinator
5. Two letters of recommendation from university professors or employers
6. Statement of purpose
7. Admission Examination: EXANI III – CENEVAL (minimum: 1000 points)
8. EGEL-IQ (satisfactory performance testimony with minimum: 1000 points)

For further information please contact:
ivan.quevedo@ibero.mx

The program is comprised by 80 credits, which must be accredited in two years (four school periods).