Industrial and Systems Engineering

Department Head: Dr. Kari Babski-Reeves
Graduate Coordinator: Dr. Mohammad Marufuzzaman
260 McCain Building
Box 9542
Mississippi State, MS 39762
Telephone: 662-325-3865
E-mail: grad-coord@ise.msstate.edu

The Department of Industrial and Systems Engineering offers the Doctor of Philosophy in Industrial and Systems Engineering. In addition, the Department offers the Master of Science in Industrial and Systems Engineering with both thesis and non-thesis options.The M.S. (thesis option) is a research-oriented degree and serves to prepare students for positions in industry or government or for further graduate study in industrial and systems engineering or related areas.The M.S. (non-thesis option) is designed to prepare students for positions in business and industry that require a graduate education.

Concentrations offered at the master's level are:

Human Factors and Ergonomics Concentration (HFE)

This concentration is designed for students who wish to increase their understanding of Human Factors and Ergonomics (HFE). Students will be exposed to both a breadth and depth of HFE principles and practices including but not limited to physical ergonomics, cognitive ergonomics, and occupational safety and health.

Industrial Systems Concentration (SYS)

This concentration prepares students for general Industrial and Systems Engineering (ISE) work. It is designed to allow the student a high degree of flexibility in selecting a program that meets his/her needs. For example, the student might choose to specialize in one or more areas of ISE (e.g., quality engineering) or choose a very broad program covering several ISE fields.

Management Systems Engineering Concentration (MGTS)

This concentration is designed for students who wish to increase their understanding and capability in the areas of management systems engineering and general engineering management. The philosophy behind this option is that students can be provided with knowledge that will enable them to apply an engineering approach to problems involved in the design and operation of management systems.

Manufacturing Systems Concentration (MFGS)

This concentration is designed for students who wish to increase their understanding of the design, analysis and control of manufacturing systems and processes.

Operations Research Concentration (OPRS)

This concentration is designed for students who wish to increase their understanding of and use of Operations Research (OR) skills for systems analysis and design.

Data Analytics (DAAS)

The Data Analytics (DAAS) concentration option is designed for students who wish to advance their careers in data analytics. The industry-relevant curriculum gives students the skills to extract valuable insights from big data. In this program, students will learn expertise in statistical modeling, data management, machine learning, data visualization, and data-driven decision-making related to industrial engineering applications, to meet the growing needs of industry, not-for-profits, government agencies, and other organizations.

Accelerated Programs

Highly qualified undergraduates in the Bagley College of Engineering are encouraged to consider applying to one of two Accelerated Programs offered by the Department of Industrial and Systems Engineering.

Bachelor of Science in Industrial Engineering leading to Master of Science in Industrial Engineering

At the time a student applies to the program, the student must:

a. be enrolled at Mississippi State University in one of the eight Bagley College of Engineering programs;
b. have earned at least 60 hours toward their respective degree; and
c. have an overall cumulative grade point average (GPA) of at least 3.50.

An application package consists of the following items which must be submitted to the Graduate Coordinator of the Industrial and Systems Engineering Department.

a. Application form
b. One-page résumé

Bachelor of Science in Industrial Engineering leading to Master of Business Administration-Project Management

A second Accelerated Program encourages undergraduate students in Industrial Engineering to work toward a Master of Business Administration-Project Management degree and permits them to earn up to 9 hours of graduate-level coursework during their undergraduate industrial engineering program. These 9 hours are taken as graduate-level courses and earn both undergraduate credit (toward B.S.I.E. completion) and graduate credit (toward M.B.A.-P.M. completion) simultaneously. The Accelerated Program allows students to complete three foundational courses in the M.B.A.-P.M.program while still pursuing their B.S.I.E. The courses approved for the Accelerated Program are IE 6333 (Production Control 1), IE 6533 (Project Management), and IE 6653 (Industrial Quality Control 1). Junior and senior industrial engineering students with a cumulative GPA of 3.50 or higher are eligible to apply. Students interested in applying to the B.S.I.E./M.B.A.-P.M. program should see Accelerated Programs (http://catalog.msstate.edu/graduate/colleges-degree-programs/) and contact Dr. Lesley Strawderman, ISE Undergraduate Coordinator. Ms. Angelia Knight is Director of the MBA programs in the College of Business.

Admission requirements include the following.

