APPROVAL FORM FOR

DEGREE PROGRAMS

MISSISSIPPI STATE UNIVERSITY

NOTE: This form is a cover sheet that must accompany the degree program change proposal. The actual proposal should be prepared in accordance with format requirements provided in the *Guide and Format for Curriculum Proposals* published by the UCCC. Both cover sheet and proposal should be submitted to UCCC Mail Stop 9702 (281 Garner Hall), Phone: 325-9410.

College BCoE **Department:** Industrial and Systems Engineering

Contact Person: Dr. Junfeng Ma **Mail Stop:** 9542 **E-mail:** ma@ise.msstate.edu

Nature of Change: Modification **Date Initiated:** 09/01/2024

Current Degree (BS, MS, etc.): Master of Science

Current Major: Industrial and Systems Engineering

Current Concentration(s): 1. Human Factors and Ergonomics 2. Industrial Systems 3. Operations Research 4. Management Systems Engineering 5. Manufacturing Systems 6. Data Analytics

Current Campus(es): ☑ Starkville ☐ Meridian ☑ Distance ☐ Gulf Coast*

*Gulf Coast campus for Bagley College of Engineering only

New Degree (BS, MS, etc.): MS

Effective Date:

Semester	Year
Fall	2025

**Any new program or modification desiring a starting semester other than fall must include a justification

Proposed Major: Industrial and Systems Engineering

Proposed Concentration(s): 1. Human Factors and Ergonomics 2. Industrial Systems 3. Operations Research 4. Management Systems Engineering 5. Manufacturing Systems 6. Data Analytics 7. Systems Engineering

Proposed Campus(es)

☑ Starkville
☐ Meridian
☑ Distance
☐ Gulf Coast*

*Gulf Coast campus for Bagley College of Engineering only

Summary of Proposed Changes:

Add the Systems Engineering concentration to the current Master of Science in Industrial and Systems Engineering

Approved: **Date:**

Mohammad Marufuzzaman Digitally signed by Mohammad Marufuzzaman Date: 2025.03.28 11:21:28 -05'00'

Department Head

Director of Academic Quality 4/21/25

Chair, College or School Curriculum Committee

Dean of College or School 23 APR 2025

Chair, University Committee on Courses and Curricula

Chair, Graduate Council (if applicable)

Chair, Deans Council

FOR OIRE USE ONLY

- ☐ Substantive Change to SACSCOC
- ☐ Notification to SACSCOC
- ☐ No significant departure

OIRE Representative Initials _____

JUSTIFICATION

The Systems Engineering Concentration (SYEG) is designed for students to develop system-level problem-solving skills. Students will master modern systems engineering skills, including models, tools, concepts, and methodologies to analyze, design, and improve new and existing human-centered systems. Blended with core systems engineering technical and engineering management courses, this concentration is dedicated to training systems engineers who are ready to advance their careers in management and leadership in industry, government agencies, academies, and other organizations.

This new concentration will meet the growing national and state needs for engineers with systems engineering skills. Systems engineering is important because it helps industries optimize their performance and improve process operations. Implementing it into a business model means organizations can help reduce costs by identifying more efficient ways of doing business and by identifying system bottlenecks.

This program is unique in preparing industrial engineers with system engineering skills. This concentration bridges the gap between real-world industrial applications and system science methods. The new concentration focuses on methodology and applications.

This new concentration is expected to increase the potential job placements of ISE graduates by preparing them with the new skillset of system engineering. Courses included in the Systems Engineering concentrations have been offered in the past few years. These courses have tremendously helped ISE students and students from other disciplines to secure higher-paid jobs in the area of systems management, systems decision support, and others.

Student Learning Outcomes

Outcome 1: Advanced understanding of Systems Engineering – students will demonstrate an advanced understanding of systems engineering principles and techniques.

Assessment description:

- Student performance will be assessed primarily through course evaluations, which include quizzes, examinations, projects, and class activities. The achievement of learning objectives will be measured across the four core required courses: IE 6753 Systems Engineering and Analysis, IE 6773 Systems Simulation I, IE 8593 Model-Based Systems Engineering, and IE 8583 Enterprise Systems Engineering.
- Students must successfully complete all required courses within this concentration to fulfill the program requirements.

Outcome 2: Effectively communicate technical materials – students will communicate technical material effectively in written and oral format.

