

# DEPARTMENT OF INDUSTRIAL AND SYSTEMS ENGINEERING

651 SCIENCE AND ENGINEERING BUILDING

(248) 370-2989  
FAX: (248) 370-2699  
[www.oakland.edu/secs/isdept](http://www.oakland.edu/secs/isdept)

**Interim Chairperson:** *Michael P. Polis*

**Professors:** *Michael P. Polis, Robert P. Van Til*

**Associate Professors:** *Patrick Dessert, Barbara Oakley, Sankar Sengupta, Christian C. Wagner*

**Adjunct Assistant Professor:** *Patrick Hillberg*

## Advisory Board

The Industrial System Engineering External Advisory and Development Board will assist the department in enhancing its educational and research programs and ensuring their relevance to current and emerging technological needs. Board members are:

*Patrick Hillberg, Ph.D., Senior Manufacturing Consultant, Dassault Systems*

*Greggory R. Garrett, Vice President, Strategy & Business Development, T-Systems North America*

*Jeanne E. VanBuren, Senior Manager, Advanced Manufacturing Engineering, Chrysler LLC*

## Mission

The Department of Industrial and Systems Engineering carries out the mission of the School of Engineering and Computer Science by offering:

- an undergraduate major in Industrial and Systems Engineering;
- a master's program in Industrial and Systems Engineering;
- a master's program in Engineering Management with the cooperation of the School of Business Administration.

Also, the department actively participates in the school-wide doctoral program in Systems Engineering.

## Major in industrial and systems engineering

Industrial and systems engineering is a discipline with roots in a diverse spectrum of engineering fields including the understanding and application of techniques for work measurement, ergonomics, optimization, facility layout, engineering economic analysis, and life cycle processes. The Industrial and Systems Engineering Department applied this diversity in developing an industrial and systems engineering program that focuses on the application of these skills into a particular domain. Typical domains addressed by industrial and systems engineering in the modern world include product design, manufacturing, health care, logistics, service and entertainment industries, and racing. The coordination of engineering tasks and the assembly of a complex array of human and engineering subsystems into a holistic solution are typical of the industrial and systems approach to problem solving and design.

The program emphasizes the important role of the computer in system design and analysis.

## Program Educational Objectives

The objectives of Industrial and Systems Engineering programs are to produce graduates who will:

- design complex human and engineering systems composed of diverse components that interact in prescribed ways to meet specified objectives;

- use laboratory (instrumentation, testing, prototyping, etc.) and/or computer skills for engineering analysis and design;
- adapt and contribute to new technologies and methods, and use these in engineering design; if desired, pursue successfully graduate study in industrial and systems engineering or related disciplines;
- function successfully in local, national or global technology-driven industries;
- exhibit the willingness and flexibility to seek, accept and be effective in a variety of roles, such as developing and implementing solutions to problems with technical and non-technical elements, serving as a team member and leading others;
- communicate effectively in both written and verbal forms;
- exhibit high standard of personal and professional integrity and ethical responsibility.

To earn the degree of Bachelor of Science in Engineering with a major in industrial and systems engineering, students must complete a minimum of 128 credits, satisfy a writing requirement (see Undergraduate degree requirements) and meet the following requirements:

	<b>Credits</b>
<b>General education (excluding mathematics and science)</b>	24
<b>Mathematics and science</b>	
MTH 154-155      Calculus	8
MTH 254            Multivariable Calculus	4
APM 255            Introduction to Differential Equations with Matrix Algebra	4
CHM 143            Chemical Principles (or CHM 157 or 162)	4
PHY 151-152      Introductory Physics	8
Approved science elective**	<u>4</u>
	32
<b>Engineering core</b>	
EGR 120            Computer Graphics and CAD	1
EGR 141            Computer Problem Solving in Engineering and Computer Science	4
EGR 240            Introduction to Electrical and Computer Engineering	4
EGR 250            Introduction to Thermal Engineering	4
EGR 260            Introduction to Industrial and Systems Engineering	4
EGR 280            Design and Analysis of Electromechanical Systems	<u>4</u>
	21
<b>Professional subjects</b>	
<b>Required</b>	
ISE 318            Engineering Statistics and Economic Analysis	4
ISE 330            Engineering Operations Research	4
ISE 341            Work Methods and Ergonomics	4
ISE 469            Computer Simulation of Discrete Event Systems	4
ISE 480            E-Commerce and ERP	4
ISE 483            Production Systems and Workflow Analysis	4
ISE 485            Statistical Quality Analysis	4
ISE 487            Foundations of Systems Engineering I	4
ISE 484            Flexible and Lean Manufacturing Systems	4
ISE 491            Senior Design	<u>4</u>
	40