• A GPA of 3.50/4.00 for all undergraduate work
• A minimum of 60 hours towards the bachelor's degree
• Completed application available from the Department of Industrial and Systems Engineering
• Résumé

Admission Criteria

Typically, an entering M.S. student should have a grade point average of 3.00 out of 4.00 for the junior and senior years. Likewise, an entering Ph.D. student with an M.S. degree should have a 3.50 out of 4.00 grade point average on the M.S. work, while a Ph.D. student entering with only a B.S. degree is expected to have a 3.50 out of 4.00 on the last two years of the undergraduate program. A student with a lower GPA may still be eligible for admission based on outstanding qualifications in other areas. All entering students must submit GRE general-test scores. International students must have a minimum TOEFL score of 550 PBT (79 iBT) or IELTS score of 6.5.

The department reviews completed applications four times a year: February 15, May 15, August 15, and November 15. Incomplete or not fully processed applications will be reviewed during the next cycle.

Provisional Admission

An applicant who has not fully met the GPA requirement stipulated by the University may be admitted on a provisional basis. The provisionally-admitted student is eligible for a change to regular status after receiving a 3.00 GPA on the first 9 hours of graduate courses at Mississippi State University (with no grade lower than a C). The first 9 hours of graduate courses must be within the student's Program of Study. Courses with an S grade, transfer credits, or credits earned while in Unclassified status cannot be used to satisfy this requirement. If a 3.00 is not attained, the provisional student **shall** be dismissed from the graduate program. Academic departments may set higher standards for students to fulfill provisional requirements; a student admitted with provisional status should contact the graduate coordinator for the program's specific requirements. **While in the provisional status, a student is not eligible to hold a graduate assistantship.**

Academic Performance

In addition to the criteria defined in the current Bulletin of the Graduate School, unsatisfactory performance in the graduate program in Industrial and Systems Engineering is defined as any of the following.

• Failure to maintain a 3.00 average in the M.S. program or 3.30 in the Ph.D. program,
• Failure of the qualifying exam (Ph.D. students only),
• Failure of the preliminary exam (Ph.D. students only);
• Failure of the comprehensive final exam (M.S. non-thesis option only),
• Unsatisfactory evaluation of thesis or dissertation, or
• A failure of the required component of the program of study.

Any one of these will constitute the basis for review for possible dismissal. If the students drops six or more quality points below the required average (3.00 for M.S. or 3.30 for Ph.D.), the graduate coordinator will review the record along with the student's graduate committee and will recommend a final course of action, which will be immediate dismissal or the establishment of a probationary period in which corrective action must take place.

While on probation, the student is not eligible to receive an assistantship and is required to raise his/her cumulative GPA to 3.00 for M.S. or 3.30 for Ph.D. by the end of the following semester of enrollment. During that semester, the student must enroll in 9 credit hours of coursework; Directed Individual Study courses are excluded.

In case of a dismissal from the graduate program, a student may appeal his/her academic dismissal according to the following procedure.

- Within four weeks of being notified of the official dismissal, the student must present the request and related explanation in writing to the graduate coordinator. The graduate coordinator will review the appeal with the appropriate departmental committee and render a recommendation.
- If the appeal at the departmental level is unsuccessful, a student may then appeal to the Associate Dean for Research and Graduate Studies in the college.
- If the appeal at the college level is unsuccessful, the student may then appeal to the Office of the Provost.

Doctor of Philosophy in Industrial & Systems Engineering

Industrial Engineering courses		30
Courses in discipline other than Industrial Engineering		6
IE 6623	Engineering Statistics II (or equivalent)	3
IE 6773	Systems Simulation I (or equivalent)	3
Additional Graduate-level coursework		6
Research		20
Total Hours		**68**

 A preliminary examination, a dissertation, and an oral examination in defense of the dissertation are required.

Additional requirements are:

a. No ISE graduate student may list ST 8114 or IE 6613 on his/her graduate program
b. No program can contain more than 15 hours of courses that are required in the bachelor's degree curriculum
c. No program can contain more than 6 hours of Directed Individual Study (IE 7000).

Doctoral students must complete at least 48 hours of coursework beyond the B.S. level.

Master of Science in Industrial and Systems Engineering with Human Factors and Ergonomics Concentration (HFE) - Thesis

Prerequisites (foundational courses) are:

- MA 1713
- MA 1723
- MA 2733
- MA 2743
- IE 3123
- IE 4613/6613

IE 6773	Systems Simulation I	3
IE 6623	Engineering Statistics II	3
At least 3 HFE ISE courses		9
At least one non-HFE ISE course		3
IE 9000	Research in Industrial Engineering	6
At least one course from Mathematics (MA), Statistics (ST), or Computer Science and Engineering (CSE)		3
At least one course from a supporting area (Biological Engineering [ABE], Psychology [PSY], Kinesiology [KI], Mechanical Engineering [ME], Mathematics [MA], Statistics [ST], etc.)		3
Total Hours		**30**

A thesis and an oral comprehensive examination in defense of the thesis are required.