Assessment description:

- Graduate students pursuing the thesis track will engage in research under the supervision of their academic advisors. Both the thesis proposal and the final defense will be assessed through written documentation and oral presentation of their research findings. Evaluation will be conducted by members of the thesis committee. Upon completion, students will submit their research for publication.
- Graduate students on the non-thesis track are required to complete a comprehensive examination, which will be evaluated in both written and oral formats.

Outcome 3: Prepared for professional career – students will have acquired the necessary skills for a professional employment position in systems engineering or a related discipline or gone on to pursue a doctorate.

Assessment description:

- Data on graduates' employment outcomes will be collected and analyzed.
- Statistics regarding graduates' acceptance into doctoral programs will also be gathered.

GRADUATE DEGREE MODIFICATION OUTLINE FORM

Use the chart below to make modifications to an existing Graduate Degree. All deleted courses and information should be shown in *italics* and all new courses and information in **bold**. Please include the course prefix, number, and title in both columns. Expand rows as needed.

CURRENT Degree Description	PROPOSED Degree Description
Degree: M.S. Major: Industrial and Systems Engineering Concentrations: Human Factors and Ergonomics (HFE), Industrial Systems (SYS), Management Systems Engineering (MGTS), Manufacturing Systems (MFGS), Operations Research (OPRS), Data Analytics (DAAS)	Degree: M.S. Major: Industrial and Systems Engineering Concentrations: Human Factors and Ergonomics (HFE), Industrial Systems (SYS), Management Systems Engineering (MGTS), Manufacturing Systems (MFGS), Operations Research (OPRS), Data Analytics (DAAS), **Systems Engineering (SYEG)**
Old degree catalog description: 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	New degree catalog description: 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.	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.
Old Concentration description: Master of Science in Industrial and Systems Engineering	New Concentration description: 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:

1. A minimum of 12 hours coursework must be at the 8000-level or higher.
2. No ISE graduate student may list ST 8114 or IE 6613 on his/her graduate program
3. No program can contain more than 15 hours of courses that are required in the bachelor's degree curriculum
4. 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

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:

1. A minimum of 12 hours coursework must be at the 8000-level or higher.
2. No ISE graduate student may list ST 8114 or IE 6613 on his/her graduate program
3. No program can contain more than 15 hours of courses that are required in the bachelor's degree curriculum
4. 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:

1. No ISE graduate student may list ST 8114 or IE 6613 on his/her graduate program.
2. No program can contain more than 15 hours of courses that are required in the bachelor's degree curriculum.
3. 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

- 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:

1. No ISE graduate student may list ST 8114 or IE 6613 on his/her graduate program.
2. No program can contain more than 15 hours of courses that are required in the bachelor's degree curriculum.
3. 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:

1. A minimum of 12 hours coursework must be at the 8000-level or higher.
2. No ISE graduate student may list ST 8114 or IE 6613 on his/her graduate program
3. No program can contain more than 15 hours of courses that are required in the bachelor's degree curriculum
4. 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

- 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:

1. A minimum of 12 hours coursework must be at the 8000-level or higher.
2. No ISE graduate student may list ST 8114 or IE 6613 on his/her graduate program
3. No program can contain more than 15 hours of courses that are required in the bachelor's degree curriculum
4. 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:

1. No ISE graduate student may list ST 8114 or IE 6613 on his/her graduate program.
2. No program can contain more than 15 hours of courses that are required in the bachelor's degree curriculum
3. 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:

1. A minimum of 12 hours at the 8000-level is

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:

1. No ISE graduate student may list ST 8114 or IE 6613 on his/her graduate program.
2. No program can contain more than 15 hours of courses that are required in the bachelor's degree curriculum
3. 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:

1. A minimum of 12 hours at the 8000-level is

required.

2. No ISE graduate student may list ST 8114 or IE 6613 on his/her graduate program
3. No program can contain more than 15 hours of courses that are required in the bachelor's degree curriculum
4. 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-accedited 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:

1. No ISE graduate student may list ST 8114 or IE 6613 on his/her graduate program
2. No program can contain more than 15 hours of courses that are required in the bachelor's

required.

