

# INDUSTRIAL ENGINEERING, BS

## REQUIREMENTS

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#### UNIVERSITY REQUIREMENTS

All undergraduate students must complete both the following Core General Education (Core GenEd) and University Degree and Quality of Work requirements. The requirements below apply to students whose first term at UW-Madison or whose earliest post-high school college attendance at any institution is Summer 2026 or later.

Students whose first term at UW-Madison or whose earliest post-high school college attendance at any institution occurred before Summer 2026 should refer to the archived Guide (<https://guide.wisc.edu/archive/>) for the requirements that apply to them.

#### CORE GENERAL EDUCATION (CORE GENED) REQUIREMENTS

Civics & Perspectives 3 credits of Civics & Perspectives coursework.

Communication & Literacy 6 credits of Communication & Literacy coursework. This requirement may be partially satisfied by a qualifying placement test score. More information: <https://go.wisc.edu/qualifyingenglishplacement> (<https://go.wisc.edu/qualifyingenglishplacement/>)

Humanities & Arts 6 credits of Humanities & Arts coursework.

Mathematics & Quantitative Reasoning 6 credits of Mathematics & Quantitative Reasoning coursework. This requirement may be partially satisfied by a qualifying placement test score. More information: <https://go.wisc.edu/qualifyingmathplacement> (<https://go.wisc.edu/qualifyingmathplacement/>)

Natural Science & Wellness Complete both:

- 6 credits of Natural Science & Wellness or Natural Science & Wellness + Laboratory coursework.
- one course must be in Natural Science & Wellness + Laboratory coursework.

Social & Behavioral Science 3 credits of Social & Behavioral Science coursework.

Total Credits 30 credits.

For more information see the policy (<https://policy.wisc.edu/library/UW-1095/>).

#### UNIVERSITY DEGREE AND QUALITY OF WORK REQUIREMENTS

All undergraduate degree recipients must complete the following minimum requirements. Requirements for some programs will exceed these requirements; see program requirements for additional information.

Total Degree 120 degree credits.

Residency Complete 30 credits in residence. A course is considered "in residence" if it is taken when in undergraduate degree-seeking status and:

- is offered by UW-Madison and completed on the UW-Madison campus or at an approved off-site location, or
- is offered by UW-Madison in an online or distance format, or is completed during participation in a UW-Madison study abroad/study away program.

Quality of Work Achieve at least the minimum grade point average specified by the school, college, and/or academic program.

Math Demonstrate minimal mathematics competence by:

- placing above MATH 96, or
- successfully completing MATH 96, or
- successfully completing a more advanced mathematics course such as MATH 112, MATH 113, MATH 114, MATH 141, MATH 211, or MATH 221.

English Language If required to take the UW-Madison English as a Second Language Assessment Test (MSN-ESLAT), demonstrate minimal English language competence by:

- earning credit for ESL 118, or
- achieving a qualifying MSN-ESLAT placement test score.

Language Complete one:

- 2 high school units of a single language other than English, or
- one course with the second semester Language designation.

Major Declaration Declare and complete the requirements for at least one major.

### COLLEGE OF ENGINEERING DEGREE GRANTING PROGRAMS' COMMON REQUIREMENTS

The College of Engineering departments collaborated and adopted a common set of guidelines in their degree granting program (major) requirements. Engineering departments incorporate specific coursework within their curricula to meet these guidelines. Students should refer to specific coursework detailed below the Summary of Requirements.

#### COLLEGE OF ENGINEERING DEGREE GRANTING PROGRAMS' COMMON REQUIREMENTS

Communication All College of Engineering majors require two levels of communication coursework:

- Engineering Communication 1: one course with the Communication A designation or satisfaction of Communication A based on eligible UW Placement Score.
- Engineering Communication 2: each major specifies one course (e.g. INTEREGR 397) which also carries the Communication B designation.

