

**BS in Industrial Engineering  
Degree Requirements, AY 2021-2022**

Major Program  
IE Methods Core

Done	Course	Course Name	Notes	Done	Course	Course Name	Notes
<b>Mathematics Requirement (4 credits)</b>				<b>IEMS Major Program: Methods Core + PL + Project (9 credits)</b>			
<input type="checkbox"/>	Math 220-1	Single-variable Differential Calculus		<input type="checkbox"/>	COMP_SCI 111	Fundamentals of Computer Programming I	
<input type="checkbox"/>	Math 220-2	Single-variable Integral Calculus		<input type="checkbox"/>	COMP_SCI 150	Fundamentals of Computer Programming 1.5	
<input type="checkbox"/>	Math 228-1	Multivariable Diff. Calc. for Eng.		<input type="checkbox"/>	IEMS 202	Probability	IE/OR Methods Core
<input type="checkbox"/>	Math 228-2	Multivariable Int. Calc. for Eng.		<input type="checkbox"/>	IEMS 303	Statistics	
<b>Engineering Analysis and Computer Proficiency (4 credits)</b>				<input type="checkbox"/>	IEMS 313	Foundations of Optimization	
<input type="checkbox"/>	Gen Eng 205-1	EA 1		<input type="checkbox"/>	IEMS 315	Stochastic Models	
<input type="checkbox"/>	Gen Eng 205-2	EA 2		<input type="checkbox"/>	IEMS 317	Discrete-Event Systems Simulation	
<input type="checkbox"/>	Gen Eng 205-3	EA 3		<input type="checkbox"/>	Prodn & Logistics	Choose from IEMS 381, 382, 383, or 385	
<input type="checkbox"/>	Gen Eng 205-4	EA 4		<input type="checkbox"/>	IEMS 394	IE Client Project Challenge	Junior spring or Senior fall
<b>Basic Sciences (4 credits)</b>				<b>IEMS Major Program: IE/OR Electives (2 credits)</b>			
<input type="checkbox"/>			See reverse for details on acceptable courses	<input type="checkbox"/>	IE/OR Elective		May not count course used for Prodn & Logistics above
<input type="checkbox"/>				<input type="checkbox"/>	IE/OR Elective		
<input type="checkbox"/>						See reverse for details on acceptable courses	
<input type="checkbox"/>							
<b>Design and Communications (3 credits)</b>				<b>IEMS Major Program: Management Science Electives (2 credits)</b>			
<input type="checkbox"/>	DSGN 106-1/Engl 106-1	DTC 1		<input type="checkbox"/>	Elective-MS		See reverse for details on acceptable courses
<input type="checkbox"/>	DSGN 106-2/Engl 106-2	DTC 2		<input type="checkbox"/>	Elective-MS		
<input type="checkbox"/>	Communications Course	Chosen from COMM_ST 102, PERF_ST 103 or PERF_ST 203					
<b>Basic Engineering (5 credits)</b>				<b>IEMS Major Program: General Technical Electives (3 credits)</b>			
<input type="checkbox"/>	IEMS 304 (IE Methods Core)	Statistical Learning for Data Analysis	Prob/Stat/Quality	<input type="checkbox"/>	Elective-GTE		See reverse for details on acceptable courses
<input type="checkbox"/>	COMP_SCI 217	Data Mgmt & Info Processing	Comp. Programming	<input type="checkbox"/>	Elective-GTE		
<input type="checkbox"/>	CIV ENV 205	Eng. Econ	Systems Eng.	<input type="checkbox"/>	Elective-GTE		
<b>2 additional courses from two different areas</b>				<b>Unrestricted Electives (5 credits)</b>			
<input type="checkbox"/>	Basic Engineering Choice		See reverse for details on acceptable courses	<input type="checkbox"/>			
<input type="checkbox"/>	Basic Engineering Choice				<input type="checkbox"/>		
<b>Theme Courses (7 credits)</b>				<input type="checkbox"/>			
<input type="checkbox"/>	Theme		See reverse for details on requirements	<input type="checkbox"/>			
<input type="checkbox"/>	Theme				<input type="checkbox"/>		
<input type="checkbox"/>	Theme				<input type="checkbox"/>		
<input type="checkbox"/>	Theme				<input type="checkbox"/>		
<input type="checkbox"/>	Theme				<input type="checkbox"/>		
<input type="checkbox"/>	Theme				<input type="checkbox"/>		
<input type="checkbox"/>	Theme				<input type="checkbox"/>		

Full details can be found in the Undergraduate Catalog for 2021-2022 ([catalogs.northwestern.edu](https://catalogs.northwestern.edu))

### Basic Science Courses

Four units, including courses from at least two areas

At most 2 units from Earth Sciences and Astronomy; no more than 3 units from any other area

Lab courses may count only in combination with their corresponding lecture courses

#### Physics

PHYSICS 135-2 & 136-2	General Physics & Laboratory
PHYSICS 135-3 & 136-3	General Physics & Laboratory
PHYSICS 239	Foundations of Modern Physics

#### Chemistry

CHEM 131 or 151 or 171	(General/Accelerated/Advanced) Chemistry 1
CHEM 141 or 161 or 181	(Gen/Acc/Adv) General Chemistry Laboratory 1
CHEM 132 or 152 or 172	(General/Accelerated/Advanced) Chemistry 2
CHEM 142 or 162 or 182	(Gen/Acc/Adv) Chemistry Laboratory 2
CHEM 210-1	Organic Chemistry
CHEM 210-2	Organic Chemistry

#### Biological Sciences

BIOL_SCI 201	Molecular Biology
BIOL_SCI 202	Cell Biology (prereq of 201)
BIOL_SCI 203	Genetics and Evolution (prereq of 202)
BIOL_SCI 232	Molecular & Cell Processes Lab (concurrent with 202)
BIOL_SCI 233	Genetics & Molecular Proc. Lab (concurrent with 203)
BIOL_SCI 234	Investigative Laboratory

CHEM_ENG 275	Molecular & Cell Biology for Engineers
CIV_ENV 202	Biological & Ecological Principles

#### Earth Sciences and Astronomy

ASTRON 220	Introduction to Astrophysics
CIV_ENV 203	Earth in the Anthropocene
EARTH 201	Earth Systems Revealed
EARTH 202	Earth's Interior
EARTH 203	Earth System History

### Basic Engineering Courses

Five basic engineering courses must come from **four distinct areas**.

