

MASTER OF SCIENCE

DOCTOR OF PHILOSOPHY

HEAD

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FIVE-YEAR MASTER'S DEGREE PROGRAM

More than one-fourth of all chemical engineering graduates choose to continue their education beyond the bachelor's degree. The five-year program offers students the opportunity to complete a master's degree in one calendar year following completion of requirements for the bachelor's degree. To qualify, a student must possess a grade point average of 3.0 or above following his or her junior year. Additional information concerning this program may be obtained by contacting the department head.

MASTER OF SCIENCE DEGREE PROGRAM

The objective of the master of science program is to study the basic principles of chemical engineering in greater depth, including transport phenomena, thermodynamics, reactor design and process control. Electives in other areas to broaden the students' exposure are also required. The program's emphasis is research and the writing of a thesis on a current problem. The results of the thesis must be publishable in a technical journal. Students are advised to see members of the faculty to determine compatibility of interests before selecting a research area. Program policies are available in the program office.

ADMISSION REQUIREMENTS

The applicant must have a Bachelor of Science in Chemical Engineering or its equivalent. Applicants with degrees in other fields of engineering, or in science or mathematics, are ordinarily required to take preparatory undergraduate courses before starting the master of science program. These courses are established by the faculty adviser and the program chair when the student obtains admission to the program.

General admission requirements and the application process are detailed in the *Graduate Information and Regulations* section of the *University Catalog*.

DEGREE REQUIREMENTS

The Master of Science in Chemical Engineering requires satisfactory completion of 30 credit hours, including six credit hours of thesis, as shown below. Required courses include the zero-credit Chemical Engineering Seminar that all graduate students are required to register for and attend every semester. The nine elective credits may be satisfied by taking chemical engineering graduate courses, or other courses approved by the graduate adviser. The degree also requires completion of an independent research project, the writing of a thesis and its successful defense.

DOCTOR OF PHILOSOPHY DEGREE PROGRAM

The doctoral program is primarily for students who wish to develop independent research or problem-solving and critical thinking abilities. Research areas must be related to the faculty's interests.

ADMISSION REQUIREMENTS

General admission requirements and the application process are covered in the *Graduate Information and Regulations* section of the *University Catalog*.

Admission to the doctoral program normally requires the completion of a master's degree in chemical engineering. However, students enrolled in the Florida Tech master's program may apply to be admitted directly to the doctoral program after completing 18 credits with a cumulative grade point average of 3.5 or more, if there is evidence of the ability to pursue problems independently.

Doctoral applicants must demonstrate outstanding scholastic achievements and aptitude, provide letters of recommendation from previous professors, including the M.S. thesis adviser and provide results of a recent GRE test including both the General Test and Subject Test in Engineering.

DEGREE REQUIREMENTS

The doctor of philosophy degree is a recognition of one's independent creative ability to research, delineate and solve novel, significant scientific and/or engineering problems. Results of such work must be publishable in refereed journals. Course work is also included in support of these objectives.

Each student is expected to complete an approved program of study, pass both oral and written examinations, propose and complete an original research project, and write and defend a dissertation on the research work.

M.S. CURRICULUM

Prior to the completion of nine semester hours of graduate study each student establishes an appropriate program of study with the guidance of a graduate committee, subject to final approval by the department head.

CHE 5100 Chemical Engineering Seminar	0
CHE 5101 Transport Phenomena 1	3
CHE 5110 Equilibrium Thermodynamics	3
CHE 5120 Process Control	3
CHE 5150 Chemical Reactor Design	3
CHE 5999 M.S. Thesis in Chemical Engineering	6
Electives	12

Areas of Specialization

The student may select electives and the thesis topic to provide an emphasis in any of the following areas:

- Environmental Engineering
- Materials Synthesis, Processing and Characterization
- Transport and Separation Processes
- Computer-aided Modeling, Processing and Control



*Florida Institute
of Technology*

College of Engineering
Department of
Chemical Engineering

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RESEARCH ACTIVITIES AND FACILITIES

Current research activities are within the scope of the areas of specialization previously stated.

In environmental engineering, activities have included experimental studies of biochemical reactors, and theoretical and experimental investigations of advanced water treatment processes such as activated carbon absorption. Current research includes experimental studies in ion exchange and membrane separation, theoretical and experimental investigation of separation through pressure-swing adsorption of a gaseous product of phosphogypsum biodegradation, and development of concentration sensors for pollution monitoring.

In materials synthesis, processing and modeling, ongoing activities are in sol-gel processing of ceramic fibers that may be used in ceramic matrix composites, modeling of ceramic matrix composite properties and reaction kinetics and transport processes in the chemical vapor deposition of hydrogenated amorphous silicon for use as a solar cell. Research on transport properties of porous and composite media during chemical vapor infiltration is actively being pursued, as well as relating such properties to nuclear magnetic resonance (NMR) relaxation times of fluids in such media. Use of supercritical fluids for extraction of citrus oil and other chemical processing applications is being studied.

The department has several ongoing projects in the area of hydrogen technology, focusing on reducing fuel cell weight and cost, prevention of fuel cell deactivation, biological production of hydrogen, membrane purification of hydrogen, hydrogen sensors, retrofitting of an experimental aircraft with a hydrogen fuel cell powered engine, and use of hydrogen for production of water and oxygen on Mars.

In the area of computer-aided modeling, processing and control research is ongoing in the area of adaptive control for both single loop and multivariable applications. Neural networks are being investigated for use in nonlinear control as well as other areas of model development in which traditional models are constrained. Other topics of research interest include the development of artificial intelligence and expert system software.

The Ph.D. in chemical engineering requires a minimum of 48 credits after the completion of a master's degree, including at least 24 credits of course work in chemical engineering (12 after the master's degree) and nine credits in mathematics, and satisfaction of the general doctoral degree requirements presented in the Graduate Information and Regulations section of this catalog. The written examination covers chemical engineering and related mathematical, physical and chemical sciences. The oral examination includes the presentation of a research proposition developed independently by the student to demonstrate ability to create and develop a research idea. The written and oral examinations are normally taken before the end of the fourth academic semester, counted from the semester of admission to the doctoral program. The dissertation may be theoretical, computational, experimental or a combination of the three in any of the areas of specialization shown for the master's degree.

FINANCIAL AID

Graduate student assistantships for instruction and research are available to well-qualified master's and doctoral degree students. Assistantships carry stipends plus a tuition waiver. In some cases, a tuition waiver alone may be awarded for a limited amount of service. Assistantships for master's degree students are normally for an academic year; assistantships for doctoral students are renewable on a yearly basis.

THE UNIVERSITY

Florida Institute of Technology is a distinctive, independent university, founded in 1958 by a group of scientists and engineers to fulfill the need for specialized, advanced educational opportunities of Florida's Space Coast.

Florida Tech is the only comprehensive, independent scientific and technological university in the southeast. Supported by both industry and the community, Florida Tech is the recipient of many research grants and contracts, a number of which provide financial support for graduate students.

LOCATION

Melbourne is located on the central east coast of Florida. The area offers a delightful year-round subtropical climate and is 10 minutes from the ocean and beaches. Kennedy Space Center and the massive NASA complex are just 45 minutes north of Melbourne. The city of Orlando, Walt Disney World, EPCOT and many other attractions are one hour west of Florida Tech's main campus.

FOR MORE INFORMATION

To obtain more detailed information about this Graduate Program or to obtain application materials, visit our home page at www.fit.edu/grad or the *University Catalog* at www.fit.edu/catalog, or contact:

Florida Institute of Technology
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