2. No ISE graduate student may list ST 8114 or IE 6613 on his/her graduate program
3. No program can contain more than 15 hours of courses that are required in the bachelor's degree curriculum
4. 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-accedited 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:

1. No ISE graduate student may list ST 8114 or IE 6613 on his/her graduate program
2. No program can contain more than 15 hours of courses that are required in the bachelor's

degree curriculum

3. 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:

1. A minimum of 12 hours coursework must be at the 8000-level or higher.
2. No ISE graduate student may list ST 8114 or IE 6613 on his/her graduate program
3. No program can contain more than 15 hours of courses that are required in the bachelor's degree curriculum
4. 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.

degree curriculum

3. 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:

1. A minimum of 12 hours coursework must be at the 8000-level or higher.
2. No ISE graduate student may list ST 8114 or IE 6613 on his/her graduate program
3. No program can contain more than 15 hours of courses that are required in the bachelor's degree curriculum
4. 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:

1. No ISE graduate student may list ST 8114 or IE 6613 on his/her graduate program
2. No program can contain more than 15 hours of courses that are required in the bachelor's degree curriculum
3. 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

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:

1. No ISE graduate student may list ST 8114 or IE 6613 on his/her graduate program
2. No program can contain more than 15 hours of courses that are required in the bachelor's degree curriculum
3. 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:

1. A minimum of 12 hours coursework must be at the 8000-level or higher.
2. No ISE graduate student may list ST 8114 or IE 6613 on his/her graduate program
3. No program can contain more than 15 hours of courses that are required in the bachelor's degree curriculum
4. 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

- 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:

1. A minimum of 12 hours coursework must be at the 8000-level or higher.
2. No ISE graduate student may list ST 8114 or IE 6613 on his/her graduate program
3. No program can contain more than 15 hours of courses that are required in the bachelor's degree curriculum
4. 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:

1. No ISE graduate student may list ST 8114 or IE 6613 on his/her graduate program
2. No program can contain more than 15 hours of courses that are required in the bachelor's degree curriculum
3. 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 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:

1. No ISE graduate student may list ST 8114 or IE 6613 on his/her graduate program
2. No program can contain more than 15 hours of courses that are required in the bachelor's degree curriculum
3. 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

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.	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. **Master of Science in Industrial and Systems Engineering with Systems Engineering Concentration (SYEG) – Thesis** **This concentration is designed for students to develop system-level problem-solving skills. Students will master modern systems engineering skills, including models, tools, concepts, and methodologies to analyze, design, and improve new and existing human-centered systems. Blended with core systems engineering technical and engineering management courses, this concentration is dedicated to training systems engineers who are ready to advance their careers in management and leadership in industry, government agencies, academies, and other organizations.** **Prerequisites (foundational courses) are:** - **MA 1713, MA 1723: Calculus I and Calculus II** - **IE 3913 Engineering Economy I** - **IE 6613 Engineering Statistics I** - **Computer Programming Proficiency** **IE 6753 Systems Engineering and Analysis 3** **IE 8593 Model-based Systems Engineering 3** **IE 6773 Systems Simulation I 3** **IE 8583 Enterprise Systems Engineering 3** **At least one course from the following: 3** **IE 6333 Production Control Systems I** **IE 6673 Reliability Engineering** **IE 8333 Production Control Systems II** **IE 8353 Manufacturing Systems Modeling** **IE 8623 Advanced Data Analytics for Complex Systems** **IE 8773 Systems Simulation II** **At least one course from the following: 3** **IE 6533 Project Management** **IE 6573 Process Improvement Engineering** **IE 6543 Logistics Engineering** **IE 8733 Decision Theory** **IE 8913 Engineering Economy II** **At least one course from the following: 3** **IE 6113 Human Factors Engineering** **IE 6173 Occupational Safety Engineering** **IE 8153 Cognitive Engineering** **IE 8163 Macroergonomics** **IE 8143 Applied Ergonomic Methods** **Courses to be selected by the student along with the academic advisor and graduate program 3**

committee		
IE 9000	**Thesis in ISE**	**6**
Total Hours		**30**

The thesis-option Master of Science in Industrial Engineering requires at least 24 credit hours of coursework above the baccalaureate degree. A thesis and an oral comprehensive examination in defense of the thesis are required for the thesis students.

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

Prerequisites (foundational courses) are:

- **MA 1713, MA 1723: Calculus I and Calculus II**
- **IE 3913 Engineering Economy I**
- **IE 6613 Engineering Statistics I**
- **Computer Programming Proficiency**

