### Industrial and Systems Engineering

#### Freshman Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>Math 1371 Calculus I (placement into course, or pre-req)</td>
</tr>
<tr>
<td></td>
<td>Phys 1301W Intro Physics I (&amp;Math 1371)</td>
</tr>
<tr>
<td></td>
<td>Liberal Education course (Biol 1009 recommended)</td>
</tr>
<tr>
<td></td>
<td>Liberal Education course or Writ 1301</td>
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<tr>
<td></td>
<td>CSE 1001: 1st Yr Experience</td>
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#### Sophomore Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Courses</th>
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<tbody>
<tr>
<td>Fall</td>
<td>Math 1372 Calculus II (1371)</td>
</tr>
<tr>
<td></td>
<td>Phys 1302W Intro Physics II (&amp;Math 1372)</td>
</tr>
<tr>
<td></td>
<td>Chem 1061/65 Chem Princ I (placement into course or 1015)</td>
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</tbody>
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#### Junior Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Courses</th>
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<tbody>
<tr>
<td>Fall</td>
<td>IE 3011 Optimization I (UD, Math 2373, 2374)</td>
</tr>
<tr>
<td></td>
<td>Mkrg 3001 Princ. of Marketing (Econ 1101)</td>
</tr>
<tr>
<td></td>
<td>Technical Elective I</td>
</tr>
<tr>
<td></td>
<td>Liberal Education course</td>
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#### Senior Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Courses</th>
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<tbody>
<tr>
<td>Fall</td>
<td>IE 4011 Stochastic Models (UD, Math 2373, 2374, IE 3521)</td>
</tr>
<tr>
<td></td>
<td>IE 4551 Prod/Inventory Ctrl (UD, 1101, 2021, 3011, IE 3521)</td>
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<tr>
<td></td>
<td>IE 3553 Simulation (UD, CSci 1113 or 1133, IE 3521)</td>
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### About This Plan

- This plan is not a contract. Curriculum can change.
- Shaded courses are only offered in the indicated semester.
- Course pre-requisites and co-requisites (designated by &) are listed below the course number and title. UD requires admission to the major prior to enrollment.
- Students can take either the CSE-only or University-wide versions of the math courses (Math 1371/1271, 1372/1272, 2373/2243, 2374/2263).
- Double boxed courses are required for application to this major.
- Biol/Lab must be taken A-F to fulfill Natural Science requirement.
- Chemical Principles lab (1065) must be taken with the lecture (1061).
- Liberal Education and Writing requirements with an (*) will be fulfilled by taking courses required for this major.

### Applying to your Major

Students who have completed the required courses for admission to this major and have a 3.2 UM-TC technical GPA at the end of the fall semester will be guaranteed admission. All other students who have completed the required courses will be considered for admission on a space-available basis. Admission following the spring semester is only based on space availability. The major application database is available at z.umn.edu/csemajorapp.

### Department Contact Information

- Website: www.isye.umn.edu
- Main Phone: 612-624-1582
- Main Office: 130 Mechanical Engineering
- Director of Undergraduate Studies: Prof. Lisa Miller
- Email: info@isye.umn.edu

### Writing Requirements

- University Writing: Wrt 1301/1401 or equivalent
- Writing Intensive (WI): Two: 1xxx or 2xxx level **
  One: 3/4/5xxx level (in major)*
  One: 3/4/5xxx level (any dept.)*

### Liberal Education

<table>
<thead>
<tr>
<th>CORES</th>
<th>THEMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bio</td>
<td>Civ</td>
</tr>
<tr>
<td>Phy*</td>
<td>DSJ</td>
</tr>
<tr>
<td>HIS</td>
<td>Env</td>
</tr>
<tr>
<td>SocS*</td>
<td>GP*</td>
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<tr>
<td>Lit</td>
<td>TS</td>
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<tr>
<td>AH</td>
<td></td>
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<tr>
<td>Mth*</td>
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</tbody>
</table>

### Total Credits Needed for Degree: 123
What can I do with a major in industrial and system engineering?

Industrial engineers determine the most effective ways to make a product or produce a service using the basic factors of production: people, machines, materials, information, and energy. They are concerned with increasing productivity through the management of people, methods of business organization, and technology. To maximize efficiency, industrial engineers study product requirements carefully and then design manufacturing and information systems to meet those requirements with the help of mathematical methods and models. They develop management control systems to aid in financial planning and cost analysis, and they design production planning and control systems to coordinate activities and ensure product quality.

Industrial engineers also design or improve systems for the physical distribution of goods and services and determine the most efficient plant locations. They develop wage and salary administration systems and job evaluation programs. Many industrial engineers move into management positions because the work is closely related to the work of managers. Generally, industrial engineers are more widely distributed among industries than other engineers.

**Employers (sample listing)**

- Arkema Inc.
- Dell
- Coca Cola
- NASA
- Mayo Clinic
- Federal Aviation Administration
- Target Corp.
- Lockheed Martin
- Microsoft
- Pentair, Inc.
- Ingersoll Rand
- Emerson Process Management
- FM Global
- Bemis
- Hormel Food Corporation
- St. Jude Medical
- Starkey Hearing Technologies
- Oshkosh Corp.
- Daikin Applied
- Honeywell
- SICK, Inc.

**Industries (sample listing)**

- Aerospace and airplanes
- Aluminum and steel
- Banking/finance/accounting
- Construction
- Electronics assembly
- Energy
- Entertainment
- Forestry and logging
- Consulting
- Insurance
- Materials testing
- Retail
- Military
- Mining
- Oil and gas
- Plastics and forming
- Medical services/healthcare
- Ship building
- State and federal government
- Transportation

**Positions (sample listing)**

**Quality Engineer:** Tests and inspects procedures using metrology, statistics, and cost concepts and techniques. Quality engineers diagnose and correct improper quality control practices.

**Operations Engineer:** Concerned with the flow of materials and information, using statistics to evaluate the effectiveness of manufacturing, supply chain, and service systems.

**Logistics Engineer:** Deals with purchasing, transporting, storing, distributing, and warehousing raw materials, unfinished works-in-progress, and finished goods and products.

**Materials Management Engineer:** Assists organizations in managing inventory by solving control, warehousing, and transportation issues.

**Project Engineer:** Plans, directs, and coordinates activities of company projects.

**Sales Engineer:** Contacts customers and makes sales presentations to demonstrate how products or services can fulfill particular needs.

**Systems Engineer:** Performs the requirements, analysis, and definition of the overall system and subsystem.

**Health and Safety Engineer:** Promotes worksite and product safety by applying knowledge of industrial processes and mechanical, chemical, and psychological principles. Health and safety engineers anticipate, recognize, and evaluate hazardous conditions as well as develop hazard control methods.

**Manufacturing Engineer:** Plans the tooling, construction, and assembly of the product as dictated by the design specifications.

*Some positions may require an advanced degree.*