

## Industrial and Systems Engineering, PhD

College of Engineering

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The Doctor of Philosophy (Ph.D.) in Industrial and Systems Engineering (ISE) program prepares students for successful careers as teachers, researchers, and leaders in academia, industry and the public sector. The program emphasizes the systems engineering, collaboration and engagement skills critical to addressing the complex societal problems of tomorrow. ISE graduate students tackle these problems in a supportive environment working with nationally-recognized faculty.

### Additional Admission Requirements

- At least one degree in Engineering or Computer Science.
- Bachelor of Science degree in Engineering or Computer Science from an ABET accredited program with a cumulative GPA of 3.5 or above or Master of Science degree in a discipline related to Industrial & Systems Engineering with a cumulative GPA of 3.3
- A Graduate Record Exam (GRE) Aptitude Exam score

### Program Outcomes:

The Doctor of Philosophy in Industrial and Systems Engineering program will prepare graduates to

- Demonstrate broad knowledge of industrial and systems engineering sub-disciplines and deep knowledge of a specific sub-discipline.
- Effectively teach industrial and systems engineering methods and tools.
- Independently perform research with mentoring from a faculty member.
- Decompose systems into component parts and logically model and evaluate using mathematical, statistical and computational tools.
- Construct and improve integrated systems or processes consisting of people, materials, information, equipment and energy considering life cycle factors.
- Formulate and solve multi-objective problems using industrial and systems engineering methods and tools.
- Communicate Industrial and Systems Engineering research information in written, oral, and presentation formats.

### Degree Requirements:

Total credit hours: 69 (post baccalaureate)

- Core courses (12 credits): ISEN 625, 655, 665, 675
- ISEN specified courses (12 credits): Select 12 credit hours from ISEN 721, 812, 813, 814, 821 or ISEN 833, 841, 852, 853
- ISEN courses (12 credits): Take additional 12 credit hours of graduate level ISEN courses with approval of advisor
- Engineering courses (12 credits): Take 12 credit hours of additional engineering courses at 700 or 800 level with approval of advisor
- At least 21 course credits should be at 800 level
- Seminar (3 credits): Take ISEN 992 three times in three semesters
- Dissertation (18 credits): ISEN 997
- Pass qualifying exam, preliminary exam, dissertation defense

### Degree Requirements:

Total credit hours: min 45 (post Master's)

- Core courses\*: ISEN 625, 655, 665, 675
- ISEN specified courses\*: Select 12 credit hours from ISEN 721, 812, 813, 814, 821 or ISEN 833, 841, 852, 853
- ISEN courses\*: Take additional 12 credit hours of graduate level ISEN courses with approval of advisor
- Engineering courses\*: Take 12 credit hours of additional engineering courses at 700 or 800 level with approval of advisor
- At least 21 course credits should be at 800 level
- Seminar (3 credits): Take ISEN 992 three times in three semesters
- Dissertation (18 credits): ISEN 997
- Pass qualifying exam, preliminary exam, dissertation defense

\*Number of credit/courses varies due to the number of credits a student can transfer from the Master's degree. The student must consult with the Graduate Program Director to initiate the credit transfer process, which will be reviewed and decided by the ISE Graduate Program Committee.

### **Dissertation Research:**

A student may not register for dissertation credits before passing Preliminary Written Examination. No more than 18 dissertation credits are counted toward the total credit hours requirement for the degree.

### **Qualifying Examination:**

The Qualifying Examination is given to assess the student's competence in a broad range of relevant subject areas. Only students with unconditional status and in good academic standing may take the Qualifying Examination. A student who wants to retake the Qualifying Examination must apply to retake the Qualifying Examination by the posted deadline. No student is permitted to take the Qualifying Examination more than twice. A student not recommended for re-examination or who fails the exam on a second attempt may be dismissed from the doctoral program.

### **Preliminary Written Examination:**

The Preliminary Written Examination is conducted by the student's dissertation committee as a depth exam. Passing this exam satisfies requirements for Ph.D. Candidacy. Failure on the examination may result in dismissal from the doctoral program. The student's Advisory Committee may permit one re-examination. Failure on the second attempt will result in dismissal from the doctoral program.

**Oral Proposal Defense:** The student must present a proposal of dissertation research to the student's Dissertation Committee. The student is permitted to proceed to this part after passing the Preliminary Written Exam. The Dissertation Committee decides the outcome of the defense. If the student fails the Oral Proposal Defense, the committee allows the student one more attempt.

### **Admission to Candidacy**

Student will be admitted to candidacy upon successful completion of the Qualifying Exam and the Preliminary Written Exam.

### **Final Oral Examination:**

The Final Oral Examination is conducted by the student's dissertation committee. This examination is the final dissertation defense presentation that is scheduled after a dissertation is completed. The examination may be held no earlier than one semester (or four months) after admission to candidacy. Failure on the examination may result in dismissal from the doctoral program. The student's Advisory Committee may permit one re-examination. At least one full semester must elapse before the re-examination. Failure on the second attempt will result in dismissal from the doctoral program.

**Submission of Dissertation:**

Upon passing the Ph.D. Final Oral Examination, the Ph.D. student must have the dissertation approved by each member of the student's dissertation committee. The approved dissertation must be submitted to The Graduate College by the deadline given in the academic calendar, and must conform to the Graduate College's guidelines for theses and dissertations.