IE 6753	**Systems Engineering and Analysis**	**3**
IE 8593	**Model-based Systems Engineering**	**3**
IE 6773	**Systems Simulation I**	**3**
IE 8583	**Enterprise Systems Engineering**	**3**
At least one course from the following: **IE 6333 Production Control Systems I** **IE 6673 Reliability Engineering** **IE 8333 Production Control Systems II** **IE 8353 Manufacturing Systems Modeling** **IE 8623 Advanced Data Analytics for Complex Systems** **IE 8773 Systems Simulation II**		**3**
At least one course from the following: **IE 6533 Project Management** **IE 6573 Process Improvement Engineering** **IE 6543 Logistics Engineering** **IE 8733 Decision Theory** **IE 8913 Engineering Economy II**		**3**
At least one course from the following: **IE 6113 Human Factors Engineering** **IE 6173 Occupational Safety Engineering** **IE 8153 Cognitive Engineering** **IE 8163 Macroergonomics** **IE 8143 Applied Ergonomic Methods**		**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 12 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

CURRENT CURRICULUM OUTLINE	Required Hours	**PROPOSED CURRICULUM OUTLINE**	Required Hours
See above section – Concentration Description and Curriculum Outline/hours are now combined in the Graduate Catalog; therefore, outline is not repeated here.		See above section – Concentration Description and Curriculum Outline/hours are now combined in the Graduate Catalog; therefore, outline is not repeated here.	

MISSISSIPPI STATE UNIVERSITY™
JAMES WORTH BAGLEY COLLEGE OF ENGINEERING

DEPARTMENT OF INDUSTRIAL & SYSTEMS ENGINEERING

Junfeng Ma, Ph.D.
ma@ise.msstate.edu

January 24, 2025

University Committee on Courses and Curricula
Mailstop: 9702
Mississippi State, MS 39762

Dear UCCC,

The Industrial & Systems Engineering (ISE) faculty and the Graduate Committee support the approval of offering the Systems Engineering (SYEG) MS Concentration program via on-campus and distance learning. All classes currently proposed to comprise the MS concentration program either have companion 6000 level sections or are 8000 courses that are approved/are submitted to UCCC for approval for campuses 1 and 5.

The proposed new concentration will meet the growing national and state needs for engineers with systems engineering skills and will keep our program in line with students' choices of degree. The ISE faculty voted unanimously to accept this new concentration into ISE curriculum offerings on September 20th, 2024, should it be approved by UCCC.

These approvals are evidenced by the minutes from the ISE September 2024 meeting and the signatures from our faculty members below.

junfeng ma Digitally signed by junfeng ma Date: 2025.01.24 14:38:07 -06'00'
Junfeng Ma, Ph.D.
Associate Professor
Graduate Coordinator
Graduate Committee Chair
Industrial and Systems Engineering

Mohammad Marufuzzaman	Junfeng Ma junfeng ma Digitally signed by junfeng ma Date: 2025.01.24 14:38:27 -06'00'
Jessica González Vargas Jessica M. Gonzalez-Vargas Digitally signed by Jessica M. Gonzalez-Vargas Date: 2025.01.24 16:08:23 -06'00'	Yingbin Hu Digitally signed by Yingbin Hu Date: 2025.01.24 19:37:40 -06'00'
Jenna Johnson Jenna Johnson Digitally signed by Jenna Johnson Date: 2025.01.25 09:53:28 -06'00'	Seunghan Lee Seunghan Lee Digitally signed by Seunghan Lee Date: 2025.01.25 11:18:35 -06'00'
Daniel Dunaway Daniel Dunaway Digitally signed by Daniel Dunaway Date: 2025.01.25 11:38:08 -06'00'	Adam Piper Adam Piper Digitally signed by Adam Piper Date: 2025.01.27 09:15:34 -06'00'

MISSISSIPPI STATE UNIVERSITY™
JAMES WORTH BAGLEY COLLEGE OF ENGINEERING

DEPARTMENT OF INDUSTRIAL & SYSTEMS ENGINEERING

Junfeng Ma, Ph.D.
ma@ise.msstate.edu

Holly Potts — Holly Potts — Digitally signed by Holly Potts Date: 2025.01.27 09:35:30 -06'00'

Brian Smith — Brian K. Smith — Digitally signed by Brian K. Smith Date: 2025.02.03 14:44:10 -06'00'

Lesley Strawderman — Lesley Strawderman — Digitally signed by Lesley Strawderman Date: 2025.02.03 16:43:16 -06'00'

Nazanin Tajik — Nazanin Tajik — Digitally signed by Nazanin Tajik Date: 2025.02.03 16:44:44 -06'00'

Wenmeng (Meg) Tian — Wenmeng Tian — Digitally signed by Wenmeng Tian Date: 2025.02.03 16:59:26 -06'00'

Haifeng Wang — Haifeng Wang — Digitally signed by Haifeng Wang Date: 2025.02.03 17:03:03 -06'00'