Quantitative Reasoning	All College of Engineering majors require a math sequence that incorporates two levels of quantitative reasoning.
Humanities or Literature	All College of Engineering majors require a minimum of 6 credits with the Humanities or Literature breadth designations. See major Liberal Studies Electives Requirement below.
Social Sciences	All College of Engineering majors require a minimum of 3 credits with the Social Sciences breadth designation. See major Liberal Studies Electives Requirement below.
Natural Sciences	All College of Engineering majors require specific coursework that incorporates a minimum of 6 credits with the Biological, Natural, or Physical Science breadth designations.
Ethnic Studies	All College of Engineering majors require at least one course of at least 3 credits with the Ethnic Studies designation. This course may also be used to satisfy the Social Sciences or Humanities or Literature requirement.

## INDUSTRIAL ENGINEERING, BS CURRICULUM

This curriculum applies to students admitted to the degree program this Guide academic year. Curricular requirements for students admitted in previous semesters are available in the Archive (<https://guide.wisc.edu/archive/>) section of Guide.

### SUMMARY OF REQUIREMENTS

Code	Title	Credits
Mathematics and Basic Science		30-31
Probability and Statistics		6
Computer Sciences		7-8
Required I SY E Courses		28
I SY E Focus Area Technical Electives		18
Professional Electives, Communication Skills and Liberal Studies Electives		27
Free Electives		4
<b>Total Credits</b>		<b>120</b>

### MATHEMATICS AND BASIC SCIENCE

Code	Title	Credits
MATH 221	Calculus and Analytic Geometry 1	5
MATH 222	Calculus and Analytic Geometry 2	4
MATH 234	Calculus--Functions of Several Variables	4
MATH 340	Elementary Matrix and Linear Algebra	3
or MATH 341	Linear Algebra	
or MATH 345	Linear Algebra and Optimization	
Select one of the following: <sup>1</sup>		5-6
PHYSICS 201	General Physics	
PHYSICS 207	General Physics	
E M A 201 & E M A 202	Statics and Dynamics	
Choose 9 credits from the following list:		9
ANAT&PHY 335	Physiology	

BIOLOGY/ BOTANY/ ZOOLOGY 151	Introductory Biology
or ZOOLOGY 153	Introductory Biology
BIOLOGY/ BOTANY/ ZOOLOGY 152	Introductory Biology
CHEM 103	General Chemistry I <sup>2</sup>
or CHEM 109	Advanced General Chemistry
or CHEM 115	Chemical Principles I
CHEM 104	General Chemistry II
CHEM 116	Chemical Principles II
CHEM 311	Chemistry Across the Periodic Table
CHEM 327	Fundamentals of Analytical Science
or CHEM 329	Fundamentals of Analytical Science
CHEM 341	Elementary Organic Chemistry
CHEM 342	Elementary Organic Chemistry Laboratory
CHEM 343	Organic Chemistry I
CHEM 344	Introductory Organic Chemistry Laboratory
CHEM 345	Organic Chemistry II
CHEM 346	Intermediate Organic Chemistry Laboratory
MICROBIO 101	General Microbiology
MICROBIO 102	General Microbiology Laboratory
PHYSICS 202	General Physics
or PHYSICS 208	General Physics
or PHYSICS 248A	Modern Introduction to Physics
PHYSICS 205	Modern Physics for Engineers
or PHYSICS 241	Introduction to Modern Physics
or PHYSICS 249A	Modern Introduction to Physics
MATH/ COMP SCI 240	Introduction to Discrete Mathematics
MATH 319	Techniques in Ordinary Differential Equations
MATH 421	The Theory of Single Variable Calculus
MATH 443	Applied Linear Algebra
MATH/ COMP SCI/ STAT 475	Introduction to Combinatorics
MATH 521	Analysis I
MATH 522	Analysis II
<b>Total Credits</b>	<b>30-31</b>

<sup>1</sup> If E M A 201 and E M A 202 are used to fulfill the PHYSICS requirement, additional credits of math or basic science will be required

<sup>2</sup> Credit will not be given for both CHEM 103 and CHEM 109 to fulfill Mathematics and Basic Science requirements.

