



Curriculum Map

Doctorate in Engineering Science: Chemical Engineering

	I	II	III	IV	V	VI	VII	VIII
1	2320 Advanced Mathematics MAT 8 4	2321 Numerical Methods in Engineering MAT 8 4						
2	Basic Course I BAS 8 4	Basic Course II BAS 8 4						
3	2369 Advanced Research Techniques INV 8 4	Elective Course I OPT 8 4	Elective Course II OPT 8 4	Elective Course III OPT 8 4	Elective Course IV OPT 8 4			
4	2378 Research (D) INV 1 TC	2378 Research (D) INV 1 TC	2378 Research (D) INV 2 TC	2378 Research (D) INV 8 TC	2378 Research (D) INV 8 TC	2378 Research (D) INV 8 TC	2378 Research (D) INV 8 TC	2378 Research (D) INV 8 TC
5	2377 Graduate Seminar (D) INV 1 2	2377 Graduate Seminar (D) INV 1 2	2377 Graduate Seminar (D) INV 1 2	2377 Graduate Seminar (D) INV 1 2	2377 Graduate Seminar (D) INV 2 2	2377 Graduate Seminar (D) INV 2 2	2377 Graduate Seminar (D) INV 2 2	2377 Graduate Seminar (D) INV 2 2
6	2376 Doctorate in Science Thesis INV 0 TC	2376 Doctorate in Science Thesis INV 0 TC	2376 Doctorate in Science Thesis INV 0 TC	2376 Doctorate in Science Thesis INV 0 TC	2376 Doctorate in Science Thesis INV 0 TC	2376 Doctorate in Science Thesis INV 0 TC	2376 Doctorate in Science Thesis INV 0 TC	2376 Doctorate in Science Thesis INV 0 TC

COURSES

Mathematics Courses

- Advanced Mathematics (mandatory)
- Numerical Methods in Engineering

Basic Courses

- Mass Transfer Operations
- Advanced Thermodynamics
- Transport Phenomena
- Reactor Engineering

Research and Thesis Courses

- Advanced Research Techniques
- Graduate Seminar
- Research
- Doctorate in Science Thesis

Elective Courses

- Computational Fluid Dynamics
- Process Simulation
- Bioprocess Design
- Bioreaction
- Advanced Biochemistry
- Cell Culturing Basics I
- Bioprocess Engineering
- Energy Generation Technologies
- Energy Sustainability and Prospective
- Alternative Energy Sources
- Water Treatment Plant Design
- Environmental Microbiology
- Environmental Chemistry
- Residuals Waste Handling and Treatment
- Multiparticle System Models
- Surface and Interface Physical Chemistry
- Processing of Materials
- Aqueous Materials Processing
- Chemical Materials Processing at High Temperatures
- Solid-Fluid Reaction Engineering
- Electro-Chemical Materials Processing
- Select Engineering Topics I
- Select Engineering Topics II
- Soil Chemistry
- Advanced Instrumental Analysis
- Experiment Design
- Solar Energy Engineering
- Separation Processes
- Solid-Liquid Separation

KEY	COURSE
	CREDITS HOURS

- BAS - Basic Course
- MAT - Mathematics Course
- OPT - Elective Course
- INV - Investigation Course
- TC - Full Time
- H - Hours per Week