# Bachelor of Science in Industrial Engineering - Advanced Studies in Operations Research and Statistics

## Code | Title | Credit Hours
---|---|---
APPH 1040 | Scientific Foundations of Health | 2
or APPH 1050 | The Science of Physical Activity and Health | 2
or APPH 1060 | Flourishing: Strategies for Well-being and Resilience | 2

### Wellness Requirement

**Core IMPACTS**

- **Institutional Priority**
  - CS 1301 | Introduction to Computing | 3

- **Mathematics and Quantitative Skills**
  - MATH 1552 | Integral Calculus | 4

- **Political Science and U.S. History**
  - HIST 2111 | The United States to 1877 | 3
  or HIST 2112 | The United States since 1877 | 3
  or INTA 1200 | American Government in Comparative Perspective | 3
  or POL 1101 | Government of the United States | 3
  or PUBP 3000 | American Constitutional Issues | 3

- **Arts, Humanities, and Ethics**
  - Any HUM | 6

- **Communicating in Writing**
  - ENGL 1101 | English Composition I | 3
  - ENGL 1102 | English Composition II | 3

- **Technology, Mathematics, and Sciences**
  - PHYS 2211 | Introductory Physics I | 4
  - PHYS 2212 | Introductory Physics II | 4
  - MATH 1551 | Differential Calculus | 2
  - MATH 1553 | Introduction to Linear Algebra | 2

- **Social Sciences**
  - ECON 2100 | Economic Analysis and Policy Problems | 3
  - PSYC 1101 | General Psychology | 3
  - Any SS | 3

- **Field of Study**
  - CS 2316 | Data Manipulation for Science and Industry | 3
  - CS 4400 | Introduction to Database Systems | 3
  - MATH 2551 | Multivariable Calculus | 4
  or MATH 2552 | Introduction to Multivariable Calculus | 4
  or MATH 2560 | Multivariable Calculus | 4
  - MATH 2106 | Foundations of Mathematical Proof | 3
  - ISYE 3025 | Essentials of Engineering Economy | 1
  - Lab Science | 4

- **Major Requirements**

### Ethics Requirement

**Environmental Requirement**

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>ACCT 2101</td>
<td>Accounting I: Financial Accounting</td>
<td>3</td>
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<tr>
<td>or MGT 3000</td>
<td>Financial and Managerial Accounting</td>
<td>3</td>
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<tr>
<td>MATH 3012</td>
<td>Applied Combinatorics</td>
<td>3</td>
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<tr>
<td>MATH 3406</td>
<td>A Second Course in Linear Algebra</td>
<td>3</td>
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<tr>
<td>ISYE 2027</td>
<td>Probability with Applications</td>
<td>3</td>
</tr>
<tr>
<td>ISYE 3030</td>
<td>Basic Statistical Methods</td>
<td>3</td>
</tr>
<tr>
<td>ISYE 3133</td>
<td>Engineering Optimization</td>
<td>3</td>
</tr>
<tr>
<td>ISYE 3232</td>
<td>Stochastic Manufacturing and Service Systems</td>
<td>3</td>
</tr>
<tr>
<td>ISYE 3044</td>
<td>Simulation Analysis and Design</td>
<td>3</td>
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<tr>
<td>ISYE 4031</td>
<td>Regression and Forecasting</td>
<td>3</td>
</tr>
<tr>
<td>ISYE 4106</td>
<td>Senior Design</td>
<td>4</td>
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### Engineering Electives

Select one of the following: 3

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

Select at least 5 credits of the following: 10

### Group 1

- AE 2220 | Dynamics |
- AE 3450 | Thermodynamics and Compressible Flow |
- BMED 3100 | Systems Physiology |
- CHBE 2100 | Chemical Process Principles |
- CHBE 2130 | Chemical Engineering Thermodynamics I |
- 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 |
- CS 6505 | Computability, Algorithms, and Complexity |
- 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 3710 | Circuits and Electronics |
- ECE 3741 | Instrumentation and Electronics Lab |
- ECE 4606 | Wireless Communications |
Select two of the following:

- ISYE 8813 Special Topics in Operations Research (Must have title Math of Operations Research)
- MATH 4311 Advanced Optimization
- ISYE 4232 Advanced Stochastic Systems
- ISYE 6661 Linear Optimization
- ISYE 6662 Discrete Optimization

ISYE 6663 Nonlinear Optimization
ISYE 6664 Stochastic Optimization
ISYE 6761 Stochastic Processes I
ISYE 6412 Theoretical Statistics

Select two of the following:

- 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 3039 Methods of Quality Improvement
- ISYE 4034 Decision and Data Analytics
- ISYE 4045 Advanced Simulation
- ISYE 4111 Advanced Supply Chain Logistics
- ISYE 4134 Constraint Programming
- ISYE 4301 Supply Chain Economics
- ISYE 4311 Capital Investment Analysis
- ISYE 4501 Energy, Efficiency, and Sustainability
- ISYE 4803 Special Topics (Advanced Manufacturing)
- ISYE 4803 Special Topics (Facility Layout and Warehousing)
- ISYE 4803 Special Topics (Health Systems Engineering)
- ISYE 4803 Special Topics (Introduction to Machine Learning)
- ISYE 4803 Special Topics (Online Learn/Decision Making)
- ISYE 4803 Special Topics (Reliability Engineering)
- ISYE 4803 Special Topics (Systems Design for IEs)

**Free Electives**

Free Electives 11

**Total Credit Hours** 128

Pass-fail only allowed for Free Electives, Core IMPACTS Arts, Humanities & Ethics and the Social Sciences elective.

Students must achieve a minimum GPA of 3.3 in the BSIE Major Requirements to graduate (Math beyond Calculus, BSIE required courses and concentration electives).

1. Students must earn a C or better in all required MATH courses in the BSIE curriculum.
2. MATH 1564 is preferred, but not required.
3. Students may also complete MATH 1554 or MATH 1564 and MATH 2550 to satisfy math requirements. If MATH 1554 or MATH 1564/MATH 2550 combination is taken, then two hours from MATH 1554 may be used in Field of Study to give Field of Study 18 hours.
4. Minimum grade of B in MATH 2106 is required to pursue the Advanced Studies for OR & Stat Concentration.
5. Only one EAS course can be used toward ISYE Lab Science Requirements.
6. PSYC 1101 will satisfy the Ethics requirement.
7. 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.
Students must complete courses from two different eligible engineering elective subjects.

At most, one computing course (CS or CX) is allowed, including courses cross-listed with CS or CX courses.

In addition to the three-credit ECE requirement, take at least one additional credit from Group 1 and no more than four credits from Group 2.

To count toward the Engineering Elective Group 2 requirement, all Vertically-Integrated Projects (VIPS) courses must be approved by the ISyE Associate 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: A minimum of four of the five concentration courses must be ISYE courses. If ISYE 3106 Cornerstone Design is taken as a breadth elective, then it must be taken prior to ISYE 4106 Senior Design.

The 6000-level ISYE course options are preferred, but not required.

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