IEMS 304, required, is in the Prob/Stat/Quality area.

COMP\_SCI 217, required, is in the Computer Programming area.

Civ\_Env 205, required, is in the Systems Engineering area.

Two additional courses must be chosen from the courses below.

#### Computer Architecture & Numerical Methods

COMP_ENG 203	Intro to Computer Eng.
COMP_ENG 205	Fundamentals of Computer Software
ES_APPM 345	Applied Linear Algebra
ES_APPM 346	Modeling & Computation

#### Computer Programming

COMP_SCI 211	Fundamentals of Computer Programming II
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#### Electrical Science

ELEC_ENG 202	Intro to Electrical Eng.
ELEC_ENG 221	Fundamentals of Circuits
ELEC_ENG 222	Fundamentals of Signals & Systems
ELEC_ENG 223	Fundamentals of Solid State Engineering
ELEC_ENG 224	Fundamentals of Electromagnetics & Photonics
MECH_ENG 233	Electronics Design

#### Fluids & Solids

BMD_ENG 270	Fluid Mechanics
BMD_ENG 271	Intro to Biomechanics
CHEM_ENG 321	Fluid Mechanics
CIV_ENV 216	Mechanics of Materials I
MECH_ENG 241	Fluid Mechanics I

#### Materials Science and Engineering

MAT_SCI 201	Introduction to Materials
MAT_SCI 301	Materials Science Principles

#### Systems Engineering and Analysis

CIV_ENV 304	Civil and Environmental Engineering Systems Analysis
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#### Thermodynamics

BMD_ENG 250	Thermodynamics
CHEM_ENG 211	Thermodynamics
MAT_SCI 314	Thermodynamics of Materials
MAT_SCI 315	Phase Equilibria and Diffusion
MECH_ENG 222	Thermo & Statistical Mechanics I
MECH_ENG 322	Thermo & Statistical Mechanics II

### IE/OR Elective Options

IEMS 307	Quality Improvement by Exper. Des.
IEMS 308	Data Science and Analytics
IEMS 351	Optimization Methods for Data Science
IEMS 365	Analytics for Social Good
IEMS 373	Intro. to Financial Engineering
IEMS 381	Supply Chain Modeling
IEMS 382	Production Plan & Sched
IEMS 383	Service Optrs. Mgmt.
IEMS 385	Health Systems Eng.

### Management Science Elective Options

IEMS 325	Engineering Entrepreneurship
IEMS 340	Field Project Methods
IEMS 341	Social Network Analysis
IEMS 342	Organizational Behavior
IEMS 343	Project Management for Engineers
IEMS 344	Whole-brain Leadership
IEMS 345	Negotiations and Conflict Resolution
IEMS 395	Special Topics: Whole-brain Leadership

(Note that other 395 courses may not count here)

### General Technical Elective Options

The following courses MAY BE USED as technical electives

Any 200-level or higher course in McCormick, excluding CRDV and PRDV courses

Any 200-level or higher course in Biology, Chemistry, or Physics

Any 300-level or higher course in Math, Statistics, or MMSS

BUS_INST 302	Marketing Management
Econ 309	Elements of Public Finance
Econ 331	Economics of Risk and Uncertainty
Econ 336	Analytic Methods for Public Policy Analysis
Econ 339	Labor Economics
Econ 349	Industrial Economics
Econ 350	Monopoly, Competition, and Public Policy
Econ 355	Transportation Economics and Public Policy
Econ 360-2	Investments
Econ 362	International Finance
Econ 380-1,2	Game Theory
Econ 381-1,2	Econometrics
Econ 383	Economic Forecasting
IMC 303	Integrated Marketing Communications Strategy
ISEN 220	Intro to Energy Systems for the 21st Century
ISEN 230	Climate Change and Sustainability

The following courses MAY NOT BE USED as technical electives

Chem 201	Chemistry of Nature and Culture
Math 310-1	Probability and Stochastic Processes
Math 311-1	MENU: Probability & Stochastic Processes
Math 314	Probability and Statistics for Econometrics
Math 385	Probability and Statistics for MMSS
Math 386-1	Econometrics for MMSS
Physics 311-1	Mathematical Tools for the Physical Sciences
Physics 311-2	Mathematical Tools for the Physical Sciences
Physics 335	Physics of Magic
Stat 320-1	Statistical Methods I
Stat 383	Probability and Statistics for ISP

### Theme Requirements

The theme requirement consists of seven courses in humanities and social sciences.

At least three courses (the "theme") must be related in content.

Requires at least two courses in social sciences, and at least two courses in humanities

See the McCormick Undergraduate Engineering website for information on eligible courses

Note that the following courses may NOT be used towards theme:

Any BUS_INST or Kellogg course		
ECON 281	ECON 381-1	ENGLISH 106-2
ECON 380-1	ECON 381-2	GEOG 341
ECON 380-2	ENGLISH 106-1	PSYCH 201