# ENGINEERING (INDUSTRIAL ENGINEERING) - DOCTOR OF PHILOSOPHY

The Department of Industrial Engineering offers a Doctor of Philosophy (Ph.D.) in Engineering with a specialization in Industrial Engineering.

The program of study leading to the Ph.D. degree must include a minimum of 36 graduate course credits, plus 24 dissertation research credits (9 credits at the IE 600 level and 15 credits of IE 700). Among the 36 graduate course credits, 18 credits must be from IE 500-level courses relevant to your research. Typical areas include statistics, electrical engineering, mathematics, or mechanical engineering. You may not transfer credits from your master's degree to meet this requirement. Refer to http://ie.nmsu.edu for a program description and current research areas.

## Time Line for a Ph.D. Program

Individual programs vary, however, you can expect to spend three to five years (mostly full-time) earning your degree. Below are the key milestones of every program:

**Admittance to the program and begin coursework:** In coordination with your academic advisor, select 500-level courses to help you prepare for the Qualifying Exam. This would include IE topics on the general part of the exam, as well as topics related to your intended research.

**Pass the qualifying examination:** It is expected that students will take the qualifying examination within one year of their entering the Ph.D. program. Details regarding the examination may be obtained from the department office. If you do not pass the examination on your first attempt, you may be allowed, based on the recommendation of the faculty, to take the exam again the next time it is offered. If you do not pass the examination on your second attempt, you will be dropped from the Ph.D. program.

**Form your committee and prepare a research proposal:** During this time, you are expected to be a full-time student. The Graduate School requires at least one academic year of residency as defined in the Graduate Catalog. You should take at least nine credits of IE 600-level courses. At this time, you should expect to file your *Program of Study* with the Graduate School.

**Pass the comprehensive examination:** The comprehensive examination consists of two parts: a written and oral presentation of your research proposal. You must pass the comprehensive examination within 24 months of passing the qualifying examination. You may not take 700-level courses until you have passed both parts of your comprehensive examination.

**Conduct research, write the dissertation, and pass the final examination:** Throughout your doctoral program, your advisor and committee will oversee your progress. During this time, you will be enrolled in IE 700 courses. Your program must include a minimum of 15 credits of IE 700 Doctoral Dissertation. There is a minimum time span of one year between the comprehensive and final oral examinations (e.g., the dissertation defense). If more than five years have passed since you passed the comprehensive examination, you may be required to pass another comprehensive examination.

| Prefix | Title | Credits |
|---|---|---|
| **Pass Qualifying Exam** | | |
| **Graduate Electives (credits beyond the Bachelor's degree)** | | **36** |
| **Pass Comprehensive Exam** | | |
| **Doctoral Dissertation** | | **24** |
| I E 700 | Doctoral Dissertation | |
| **Defend doctoral dissertation** | | |
| **Total Credits** | | **60** |

## Ph.D. Qualifying Exam

### 1. Format

- Exam offered in two parts:
  - Foundations of IE, all day Thursday
  - IE Specific area exam: all day Friday.

### 2. Content

- **IE Foundation Portion of the Exam** (all students will take an identical exam for the foundation portion). The Foundation portion consists of four areas:
  - Operations Research Deterministic and Stochastic
  - Probability and Statistics
  - Industrial Engineering Theory
  - Combination of questions from one or all of these four areas. Selection of Manufacturing, Engineering Economy, Process Improvement, Methods.
- **IE Research Topics Portion of the Exam** (Each student taking the qualifier must select two of the topics listed below for testing at least 6 weeks before the exam is offered. The student will work with his or her advisor on selecting the topics. The advisor must submit the two selected areas to the Chair of the Examining Committee at least one month before the exam is offered.)
  - Manufacturing
  - Computer/Simulation Modeling
  - Stochastic Operations Research
  - Queuing Theory
  - Design Optimization (product, facility, process, etc.)
  - Algorithmic Optimization (Dynamic cases)
  - Quality Control
  - Systems Integration and Control
  - Facility Design and Layout
  - Reliability

## Additional Requirements

Ph.D. candidates in the College of Engineering, who have successfully completed their Ph.D. Qualifying Examination after January 1, 2018, must satisfy a publication requirement which requires two papers:

> Paper #1: An archival paper accepted or published in any journal listed in the source publication list for the Web of Science, or a refereed Journal or Conference Proceeding approved by the student's doctoral committee and the cognizant Department Head(s), before the Doctorate of Philosophy final examination. The candidate should be listed as the lead author in Paper #1.
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> Paper #2: An additional archival paper submitted, accepted, or published in any journal listed in the source publication list for the Web of Science. Alternatively, one conference paper accepted or published in national or international conference proceedings.