Additional requirements are:

a. A minimum of 12 hours coursework must be at the 8000-level or higher.
b. No ISE graduate student may list ST 8114 or IE 6613 on his/her graduate program

c. No program can contain more than 15 hours of courses that are required in the bachelor's degree curriculum

d. No program can contain more than 6 hours of Directed Individual Study (IE 7000).

The thesis-option Master of Science in Industrial Engineering requires at least 24 credit hours of coursework above the baccalaureate degree. IE 9000 does not apply to M.S. students.

Master of Science in Industrial and Systems Engineering with Human Factors and Ergonomics Concentration (HFE) - Non-Thesis

Prerequisites (foundational courses) are:

- MA 1713
- MA 1723
- MA 2733
- MA 2743
- IE 3123
- IE 4613/6613

IE 6773	Systems Simulation I	3
IE 6623	Engineering Statistics II	3
At least three HFE ISE courses		9
At least two non-HFE ISE courses		6
At least two courses from Mathematics (MA), Statistics (ST), or Computer Science and Engineering (CSE)		6
At least one course from a supporting area (Biological Engineering [ABE], Psychology [PSY], Kinesiology [KI], Mechanical Engineering [ME], Mathematics [MA], Statistics [ST], etc.)		3
Total Hours		**30**

A written and oral comprehensive final exam on the coursework. At least 15 hours for the M.S. non-thesis degree must be from 8000-level courses or above. The specific courses required depend upon the student's area of concentration. IE 8000 Research/Thesis does not apply to non-thesis students.

Additional requirements are:

a. No ISE graduate student may list ST 8114 or IE 6613 on his/her graduate program.

b. No program can contain more than 15 hours of courses that are required in the bachelor's degree curriculum.

c. No program can contain more than 6 hours of Directed Individual Study (IE 7000).

The non-thesis Master of Science requires at least 30 credit hours of coursework above the baccalaureate degree.

Master of Science in Industrial and Systems Engineering with Industrial Systems Concentration (SYS) - Thesis

Prerequisites (foundational courses) are:

- MA 1713
- MA 1723
- MA 2733
- MA 2743
- Computer programming proficiency
- IE 3123
- IE 3913
- IE 4333
- IE 4613/6613

IE 6773	Systems Simulation I	3
All other courses to be selected by the student along with the academic advisor and graduate program committee		21
IE 9000	Research in Industrial Engineering	6
Total Hours		**30**

A thesis and an oral comprehensive examination in defense of the thesis are required.

Additional requirements are:

a. A minimum of 12 hours coursework must be at the 8000-level or higher.
b. No ISE graduate student may list ST 8114 or IE 6613 on his/her graduate program
c. No program can contain more than 15 hours of courses that are required in the bachelor's degree curriculum
d. No program can contain more than 6 hours of Directed Individual Study (IE 7000).

The thesis-option Master of Science in Industrial Engineering requires at least 24 credit hours of coursework above the baccalaureate degree.

Master of Science in Industrial and Systems Engineering with Industrial Systems Concentration (SYS) - Non-Thesis

Prerequisites (foundational courses) are:

- MA 1713
- MA 1723
- MA 2733
- MA 2743
- Computer programming proficiency
- IE 3123
- IE 3913
- IE 4333
- IE 4613/6613

At least 15 hours of 8000-level courses selected by the student along with the academic advisor and grade program committee.	15
Other courses to be selected by the student along with the academic advisor and grade program committee.	15
Total Hours	**30**

A written and oral comprehensive final exam on the coursework. At least 15 hours for the M.S. non-thesis degree must be from 8000-level courses or above. The specific courses required depend upon the student's area of concentration. IE 8000 Research/Thesis does not apply to non-thesis students.

Additional requirements are:

a. No ISE graduate student may list ST 8114 or IE 6613 on his/her graduate program.
b. No program can contain more than 15 hours of courses that are required in the bachelor's degree curriculum
c. No program can contain more than 6 hours of Directed Individual Study (IE 7000).

The non-thesis Master of Science requires at least 30 credit hours of coursework above the baccalaureate degree.

