

# PH.D IN ENGINEERING (INDUSTRIAL ENGINEERING)

## OVERVIEW

The Ph.D. program in Engineering with a concentration in Industrial Engineering is interdisciplinary and provides its students with an opportunity to study in a broad range of areas within mechanical engineering, industrial engineering, and other engineering areas within the College of Engineering and College of Medicine and Life Sciences. Ph.D. students could work at the intersection of materials engineering, medicine, and advanced manufacturing on a wide range of projects from innovative biomedical devices and technologies to advanced bearing, ice detection and prevention, human movements, robotics, recycling, fatigue, and innovative coatings. These projects include experimental characterization as well as multi-scale modeling and data analysis.

## ADMISSIONS REQUIREMENTS

Admission for the Ph.D. program in Engineering with a concentration in Industrial Engineering requires the M.S. in Industrial Engineering or another engineering field provided the student shows evidence of an appropriate engineering background at the undergraduate level, including a minimum of two years of calculus through differential equations and one year of physics. Highly qualified B.S. engineering graduates can be admitted directly into the Ph.D. program.

## PROGRAM REQUIREMENTS

A satisfactory doctoral degree plan is developed jointly by the student and the dissertation adviser, subject to the approval of the department chair or graduate program director.

A minimum of 15 credit hours of regular 8000-level graduate courses taken for a letter grade beyond the M.S. degree is required for the doctoral degree program. Twelve of these 15 credit hours must be departmental graduate courses. Students entering the direct doctoral program with a bachelor's degree must complete 45 credit hours of graduate course work, of which 36 are regular departmental graduate courses beyond their bachelor's degree, and at least 27 credit hours must be at the 6000/8000 level. Other courses taken may include courses not listed as departmental courses, independent study courses, and courses taken S/U.

In addition to the above course requirements, all supported students are required to enroll and participate in a graduate seminar (MIME 8930 or equivalent) each semester. The department may specify additional credit or non-credit requirements, for satisfactory completion as well as enhancement of degree objectives.

For transfer credit, students should refer to the general policies of the College of Graduate Studies.

### Industrial Engineering Concentration - Manufacturing

Students pursuing a Ph.D with a concentration in Industrial Engineering need to take the qualifying examination in the following three areas:

- Mathematics. General and specific topics are typically covered in MIME 8000: Advanced Engineering Math I and MIME 8100: Advanced Engineering Math II
- Design of Experiments. Topics are typically covered in courses such as MIME 8720: Design of Experiments
- Manufacturing Engineering. Topics tested in this area are typically covered in courses such as MIME 5060: Manufacturing Engineering

## Doctoral Degree Candidacy

Doctoral candidacy requires satisfactory performance in the doctoral qualifying examination, filing of an approved doctoral program plan, selection of an academic adviser, formation of a doctoral dissertation committee and maintaining good academic performance as specified in the MIME Department Graduate Student Handbook.

When the above requirements have been met, the student may file his/her application for doctoral candidacy. The department requires that the application be filed within one year of the time the doctoral qualifying examination is passed. Doctoral students must have established candidacy for the doctoral degree before presenting and defending dissertation research.

## Doctoral Dissertation

After the student and the adviser have agreed on a dissertation topic, the student must write a dissertation proposal. The student will present the proposal to the doctoral dissertation committee and successfully defend his/her dissertation proposal.

The doctoral dissertation committee must consist of at least five members. The chair of the committee will be the candidate's principal adviser. The other members usually will be the co-adviser (if any), faculty members or experts in a related field, with at least one committee member outside the department. The signatures of the committee on the candidate's dissertation indicate approval of the dissertation research and represent the final certification of its adequacy.

- 1) Demonstrate technical proficiency in their focus area topics.
- 2) Explain doctoral level course projects clearly and concisely in written and oral formats.
- 3) Explain their doctoral research clearly and concisely in written and oral formats.
- 4) Generate high quality engineering research that is original, significant and consequential, and is publishable in high quality journals, book chapters, and conference proceedings.
- 5) Participate in research proposal writing to fund their research.
- 6) Teach undergraduate engineering courses.