Select 7-8 credits from professional electives below, at least one course from group A

Group A:		
ISE 422	Robotic Systems (4)	
ISE 430	Engineering Operations Research – Stochastic Models (4)	
ISE 441	Human Factors (4)	
ISE 464	Design for Manufacturing and Assembly Analysis (4)	
ISE 488	Foundations of Systems Engineering II (4)	
ME 474	Manufacturing Processes (4)	
Group B:		
ISE 490**	Senior Project (2-4)	
ISE 494**	Independent Study (2-4)	
ME 308	Computer-Aided Design (3)	
ME 372	Properties of Materials (4)	
ECE 463	Foundations of Computer-Aided Design (4)	
OSH 331	Occupational Safety I: Engineering and Technology (3)	
		7-8
<b>Free Electives</b> (may be used to satisfy writing requirement)		3-4
For limitations on free electives see Policies on electives.		
Total		128

*\*Students who have an explicit interest in broadening their knowledge in a specific area of math or science should select an elective from the following list of additional approved math or science electives: APM 332, APM 357, APM 433, APM 434, APM 455, APM 463, APM 477, BIO 111, BIO 341, BIO 351, BIO 443, CHM 158, CHM 163, MTH 256, MTH 352, PHY 325, PHY 326, PHY 331, PHY 361, PHY 366, PHY 371, PHY 431, PHY 445 or other math or science courses with approval by petition to the SECS Committee on Academic Standing. Students are encouraged to meet with an SECS undergraduate advisor before registering for an approved math or science elective.*

*\*\*Needs prior permission of the chairperson of the Department of Industrial and Systems Engineering.*

### Economics requirement

In addition to the requirements stated above, industrial and systems engineering students must fulfill the economics requirement. This may be met by completion of ECN 150, 200, 201 or 210. However ECN 201 is not part of the general education requirement.

### General business

Students may wish to augment their degree with a minor in general business. This may be done by completing 19-23 credits specified by the School of Business Administration (see *Minors* in the Business Administration portion of this catalog). Credits from the minor may be used to satisfy the social science general education requirement, the economics requirement, and the free elective requirement.

### Performance requirements

In addition to all previously stated requirements, satisfactory completion of the industrial and systems engineering program requires a grade point average of at least 2.00 within each of the following three groups of courses: mathematics and science, engineering core and professional subjects. Within professional subjects, at most two grades below 2.0 are permitted; at most two different courses may be repeated and a total of three repeat attempts is permitted.

### **Sample industrial and systems engineering schedule**

Students entering the School of Engineering and Computer Science with the required background may follow a schedule such as the one indicated below. However, students will need additional time to complete the program if they do not have the required background upon entrance to the program.

**Freshman year** —fall semester: EGR 120, MTH 154, CHM 143, EGR 141, general education; 17 credits, winter semester: MTH 155, PHY 151, EGR 240, general education; 16 credits

**Sophomore year** —fall semester: —MTH 254, PHY 152, EGR 250, general education; 16 credits, winter semester: APM 255, EGR 260, EGR 280, general education; 16 credits

**Junior year** —fall semester: ISE 318, ISE 341, general education; science elective; 16 credits, winter semester: ISE 330, ISE 487, ISE 469, general education; 16 credits

**Senior year** —fall semester: ISE 480, ISE 483, professional elective; free elective, 15 credits, winter semester: ISE 485, ISE 491, ISE 484, professional elective, 16 credits