INDUSTRIAL ENGINEERING, BS

REQUIREMENTS

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UNIVERSITY GENERAL EDUCATION REQUIREMENTS

All undergraduate students at the University of Wisconsin-Madison are required to fulfill a minimum set of common university general education requirements to ensure that every graduate acquires the essential core of an undergraduate education. This core establishes a foundation for living a productive life, being a citizen of the world, appreciating aesthetic values, and engaging in lifelong learning in a continually changing world. Various schools and colleges will have requirements in addition to the requirements listed below. Consult your advisor for assistance, as needed. For additional information, see the university Undergraduate General Education Requirements (https://guide.wisc.edu/undergraduate/#requirementsforundergraduatestudytext) section of the Guide.

General Education
- Breadth—Humanities/Literature/Arts: 6 credits
- Breadth—Natural Science: 4 to 6 credits, consisting of one 4- or 5-credit course with a laboratory component; or two courses providing a total of 6 credits
- Breadth—Social Studies: 3 credits
- Communication Part A & Part B *
- Ethnic Studies *
- Quantitative Reasoning Part A & Part B *

* The mortarboard symbol appears before the title of any course that fulfills one of the Communication Part A or Part B, Ethnic Studies, or Quantitative Reasoning Part A or Part B requirements.

SUMMARY OF REQUIREMENTS

The following curriculum applies to students admitted to the Industrial Engineering, BS, degree program. Required courses and electives satisfying the Mathematics and Basic Science, Computer Sciences, IE Focus Area, and General Education Communication requirements are indicated. For Liberal Studies Electives refer to the College of Engineering Liberal Studies Guidelines.

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		27
Free Electives		4
Total Credits		**120**

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
Select one of the following: [1]		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 [2]	
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 248	A Modern Introduction to Physics	
PHYSICS 205	Modern Physics for Engineers	
or PHYSICS 241	Introduction to Modern Physics	
or PHYSICS 249	A 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	
Total Credits		**30-31**

[1] 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

[2] 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
I SY 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	
Total Credits		**6**

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	
Total Credits		**7-8**

REQUIRED I SY E COURSES

Code	Title	Credits
I SY E 191	The Practice of Industrial Engineering	2
I SY E 312	Data Management and Analysis for Industrial Engineers	3
I SY E 313	Engineering Economic Analysis	3
I SY E 315	Production Planning and Control	3
I SY E 320	Simulation and Probabilistic Modeling	3
I SY E 321	Simulation Modeling Laboratory	1
I SY E 323	Operations Research-Deterministic Modeling	3
I SY E 348	Introduction to Human Factors Engineering Laboratory	1
I SY E/PSYCH 349	Introduction to Human Factors	3
I SY E 350	Industrial Engineering Design I	3
I SY E 450	Industrial Engineering Design II	3
Total Credits		**28**

I SY 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 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 [1]	
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
Total Credits		**18**

Applications of Industrial Engineering

Code	Title	Credits
Choose at least 3 courses from the following applications:		9
Manufacturing		
I SY E 415	Introduction to Manufacturing Systems, Design and Analysis	
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		
I SY E 417	Health Systems Engineering	
I SY E 517	Decision Making in Health Care	
I SY E 606	Special Topics in Healthcare Systems Engineering	
Quality Engineering		
I SY E 520	Quality Assurance Systems	
I SY E 575	Introduction to Quality Engineering	
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
Total Credits	**18**

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 555	Human Performance and Accident Causation	
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 [1]	
I SY E 620	Simulation Modeling and Analysis	
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**

[1] 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

Code	Title	Credits
Professional Electives [1]		
Choose courses from the following areas:		6
College of Engineering courses numbered 200 or higher		
Biological, natural, social, or physical sciences; humanities; or literature at the Intermediate or Advanced level		
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		
Choose courses from the following area:		
ENGL 100	Introduction to College Composition	3
or COM ARTS 100	Introduction to Speech Composition	
or LSC 100	Science and Storytelling	
or ESL 118	Academic Writing II	
INTEREGR 397	Engineering Communication	3
Liberal Studies		
Liberal Studies Electives (according to CoE requirements) [2]		11
ECON 101	Principles of Microeconomics	4
Total Credits		**27**

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

[2] See CoE Liberal Studies Guidelines (https://guide.wisc.edu/undergraduate/engineering/#requirementstext).

FREE ELECTIVES

Code	Title	Credits
Choose 4 credits of Free Electives		4
Total Credits		**4**

MINIMUM REQUIRED CREDITS: 120

UNIVERSITY DEGREE REQUIREMENTS

Total Degree	To receive a bachelor's degree from UW–Madison, students must earn a minimum of 120 degree credits. The requirements for some programs may exceed 120 degree credits. Students should consult with their college or department advisor for information on specific credit requirements.
Residency	Degree candidates are required to earn a minimum of 30 credits in residence at UW–Madison. "In residence" means on the UW–Madison campus with an undergraduate degree classification. “In residence” credit also includes UW–Madison courses offered in distance or online formats and credits earned in UW–Madison Study Abroad/Study Away programs.
Quality of Work	Undergraduate students must maintain the minimum grade point average specified by the school, college, or academic program to remain in good academic standing. Students whose academic performance drops below these minimum thresholds will be placed on academic probation.