## PROBABILITY AND STATISTICS

Code	Title	Credits
ISY E 210	Introduction to Industrial Statistics	3
or STAT/ MATH 310	Introduction to Probability and Mathematical Statistics II	
or STAT 312	Introduction to Theory and Methods of Mathematical Statistics II	
STAT 311	Introduction to Theory and Methods of Mathematical Statistics I	3
or STAT/ MATH 309	Introduction to Probability and Mathematical Statistics I	
or MATH 331	Introductory Probability	
<b>Total Credits</b>		<b>6</b>

## COMPUTER SCIENCES

Code	Title	Credits
COMP SCI 220	Data Science Programming I	4
Select one of the following courses:		3-4
COMP SCI 200	Programming I	
COMP SCI 300	Programming II	
COMP SCI 320	Data Science Programming II	
COMP SCI 400	Programming III	
COMP SCI 412	Introduction to Numerical Methods	
<b>Total Credits</b>		<b>7-8</b>

## REQUIRED ISY E COURSES

Code	Title	Credits
ISY E 191	The Practice of Industrial Engineering	2
or INTEREGR 180	Foundations of Computational Engineering Design	
ISY E 312	Data Management and Analysis for Industrial Engineers	3
ISY E 313	Engineering Economic Analysis	3
ISY E 315	Production Planning and Control	3
ISY E 320	Simulation and Probabilistic Modeling	3
ISY E 321	Simulation Modeling Laboratory	1
ISY E 323	Operations Research-Deterministic Modeling	3
or ISY E/ COMP SCI/ ECE 524	Introduction to Optimization	
ISY E 348	Introduction to Human Factors Engineering Laboratory	1
ISY E/PSYCH 349	Introduction to Human Factors	3
ISY E 350	Industrial Engineering Design I	3
ISY E 450	Industrial Engineering Design II	3
<b>Total Credits</b>		<b>28</b>

## ISY E FOCUS AREA TECHNICAL ELECTIVES

Choose one of the following six focus areas.

## Industrial Data Analytics

Code	Title	Credits
Choose at least 3 courses from the following list:		9
I SY E 373	Artificial Intelligence (AI) in Systems	
I SY E 412	Fundamentals of Industrial Data Analytics	
I SY E/M E 512	Inspection, Quality Control and Reliability	
I SY E 521	Machine Learning in Action for Industrial Engineers	
I SY E 562	Human Factors of Data Science and Machine Learning	
I SY E/E C E 570	Ethics of Data for Engineers	
I SY E 603	Special Topics in Engineering Analytics and Operations Research <sup>1</sup>	
I SY E 612	Information Sensing and Analysis for Manufacturing Processes	
I SY E 649	Interactive Data Analytics	
One elective I SY E course other than those listed in the Industrial Data Analytics area		3
Additional elective I SY E courses in any area		6
<b>Total Credits</b>		<b>18</b>

## Applications of Industrial Engineering

Code	Title	Credits
Choose at least 3 courses from one or more of the following applications: Manufacturing, Health Systems, and Quality Engineering		9
One elective I SY E course other than those listed in the Applications of Industrial Engineering area		3
Additional elective I SY E courses in any area		6
<b>Total Credits</b>		<b>18</b>

### Manufacturing

Code	Title	Credits
I SY E 415	Introduction to Manufacturing Systems, Design and Analysis	
I SY E 445	Engineering Supply Chain Management for Logistics	
I SY E/M E 510	Facilities Planning	
I SY E 515	Engineering Management of Continuous Process Improvement	
I SY E 604	Special Topics in Manufacturing and Supply Chain Management	
I SY E 605	Computer Integrated Manufacturing	
I SY E/M E 641	Design and Analysis of Manufacturing Systems	
I SY E 645	Engineering Models for Supply Chains	

### Health Systems

Code	Title	Credits
I SY E 417	Health Systems Engineering	
I SY E 517	Decision Making in Health Care	
I SY E 557	Human Factors Engineering for Healthcare Systems	

I SY E 606	Special Topics in Healthcare Systems Engineering	
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### Quality Engineering

Code	Title	Credits
I SY E 520	Quality Assurance Systems	
I SY E 575	Introduction to Quality Engineering	

