## Industrial and Systems Engineering

### Freshman Year

**Fall Semester**
- Math 1371 Calculus I (placement into course, or pre-req) **4**
- Phys 1301W Intro Physics I (&Math 1371) **4**
- CSE 1001 1st Yr Experience **1**
- Liberal Education course (recommend Biol 1009) **3/4**
- Liberal Education course or Writ 1301 **3/4**

**Spring Semester**
- Math 1372 Calculus II (1371) **4**
- Phys 1302W Intro Physics II (1301, &Math 1372) **4**
- Chem 1065 Chem Princ I Lab (&1061) **1**
- Chem 1061 Chem Princ I (placement into course or 1015, &1065) **3**
- Liberal Education course or Writ 1301 **3/4**

### Sophomore Year

**Fall Semester**
- Math 1372 Calculus II (1371) **4**
- Chem 1061 Chem Princ I Lab (&1061) **1**
- Liberal Education course or Writ 1301 **3/4**

**Spring Semester**
- Math 2373 Lin Alg/Diff Eq (1372) **4**
- IE 1101 Foundations of ISyE (Math 1372, CSE) **4**
- IE 2021 Engineering Econ (Math 1372, CSE) **4**
- Chem 1065 Chem Princ I Lab (&1061) **1**
- Chem 1061 Chem Princ I (placement into course or 1015, &1065) **3**
- Liberal Education course or Writ 1301 **3/4**

### Junior Year

**Fall Semester**
- IE 3011 Optimization I (UD, Math 2374, 2373) **4**
- Mktg 3001 Princ of Marketing (Econ 1101) **3**
- Technical Elective I **3/4**
- Liberal Education course **3/4**

**Spring Semester**
- IE 3522 Qual Eng & Reliab (UD, Math 2373, 2374, 3521) **4**
- IE 3012 Optimization II (UD, Math 3011) **4**
- IE 4011 Stochastic Models (UD, Math 2373, 2374, 3521) **4**
- IE 4551 Prod/Inventory Ctrl (UD, 1101, 2021, 3011, 3521) **4**

### Senior Year

**Fall Semester**
- IE 3553 Simulation (UD, CSci 1133, 3521) **4**
- IE 4511 Human Factors (ISyE senior) **4**
- IE 4541W Project Mgmt (ISyE senior) **4**
- Technical Elective II **3/4**

**Spring Semester**
- IE 4041 W Senior Design (UD, 3012, 3522, 3533, 4011, 4511, 4551, 4541) **4**
- Technical Elective III **3/4**
- Technical Elective IV **3/4**
- Technical Elective V **3/4**

### About This Plan

- This plan is not a contract. Curriculum can change. The APAS is the official method for tracking completion of University degree requirements.
- 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. Upper Division (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, 2373/2263).
- Biological Science w/lab must be taken A-F to fulfill Natural Science requirement.

### Applying to your Major

Students who have completed the required courses for admission to this major (indicated with double boxes on plan) 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.

### Total Credits Needed for Degree: 122
What can I do with a major in...
Industrial and Systems Engineering

ACTIVITIES INDUSTRIAL AND SYSTEMS ENGINEERING MAJORS DO:
Industrial engineers determine the most effective ways to use the basic factors of production—people, machines, materials, information, and energy—to make a product or provide a service. They are concerned primarily 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. Industrial engineers 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.

INDUSTRIES INDUSTRIAL AND SYSTEMS ENGINEERING MAJORS WORK IN (SAMPLE LISTING):
Construction  Aerospace  Aluminum and steel  Banking/finance/accounting
Ceramics  Electronics assembly  Forestry and logging  Materials testing
Energy  Entertainment  Mining  Consulting
Insurance  Military  Retail  Oil and gas
Plastics and forming  Medical services/healthcare  Transportation  Ship construction
State and federal government

EMPLOYERS WHO HIRE INDUSTRIAL AND SYSTEMS ENGINEERING MAJORS (SAMPLE LISTING):
Arkema Inc.  Dell  Coca-Cola  SICK Inc.
NASA  Mayo Clinic  Federal Aviation Administration  Honeywell
Target Corporation  Lockheed Martin  The Schwan Food Company  Unison Comfort Tech
Pentair Inc.  Ingersoll Rand  Emerson Process Management  Microsoft Corporation
Polaris Industries  Starkey Hearing Technologies  Hormel Food Corporation  St. Jude Medical
Bemis  Boston Scientific  Cognizant Tech. Solutions  HUSCO International

TYPES OF POSITIONS FOR INDUSTRIAL AND SYSTEMS ENGINEERING MAJORS (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 engineers: 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 their particular needs.
• Systems engineer: Performs the requirements, analysis, and definition of the overall system and its subsystems.
• Manufacturing engineer: Plans the tooling, construction, and assembly of the product as dictated by the design specifications.

**Some of these positions may require an advanced degree.**