Master of Science in Industrial and Systems Engineering with Management Systems Engineering Concentration (MGTS) - Thesis

Prerequisites (foundational courses) are:

- B.S. in engineering from an ABET-accredited program or permission from the MSE Technical Committee
- IE 3913
- IE 4613/6613

IE 6513	Engineering Administration	3
IE 6533	Project Management	3
IE 6573	Process Improvement Engineering	3
IE 8583	Enterprise Systems Engineering	3
IE 8913	Engineering Economy II	3
At least two non-MSE ISE courses		6
IE 9000	Research in Industrial Engineering	6
Course to be selected by the student along with academic advisor and graduate program committee		3
Total Hours		**30**

A thesis and an oral comprehensive examination in defense of the thesis are required.

Additional requirements are:

a. A minimum of 12 hours at the 8000-level is required.
b. No ISE graduate student may list ST 8114 or IE 6613 on his/her graduate program
c. No program can contain more than 15 hours of courses that are required in the bachelor's degree curriculum
d. No program can contain more than 6 hours of Directed Individual Study (IE 7000).

The thesis-option Master of Science in Industrial Engineering requires at least 24 credit hours of coursework above the baccalaureate degree.

Master of Science in Industrial and Systems Engineering with Management Systems Engineering Concentration (MGTS) - Non-Thesis

Prerequisites (foundational courses) are:

- B.S. in engineering from an ABET-accredited program or permission from the MSE Technical Committee
- IE 3913
- IE 4613/6613

IE 6513	Engineering Administration	3
IE 6533	Project Management	3
IE 6573	Process Improvement Engineering	3
IE 8583	Enterprise Systems Engineering	3
IE 8913	Engineering Economy II	3
At least two non-MSE ISE courses		6
Other courses to be selected by the student along with the academic advisor and graduate program committee		9
Total Hours		**30**

A written and oral comprehensive final exam on the coursework. At least 15 hours for the M.S. non-thesis degree must be from 8000-level courses or above. The specific courses required depend upon the student's area of concentration. IE 8000 Research/Thesis does not apply to non-thesis students.

Additional requirements are:

a. No ISE graduate student may list ST 8114 or IE 6613 on his/her graduate program
b. No program can contain more than 15 hours of courses that are required in the bachelor's degree curriculum
c. No program can contain more than 6 hours of Directed Individual Study (IE 7000).

The non-thesis Master of Science requires at least 30 credit hours of coursework above the baccalaureate degree.

Master of Science in Industrial and Systems Engineering with Manufacturing Systems Concentration (MFGS) - Thesis

Prerequisites (foundational courses) are:

- B.S. in engineering from an ABET-accredited program or permission from the Manufacturing Systems Technical Committee
- Computer programming proficiency
- IE 4333/6333
- IE 4613/6613

IE 6653	Industrial Quality Control	3
IE 6773	Systems Simulation I	3
IE 8333	Production Control Systems II	3
At least two Manufacturing Systems ISE courses		6
IE 9000	Research in Industrial Engineering	6
At least two non-Manufacturing Systems ISE courses		6
Course to be selected by the student along with the academic advisor and graduate program committee		3
Total Hours		**30**

A thesis and an oral comprehensive examination in defense of the thesis are required.

Additional requirements are:

a. A minimum of 12 hours coursework must be at the 8000-level or higher.
b. No ISE graduate student may list ST 8114 or IE 6613 on his/her graduate program
c. No program can contain more than 15 hours of courses that are required in the bachelor's degree curriculum
d. No program can contain more than 6 hours of Directed Individual Study (IE 7000).

The thesis-option Master of Science in Industrial Engineering requires at least 24 credit hours of coursework above the baccalaureate degree.

Master of Science in Industrial and Systems Engineering with Manufacturing Systems Concentration (MFGS) - Non-Thesis

Prerequisites (foundational courses) are:

- B.S. in engineering from an ABET-accredited program or permission from the Manufacturing Systems Technical Committee
- Computer programming proficiency
- IE 4333/6333
- IE 4613/6613

IE 6653	Industrial Quality Control	3
IE 6773	Systems Simulation I	3
IE 8333	Production Control Systems II	3
At least two Manufacturing Systems ISE courses		6
At least two non-Manufacturing Systems ISE courses		6
Other courses to be selected by the student along with the academic advisor and graduate program committee		9
Total Hours		**30**

A written and oral comprehensive final exam on the coursework. At least 15 hours for the M.S. non-thesis degree must be from 8000-level courses or above. The specific courses required depend upon the student's area of concentration. IE 8000 Research/Thesis does not apply to non-thesis students.

Additional requirements are:

a. No ISE graduate student may list ST 8114 or IE 6613 on his/her graduate program
b. No program can contain more than 15 hours of courses that are required in the bachelor's degree curriculum
c. No program can contain more than 6 hours of Directed Individual Study (IE 7000).

