BACHELOR OF SCIENCE IN INDUSTRIAL ENGINEERING - ANALYTICS AND DATA SCIENCE

The principal strength of the academic program leading to the Bachelor of Science in Industrial Engineering (BS IE) is its blend of mathematics, physical sciences and business applications. The methodology foundation is built on probability, optimization, statistics, computing, and economics. The program features a unique concentration system that allows students to get a broad industrial engineering education and to specialize in areas such as

- Analytics and Data Science (p. 1).
- Economic and Financial Systems (http://catalog.gatech.edu/programs/industrial-engineering-economic-financial-systems-bs),
- Operations Research (http://catalog.gatech.edu/programs/industrial-engineering-operations-research-bs),
- Quality and Statistics (http://catalog.gatech.edu/programs/industrial-engineering-quality-statistics-bs),
- Supply Chain Engineering (http://catalog.gatech.edu/programs/industrial-engineering-supply-chain-engineering-bs), and
- General Industrial Engineering (http://catalog.gatech.edu/programs/industrial-engineering-general-bs).

This blend produces the flexibility that is inherent in the field of industrial and systems engineering, and that affords BSIE graduates a wide array of career options. Our graduates are constantly looking for ways to make anything in life work better, more efficiently and more productively.

Program Educational Objectives

The Stewart School of Industrial & Systems Engineering expects our graduates (in 3 to 6 years):

- to become successful Industrial Engineers;
- to take leadership in their endeavors;
- to be self-learners and starters;
- to succeed in professional and educational advancement.

Any HUM (http://www.catalog.gatech.edu/academics/undergraduate/core-curriculum/core-area-c) 6

Core D - Science, Math, & Technology
PHYS 2211 Introductory Physics I 4
PHYS 2212 Introductory Physics II 4
MATH 1551 Differential Calculus 1 2
MATH 1553 Introduction to Linear Algebra 1,2 2

Core E - Social Sciences
Select one of the following: 3
HIST 2111 The United States to 1877
HIST 2112 The United States since 1877
INTA 1200 American Government in Comparative Perspective
POL 1101 Government of the United States
PUBP 3000 American Constitutional Issues
ECON 2100 Economic Analysis and Policy Problems 3
PSYC 1101 General Psychology 3
Any SS (http://www.catalog.gatech.edu/academics/undergraduate/core-curriculum/core-area-e) 3

Core F - Courses Related to Major
CS 2316 Data Manipulation for Science and Industry 3
CS 4400 Introduction to Database Systems 3
MATH 2551 Multivariable Calculus 1,2 4
Lab Science 3 8

Ethics Requirement (http://www.catalog.gatech.edu/academics/undergraduate/core-curriculum/ethics) 4
Environmental Requirement 5

Major Requirements
ACCT 2101 Accounting I: Financial Accounting 3
or MGT 300 Accounting for Decision Making
MATH 2603 Introduction to Discrete Mathematics 1 4
ISYE 2027 Probability with Applications 3
ISYE 3030 Basic Statistical Methods 3
ISYE 3025 Essentials of Engineering Economy 1
ISYE 3133 Engineering Optimization 3
ISYE 3232 Stochastic Manufacturing and Service Systems 3
ISYE 3044 Simulation Analysis and Design 3
ISYE 4031 Regression and Forecasting 3
ISYE 4106 Senior Design 4

Engineering Electives 6,7
Select one of the following: 3
ECE 2020 Digital System Design
ECE 2026 Introduction to Signal Processing
ECE 3710 Circuits and Electronics & ECE 3741 and Instrumentation and Electronics Lab

Select 6 credits of the following: 8
Group 1
AE 2220 Dynamics
AE 3450 Thermodynamics and Compressible Flow
BMED 2210 Conservation Principles in Biomedical Engineering
BMED 3100 Systems Physiology

Wellness
APPH 1040 Scientific Foundations of Health 2
or APPH 10 The Science of Physical Activity and Health

Core A - Essential Skills
ENGL 1101 English Composition I 3
ENGL 1102 English Composition II 3
MATH 1552 Integral Calculus 1 4

