## Bachelor of Science in Industrial Engineering - Analytics and Data Science

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td></td>
<td><strong>Wellness</strong></td>
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<tr>
<td></td>
<td>APPH 1040 Scientific Foundations of Health</td>
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<td></td>
<td>or APPH 10 The Science of Physical Activity and Health</td>
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<td></td>
<td>or APPH 10 Flourishing: Strategies for Well-being and Resilience</td>
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<td><strong>Core A - Essential Skills</strong></td>
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<tr>
<td></td>
<td>ENGL 1101 English Composition I</td>
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<td>ENGL 1102 English Composition II</td>
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<tr>
<td></td>
<td>MATH 1552 Integral Calculus</td>
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<td><strong>Core B - Institutional Options</strong></td>
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<tr>
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<td>CS 1301 Introduction to Computing</td>
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<td><strong>Core C - Humanities</strong></td>
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<td><strong>Core D - Science, Math, &amp; Technology</strong></td>
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<tr>
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<td>PHYS 2211 Introductory Physics I</td>
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<td>PHYS 2212 Introductory Physics II</td>
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<td>MATH 1551 Differential Calculus</td>
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<td>MATH 1553 Introduction to Linear Algebra</td>
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<td><strong>Core E - Social Sciences</strong></td>
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<tr>
<td></td>
<td>HIST 2111 The United States to 1877</td>
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<td>HIST 2112 The United States since 1877</td>
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<td>INTA 1200 American Government in Comparative Perspective</td>
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<td>POL 1101 Government of the United States</td>
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<td>PUBP 3000 American Constitutional Issues</td>
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<td>ECON 2100 Economic Analysis and Policy Problems</td>
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<td>PSYC 1101 General Psychology</td>
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<td>Any SS</td>
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<td><strong>Core F - Courses Related to Major</strong></td>
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<tr>
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<td>CS 2316 Data Manipulation for Science and Industry</td>
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<td>CS 4400 Introduction to Database Systems</td>
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<td>MATH 2551 Multivariable Calculus</td>
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<td>Lab Science</td>
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<td><strong>Ethics Requirement</strong></td>
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<td>Environmental Requirement</td>
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<td><strong>Major Requirements</strong></td>
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<tr>
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<td>ACCT 2101 Accounting I: Financial Accounting</td>
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<td>or MGT 300 Financial and Managerial Accounting</td>
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<td>MATH 2603 Introduction to Discrete Mathematics</td>
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<td>ISYE 2027 Probability with Applications</td>
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<td>ISYE 3030 Basic Statistical Methods</td>
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<td>ISYE 3025 Essentials of Engineering Economy</td>
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<td>ISYE 3044 Simulation Analysis and Design</td>
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**Engineering Electives**

Select one of the following:

- ECE 2020 Digital System Design
- ECE 2026 Introduction to Signal Processing
- ECE 3710 Circuits and Electronics
- ECE 3741 Instrumentation and Electronics Lab

Select 6 credits of the following:

- ECE 2020 Digital System Design
- ECE 2026 Introduction to Signal Processing
- ECE 3710 Circuits and Electronics
- ECE 3741 Instrumentation and Electronics Lab

**Group 1**

- AE 2220 Dynamics
- AE 3450 Thermodynamics and Compressible Flow
- BMED 3100 Systems Physiology
- CHBE 2100 Chemical Process Principles
- CHBE 2110 Chemical Engineering Thermodynamics
- CHBE 4763 Pulping and Chemical Recovery
- CHBE 4764 Bleaching and Papermaking
- COE 2001 Statics
- COE 3001 Mechanics of Deformable Bodies
- CEE 2040 Dynamics
- CEE 2300 Environmental Engineering Principles
- CEE 3010 Geomatics
- CEE 4100 Construction Engineering and Management
- CEE 4300 Environmental Engineering Systems
- CEE 4600 Transportation Planning, Operations, and Design
- CS 2110 Computer Organization and Programming
- CS 4641 Machine Learning
- CX 4010 Computational Problem Solving for Scientists and Engineers
- CX 4240 Introduction to Computing for Data Analysis
- CX 4242 Data and Visual Analytics
- ECE 2020 Digital System Design
- ECE 2026 Introduction to Signal Processing
- ECE 2040 Circuit Analysis
- ECE 3035 Mechanisms for Computing Systems
- ECE 3076 Computer Communications
- ECE 3090 Software Fundamentals for Engineering Systems
- ECE 3710 Circuits and Electronics
- ECE 3741 Instrumentation and Electronics Lab
- ECE 4606 Wireless Communications
- ME 2202 Dynamics of Rigid Bodies
- ME 3015 System Dynamics and Control
- ME 3322 Thermodynamics
- ME 3720 Introduction to Fluid and Thermal Engineering
- ME 4763 Pulping and Chemical Recovery
- ME 4764 Bleaching and Papermaking
- MSE 2001 Principles and Applications of Engineering Materials
MSE 3012 Thermal and Transport Properties of Materials
MSE 3015 Electrical, Optical, and Magnetic Properties
NRE 3301 Radiation Physics