### Human Factors and Ergonomics

Code	Title	Credits
Choose at least 3 courses from the following list:		9

I SY E/COMP SCI/ DS 518	Wearable Technology	
I SY E/ PSYCH 549	Human Factors Engineering	
I SY E 552	Human Factors Engineering Design and Evaluation	
I SY E 555	Human Performance and Accident Causation	
I SY E 557	Human Factors Engineering for Healthcare Systems	
I SY E 562	Human Factors of Data Science and Machine Learning	
I SY E/B M E 564	Occupational Ergonomics and Biomechanics	
I SY E 602	Special Topics in Human Factors	
I SY E/B M E 662	Design and Human Disability and Aging	

One elective I SY E course other than those listed in the Human Factors and Ergonomics area	3
Additional elective I SY E courses in any area	6

**Total Credits** 18

### Optimization and Operations Research

Code	Title	Credits
Choose at least 3 courses from the following list:		9

I SY E/COMP SCI/ MATH 425	Introduction to Combinatorial Optimization	
I SY E 516	Introduction to Decision Analysis	
I SY E/COMP SCI/ E C E 524	Introduction to Optimization	
I SY E/COMP SCI/ MATH/STAT 525	Linear Optimization	
I SY E 603	Special Topics in Engineering Analytics and Operations Research <sup>1</sup>	
I SY E 620	Simulation Modeling and Analysis	
I SY E 623	Advanced Optimization Modeling	
I SY E 624	Stochastic Modeling Techniques	
I SY E/MATH/ OTM/STAT 632	Introduction to Stochastic Processes	

One elective I SY E course other than those listed in the Optimization and Operations Research area	3
Additional elective I SY E courses in any area	6

**Total Credits** 18

### Distributed Focus Area

Code	Title	Credits
Choose 6 courses in at least 3 of the 4 areas listed above (Industrial Data Analytics, Applications of Industrial Engineering, Human Factors and Ergonomics, and Optimization and Operations Research)		18

**Total Credits** 18

### Honors in Research Focus Area

Code	Title	Credits
Choose 5 courses in at least 2 of the 4 areas listed above (Industrial Data Analytics, Applications of Industrial Engineering, Human Factors and Ergonomics, and Optimization and Operations Research)		15

I SY E 468	Introduction to Industrial Engineering Research	1
I SY E 478	Research and Beyond in Industrial Engineering	1
I SY E 489	Honors in Research	3

**Total Credits** 20

<sup>1</sup> The area to which I SY E 603 Special Topics in Engineering Analytics and Operations Research will count is dependent on course topic. Please consult your advisor for details.

## PROFESSIONAL ELECTIVES, COMMUNICATION SKILLS AND LIBERAL STUDIES ELECTIVES

Code	Title	Credits
<b>Professional Electives <sup>1</sup></b>		<b>6</b>

College of Engineering courses numbered 200 or higher

Intermediate or advanced level classes in any of the following breadth areas: biological sciences, natural sciences, social sciences, physical sciences, humanities, or literature

At most 5 credits of I SY E 699 and/or I SY E 1 (independent study courses from other engineering subject areas can also be used)

School of Business courses numbered 200 or higher (as well as ACCT I S 100)

### Communication Skills

#### Engr Comm 1

INTEREGR 156	Introduction to Writing, Speaking, and Ethics for Engineers	3
or ENGL 100	Introduction to College Composition	
or COM ARTS 100	Introduction to Speech Composition	
or LSC 100	Science and Storytelling	
or ESL 118	Academic Writing II	

#### Engr Comm 2

INTEREGR 397	Engineering Communication	3
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### Liberal Studies Electives

ECON 101	Principles of Microeconomics	4
Liberal Studies Electives according to CoE requirement guidelines <sup>2</sup>		11

**Total Credits** 27

<sup>1</sup> Professional electives may not include STAT 301 Introduction to Statistical Methods or transfer/test math elective credits for calculus.

<sup>2</sup> See CoE Liberal Studies Guidelines (<https://guide.wisc.edu/undergraduate/engineering/#requirements-text>).

## FREE ELECTIVES

<b>Code</b>	<b>Title</b>	<b>Credits</b>
	Choose 4 credits of Free Electives (students in Honors in Research area only need 2 free elective credits)	4
<b>Total Credits</b>		<b>4</b>