Core B - Institutional Options
CS 1301 Introduction to Computing 3

Core C - Humanities

Bachelor of Science in Industrial Engineering - Analytics and Data Science
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>CHBE 2100</td>
<td>Chemical Process Principles</td>
</tr>
<tr>
<td>CHBE 2110</td>
<td>Chemical Engineering Thermodynamics I</td>
</tr>
<tr>
<td>CHBE 4763</td>
<td>Pulping and Chemical Recovery</td>
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<tr>
<td>CHBE 4764</td>
<td>Bleaching and Papermaking</td>
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<tr>
<td>COE 2001</td>
<td>Statics</td>
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<td>COE 3001</td>
<td>Mechanics of Deformable Bodies</td>
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<td>CEE 2040</td>
<td>Dynamics</td>
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<td>CEE 2300</td>
<td>Environmental Engineering Principles</td>
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<td>CEE 3010</td>
<td>Geomatics</td>
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<td>CEE 4100</td>
<td>Construction Engineering and Management</td>
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<td>CEE 4300</td>
<td>Environmental Engineering Systems</td>
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<tr>
<td>CEE 4600</td>
<td>Transportation Planning, Operations, and Design</td>
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<tr>
<td>CS 2110</td>
<td>Computer Organization and Programming</td>
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<td>CS 4641</td>
<td>Machine Learning</td>
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<tr>
<td>CX 4010</td>
<td>Computational Problem Solving for Scientists and Engineers</td>
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<td>CX 4240</td>
<td>Introduction to Computing for Data Analysis</td>
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<td>CX 4242</td>
<td>Data and Visual Analytics</td>
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<td>ECE 2020</td>
<td>Digital System Design</td>
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<td>ECE 2026</td>
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<td>ECE 2040</td>
<td>Circuit Analysis</td>
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<td>ECE 3035</td>
<td>Mechanisms for Computing Systems</td>
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<td>ECE 3076</td>
<td>Computer Communications</td>
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<td>ECE 3090</td>
<td>Software Fundamentals for Engineering Systems</td>
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<td>ECE 3710</td>
<td>Circuits and Electronics</td>
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<td>ECE 3741</td>
<td>Instrumentation and Electronics Lab</td>
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<td>ECE 4606</td>
<td>Wireless Communications</td>
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<td>ME 2202</td>
<td>Dynamics of Rigid Bodies</td>
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<td>ME 3015</td>
<td>System Dynamics and Control</td>
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<td>ME 3322</td>
<td>Thermodynamics</td>
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<tr>
<td>ME 3720</td>
<td>Introduction to Fluid and Thermal Engineering</td>
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<tr>
<td>MSE 2001</td>
<td>Principles and Applications of Engineering Materials</td>
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<td>MSE 3012</td>
<td>Thermal and Transport Properties of Materials</td>
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<tr>
<td>MSE 3015</td>
<td>Electrical, Optical and Magnetic Properties</td>
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<tr>
<td>NRE 3301</td>
<td>Radiation Physics</td>
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**Analytics and Data Science Concentration**

Select four from the two groups below:

Select 1-2 from Group A:
- ISYE 4133 Advanced Optimization
- ISYE 4232 Advanced Stochastic Systems
- ISYE 4045 Advanced Simulation
- ISYE 4134 Constraint Programming

Select 2-3 from 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 4641 Machine Learning
- ISYE 4803 Special Topics (On-Line Learning and Decision Making)

Select 1 from the following:
- 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 4111 Advanced Supply Chain Logistics
- ISYE 4301 Supply Chain Economics
- ISYE 4311 Capital Investment Analysis
- ISYE 4803 Special Topics (Additive Manufacturing)
- ISYE 4803 Special Topics (Advanced Manufacturing)
- ISYE 4803 Special Topics (Decision Analysis and Risk Modeling)
- ISYE 4803 Special Topics (Design of Experiments)
- ISYE 4803 Special Topics (Facility Layout and Warehousing)
- ISYE 4803 Special Topics (Financial Data Analysis)
- ISYE 4803 Special Topics (Health Systems Engineering)
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.
10. Students must complete five concentration courses: one or two from Group A, two or three from Group B, and one as listed from any other concentration. A minimum of four of the five concentration courses must be ISYE courses.
11. MATH 1113, MGT 2250, ISYE 3770, and PHYS 2XXX (AP credit) not allowed.

### Cooperative Plan
The Co-op Program enhances the student's education, employability and earnings potential. For more details, visit co-op pages from Georgia Tech’s co-op Website (http://www.coop.gatech.edu).