Group 2
AE 4370 Life Cycle Cost Analysis
AE 4701 Wind Engineering
AE 4793 Composite Materials and Processes
ARCH 6271 Healthcare Design of the Future
BIOS 2400 Math Models in Biology
BIOS 4740 Biologically-Inspired Design
BMED 2300 Problems in Biomedical Engineering II
BMED 3400 Introduction to Biomechanics
BMED 4751 Introduction to Biomaterials
CHBE 4793 Composite Materials and Processes
COE 3002 Intro to Microelectronics and Nanotechnology Revolution
CEE 4225 Introduction to Coastal Engineering
CEE 4330 Air Pollution Engineering
CEE 4793 Composite Materials and Processes
CP 4310 Urban Transportation and Planning
CP 4510 Fundamentals of Geographic Information Systems
ECE 2031 Digital Design Laboratory
ECE 4755 Electronic Packaging Substrate Fabrication
ME 2110 Creative Decisions and Design
ME 3057 Experimental Methodology and Technical Writing
ME 4740 Biologically Inspired Design
ME 4793 Composite Materials and Processes
MSE 2021 Materials Characterization
MSE 3720 Introduction to Polymer/Fiber Enterprise
MSE 4751 Introduction to Biomaterials
MSE 4755 Electronic Packaging Substrate Fabrication
MSE 4793 Composite Materials and Processes

Analytics and Data Science Concentration

Group A:
ISYE 4133 Advanced Optimization
ISYE 4232 Advanced Stochastic Systems
ISYE 4045 Advanced Simulation
ISYE 4134 Constraint Programming

Group B:
ISYE 4034 Decision and Data Analytics
CX 4240 Introduction to Computing for Data Analysis
ISYE 4803 Special Topics (Intro to Machine Learning) or CS 464 Machine Learning
ISYE 4803 Special Topics (On-Line Learning and Decision Making)
ISYE 4803 Special Topics (Nonlin Opt: App to ML&Eng)
ISYE 4803 Special Topics (Foundations of Modern Data Sci)

Analytics Breadth Electives:
ECON 3150 Economic and Financial Modeling
ECON 4340 Economics of Industrial Competition
ECON 4350 International Economics
ISYE 3039 Methods of Quality Improvement
ISYE 3103 Introduction to Supply Chain Modeling: Logistics
ISYE 3104 Introduction to Supply Chain Modeling: Manufacturing and Warehousing
ISYE 3106 Cornerstone Design for Industrial Engineers
ISYE 4111 Advanced Supply Chain Logistics
ISYE 4301 Supply Chain Economics
ISYE 4311 Capital Investment Analysis
ISYE 4803 Special Topics (Advanced Manufacturing)
ISYE 4803 Special Topics (Design of Experiments)
ISYE 4803 Special Topics (Facility Layout and Warehousing)
ISYE 4803 Special Topics (Health Systems Engineering)
ISYE 4803 Special Topics (Reliability Engineering)
ISYE 4803 Special Topics (Systems Design for IEs)
MATH 4262 Mathematical Statistics II
MGT 3078 Mathematical Statistics II

Free Electives

Total Credit Hours 128

Pass-fail only allowed for Free Electives, Humanities, and the Social Sciences elective.

Students must achieve a minimum GPA of 2.0 in the BSIE Major Requirements to graduate.

1. Students must earn a C or better in all required MATH courses in the BSIE curriculum.
2. Students may also complete MATH 1554 and MATH 2550 to satisfy math requirements. If MATH 1554/MATH 2550 combination is taken, then two hours from MATH 1554 may be used in Area F to give Area F 18 hours.
3. Only one EAS course can be used toward ISYE Lab Science requirements.
4. PSYC 1101 will satisfy the Ethics requirement.
5. Students must choose from the following to meet the Environmental requirement: BIOS 1107 and BIOS 1107L, BIOS 2300, CEE 2300, CEE 4300, EAS 1600, EAS 1601, EAS 2600, EAS 2750, EAS 3110, EAS 4480, ECON 4440, ISYE 4803 titled “Energy and Environmental Analysis,” ISYE 4501, SLS 3120, or PHYS 2750.
6. Students must take at least nine credits of engineering electives. Three credits must be chosen from ECE 2020, ECE 2026, or ECE 3710 AND ECE 3741. Students must complete courses from two different eligible engineering elective subjects. Engineering elective credits taken in excess of the nine required may count toward free electives.
7. At most, one computing course (CS or CX) is allowed, including courses cross-listed with CS or CX courses.
8. In addition to the ECE requirement, take at least two additional credits from Group 1 and no more than four credits from Group 2.
9. To count as Group 2 Engineering Elective credit, all Vertically-Integrated Projects (VIP) courses must be approved by the ISYE Associate Undergraduate Chair, and at least three but no more than four credits of VIP coursework may count toward the Engineering Elective requirement.
Students must complete five concentration courses: one from Group A, two from Group B, and two as listed from any other concentration. A minimum of four of the five concentration courses must be ISYE courses. If ISYE 3106 Cornerstone Design is taken as a breadth elective, it must be taken prior to ISYE 4106 Senior Design.

MATH 1113, MGT 2250, ISYE 3770, and PHYS 2XXX (AP credit) not allowed.