The non-thesis Master of Science requires at least 30 credit hours of coursework above the baccalaureate degree.

Master of Science in Industrial and Systems Engineering with Operations Research Concentration (OPRS) - Thesis

Prerequisites (foundational courses) are:

- MA 1713
- MA 1723
- MA 2733
- MA 2743
- Computer programming proficiency
- IE 4613/6613

IE 6733	Linear Programming	3
IE 6773	Systems Simulation I	3
At least two OR ISE ccourses		6
IE 9000	Research in Industrial Engineering	6
At least two non-OR ISE courses		6
At least one course from Computer Science (CSE), Mathematics (MA), or Statistics (ST)		3
Course to be selected by the student along with the academic advisor and graduate program committee		3
Total Hours		**30**

A thesis and an oral comprehensive examination in defense of the thesis are required.

Additional requirements are:

a. A minimum of 12 hours coursework must be at the 8000-level or higher.
b. No ISE graduate student may list ST 8114 or IE 6613 on his/her graduate program
c. No program can contain more than 15 hours of courses that are required in the bachelor's degree curriculum
d. No program can contain more than 6 hours of Directed Individual Study (IE 7000).

The thesis-option Master of Science in Industrial Engineering requires at least 24 credit hours of coursework above the baccalaureate degree.

Master of Science in Industrial and Systems Engineering with Operations Research Concentration (OPRS) - Non-Thesis

Prerequisites (foundational courses) are:

- MA 1713
- MA 1723
- MA 2733
- MA 2743
- Computer programming proficiency
- IE 4613/6613

IE 6733	Linear Programming	3
IE 6773	Systems Simulation I	3
At least two Operations Research ISE courses		6
At least two non-Operations Research ISE courses		6
At least one course com Computer Science (CSE), Mathematics (MA), or Statistics (ST)		3
Courses to be selected by the student along with the academic advisor and graduate program committee		9
Total Hours		**30**

A written and oral comprehensive final exam on the coursework. At least 15 hours for the M.S. non-thesis degree must be from 8000-level courses or above. The specific courses required depend upon the student's area of concentration. IE 8000 Research/Thesis does not apply to non-thesis students.

Additional requirements are:

a. No ISE graduate student may list ST 8114 or IE 6613 on his/her graduate program
b. No program can contain more than 15 hours of courses that are required in the bachelor's degree curriculum
c. No program can contain more than 6 hours of Directed Individual Study (IE 7000).

The non-thesis Master of Science requires at least 30 credit hours of coursework above the baccalaureate degree. IE 9000 does not apply to M.S. students.

Master of Science in Industrial and Systems Engineering with Data Analytics Concentration (DAAS) – Thesis

Prerequisites (foundational courses) are:

- MA 1713
- MA 1723
- MA 2733
- MA 2743
- MA 3113
- Computer programming proficiency
- IE 4613

IE 6623	Engineering Statistics II	3
IE 6683	Machine Learning with Industrial Engineering Applications	3
IE 8623	Advanced Data Analytics for Complex Systems	3
At Least 3 ISE electives in Data Analytics. See academic advisor for list of approved electives		9

At least one graduate class from CSE, ECE, or Math/Stat		3
Courses to be selected by the student along with the academic advisor and graduate program committee		3
Thesis Research		6
IE 9000	Research in Industrial Engineering	
Total Hours		**30**

1. The thesis-option Master of Science in Industrial Engineering requires at least 24 credit hours of coursework above the baccalaureate degree.

Master of Science in Industrial and Systems Engineering with Data Analytics Concentration (DAAS) - Non-Thesis

Prerequisites (foundational courses) are:

- MA 1713
- MA 1723
- MA 2733
- MA 2743
- MA 3113
- Computer programming proficiency
- IE 4613

IE 6623	Engineering Statistics II	3
IE 6683	Machine Learning with Industrial Engineering Applications	3
IE 8623	Advanced Data Analytics for Complex Systems	3
At least three ISE elective courses in Data Analytics. See academic advisor for a list of approved electives		9
At least one graduate class from CSE, ECE, or Math/Stat		3
Courses to be selected by the student along with the academic advisor and graduate program committee		9
Total Hours		**30**

1. A written and oral comprehensive final exam on the coursework. At least 15 hours for the M.S. non-thesis degree must be from 8000-level courses or above. The specific courses required depend upon the student's area of concentration. IE 9000 Research/Thesis does not apply to non-thesis students.