# BS in Industrial Engineering
## Degree Requirements, AY 2018-2019

### Major Program

#### IE Methods Core

<table>
<thead>
<tr>
<th>Mathematics Requirement (4 credits)</th>
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<tbody>
<tr>
<td>□ Math 220-0  Diff. Calculus of One-Var Functions</td>
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<tr>
<td>□ Math 224-0  Int. Calculus of One-Var Functions</td>
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<tr>
<td>□ Math 230-0  Diff. Calculus of Multivariable Func.</td>
</tr>
<tr>
<td>□ Math 234-0  Int. Calculus of Multivariable Func.</td>
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<table>
<thead>
<tr>
<th>Engineering Analysis and Computer Proficiency (4 credits)</th>
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<tbody>
<tr>
<td>□ Gen Eng 205-1  EA 1</td>
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<tr>
<td>□ Gen Eng 205-2  EA 2</td>
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<tr>
<td>□ Gen Eng 205-3  EA 3</td>
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<tr>
<td>□ Gen Eng 205-4  EA 4</td>
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<table>
<thead>
<tr>
<th>Basic Sciences (4 credits)</th>
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<tr>
<td>See reverse for details on acceptable courses</td>
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<tr>
<th>Design and Communications (3 credits)</th>
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<tbody>
<tr>
<td>□ DSGN 106-1/Engl 106-1  DTC 1</td>
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<tr>
<td>□ DSGN 106-2/Engl 106-2  DTC 2</td>
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<tr>
<td>□ Communications Course Chosen from COMM_ST 102, PERF_ST 103 or PERF_ST 203</td>
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<thead>
<tr>
<th>Basic Engineering (5 credits)</th>
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<tbody>
<tr>
<td>□ EECS 211  Fund. Of Computer Programming II Comp. Programming</td>
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<tr>
<td>□ EECS 317  Data Mgmt/Info Proc. Comp. Programming</td>
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<tr>
<td>□ CIV ENV 205  Eng. Econ Systems Eng.</td>
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**2 additional courses from two different areas**

<table>
<thead>
<tr>
<th>Theme Courses (7 credits)</th>
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**Unrestricted Electives (5 credits)**

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Full details can be found in the Undergraduate Catalog for 2018-2019.

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<table>
<thead>
<tr>
<th>IEMS Major Program: Methods Core + PL + Project (9 credits)</th>
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<tbody>
<tr>
<td>□ EECS 111  Fundamentals of Computer Programming I Prerequisite for EECS 211</td>
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<tr>
<td>□ IEMS 202  Probability</td>
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<tr>
<td>□ IEMS 303  Statistics</td>
</tr>
<tr>
<td>□ IEMS 304  Statistical Learning for Data Analysis</td>
</tr>
<tr>
<td>□ IEMS 313  Foundations of Optimization</td>
</tr>
<tr>
<td>□ IEMS 315  Stochastic Models</td>
</tr>
<tr>
<td>□ IEMS 317  Discrete-Event Systems Simulation</td>
</tr>
<tr>
<td>□ Prodn &amp; Logistics Choose from IEMS 381, 382, 383, or 385</td>
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<tr>
<td>□ IEMS 394  IE Client Project Challenge Junior spring or senior fall</td>
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<tr>
<th>IEMS Major Program: IE/OR Electives (2 credits)</th>
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<tbody>
<tr>
<td>□ IE/OR Elective May not count course used for Prodn &amp; Logistics above</td>
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<tr>
<th>IEMS Major Program: Management Science Electives (2 credits)</th>
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<tbody>
<tr>
<td>□ Elective-M5 See reverse for details on acceptable courses</td>
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<table>
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<tr>
<th>IEMS Major Program: General Technical Electives (3 credits)</th>
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</thead>
<tbody>
<tr>
<td>□ Elective-GTE See reverse for details on acceptable courses</td>
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See reverse for details on requirements.
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 215 Genetics and Molecular Biology
BIOL_SCI 217 Physiology
BIOL_SCI 219 Cell Biology
BIOL_SCI 220 Genetics and Molecular Processes Laboratory
BIOL_SCI 221 Cellular Process Laboratory
BIOL_SCI 222 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.
EECS 211 & EECS 317, required, are in the Computer Programming area.
CIV_ENV 205, required, is in the Systems Engineering area.
Two additional courses must be chosen from two of the areas below.

Computer Architecture & Numerical Methods
EECS 203 Intro to Computer Eng.
EECS 205 Fundamentals of Computer Software
EECS_APPM 346 Modeling & Computation

Electrical Science
EECS 202 Intro to Electrical Eng.
EECS 270 Applications of Electronic Devices
EECS 221 Fundamentals of Circuits
EECS 222 Fundamentals of Signals & Systems
EECS 223 Fundamentals of Solid State Engineering
EECS 224 Fundamentals of Electromagnetics & Photonics
MECH_ENG 233 Electronics Design

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

Materials Science and Engineering
MAT_SCI 201 Introduction to Materials
MAT_SCI 301 Materials Science Principles

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 304 Stat. Methods for Data Mining
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 Ops. Mgmt.
IEMS 385 Health Systems Eng.

Management Science Elective Options
IEMS 325 Engineering Entrepreneurship
IEMS 341 Social Network Analysis
IEMS 342 Organizational Behavior
IEMS 343 Project Management for Engineers
IEMS 344 Leading Organizations and Teams
IEMS 345 Negotiations and Conflict Resolution

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
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 ECON 381-2 ENGLISH 106-2 GEOG 341
ECON 380-2 ENGLISH 106-1 PSYCH 201