

INDUSTRIAL AND SYSTEMS ENGINEERING

Industrial and systems engineering deals with the optimization of complex processes or systems. It typically focuses on the development, improvement, implementation and evaluation of integrated systems of people, money, knowledge, information, equipment, energy, materials, etc. Industrial and systems engineering often relies on, among others, the analysis and synthesis of mathematical, physical, social sciences, and the principles and methods of engineering design to specify, predict and evaluate results from such systems or processes.

About this Program

- **College:** Herbert Wertheim College of Engineering
- **Degree:** Bachelor of Science in Industrial and Systems Engineering
- **Credits for Degree:** 125
- **Additional Information**
- **Related Industrial and Systems Engineering Programs**

To graduate with this major, students must complete all university, college, and major requirements.

Industrial and systems engineering prepares students for industrial practice in product design, process design, plant operation, production control, quality control, facilities planning, work system analysis and evaluation, and economic analysis of operational systems.

Students are prepared to use engineering principles to solve problems that require a quantitative basis for decision making and the application of economics, operations research, statistics, mathematics and engineering analysis, with dependence on the computer. The curriculum also provides the preparation necessary for graduate study.

Admission Requirements

The minimum requirements for admission to the undergraduate program are an overall 2.5 grade point average and a 2.5 grade point average in the designated pre-engineering technical courses. Students who have not met these requirements at 60 credits may be admitted on probation with successful petition.

Department Requirements

Students must complete successfully every required course with minimum grades of C in at most three attempts. Grades of H, I, N, U, and W are considered attempts. Registration canceled for non-payment is also considered an attempt.

Educational Objectives

The objective of the industrial and systems engineering program is to produce graduates who:

- will be successful professionals in industrial and systems engineering or other disciplines
- can acquire advanced knowledge through continuing education or advanced degree programs
- can become active leaders in their profession and/or community

Mission

The mission of the undergraduate program is to provide a top quality, state-of-the-art education in industrial and systems engineering and to foster leading-edge instruction. The program seeks national recognition by peer institutions and key employers of industrial and systems engineering graduates.

Related Industrial and Systems Engineering Programs

- Combined Degree

Critical Tracking

Critical Tracking records each student's progress in courses that are required for entry to each major. Please note the critical-tracking requirements below on a per-semester basis.

Equivalent critical-tracking courses as determined by the State of Florida Common Course Prerequisites may be used for transfer students.

Semester 1

- Complete 1 of 8 critical-tracking courses with a minimum grade of C within two attempts: COP 2271 (VB.NET), ESI 4327C, MAC 2311, MAC 2312, MAC 2313, MAP 2302, PHY 2048, PHY 2049
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 2

- Complete 2 additional critical-tracking course with a minimum grades of C within two attempts
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 3

- Complete 2 additional critical-tracking courses with minimum grades of C within two attempts
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 4

- Complete 2 additional critical-tracking courses with minimum grades of C within two attempts
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 5

- Complete 1 additional critical-tracking course with a minimum grade of C within two attempts
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Model Semester Plan

To remain on track, students must complete the appropriate critical-tracking courses, which appear in bold. These courses must be completed by the terms as listed above in the Critical Tracking criteria.

This semester plan represents an example progression through the major. Actual courses and course order may be different depending on the student's academic record and scheduling availability of courses. Prerequisites still apply.

Course	Title	Credits
Semester One		
Select one:		3
CHM 2045	General Chemistry 1 (Gen Ed Physical Sciences) ¹	
CHM 2095	Chemistry for Engineers 1 ¹	
CHM 2045L	General Chemistry 1 Laboratory (Gen Ed Physical Sciences) ¹	1
ENC 1101	Expository and Argumentative Writing (State Core Gen Ed Composition; Writing Requirement: 6,000 words) ¹	3
MAC 2311	Analytic Geometry and Calculus 1 (Critical Tracking ; State Core Gen Ed Mathematics)	4
State Core Gen Ed Humanities with Diversity or International, Writing Requirement: 6,000 words ^{1,2}		3
IUF 1000	What is the Good Life (Gen Ed Humanities; must be completed in semester one or two) ¹	3
Credits		17
Semester Two		
ECO 2013	Principles of Macroeconomics (State Core Gen Ed Social and Behavioral Sciences) ^{1,2}	4
EGS 4034	Engineering Ethics and Professionalism ¹	1
Select one:		3
Gen Ed Humanities with Diversity or International, Writing Requirement: 6,000 words ¹		
Gen Ed Social and Behavioral Sciences with Diversity or International; Writing Requirement: 6,000 words ^{1,2}		
PHY 2048	Physics with Calculus 1 (Critical Tracking ; Gen Ed Physical Sciences) ³	3
PHY 2048L	Laboratory for Physics with Calculus 1 (Gen Ed Physical Sciences) ^{1,3}	1
MAC 2312	Analytic Geometry and Calculus 2 (Critical Tracking ; Gen Ed Mathematics)	4
Credits		16
Semester Three		
ECO 2023	Principles of Microeconomics (Gen Ed Social and Behavioral Sciences) ^{1,2}	4
MAC 2313	Analytic Geometry and Calculus 3 (Critical Tracking ; Gen Ed Mathematics)	4
MAP 2302	Elementary Differential Equations (Critical Tracking)	3
PHY 2049	Physics with Calculus 2 (Critical Tracking)	3
PHY 2049L	Laboratory for Physics with Calculus 2 ¹	1
Credits		15
Semester Four		
COP 2271	Computer Programming for Engineers (Critical Tracking ; VB.NET)	2
COP 2271L	Computer Programming for Engineers Laboratory (VB.NET) ¹	1
EGM 2511	Engineering Mechanics: Statics ¹	3
EMA 3010	Materials ¹	3
ENC 3246	Professional Communication for Engineers (Gen Ed Composition; Writing Requirement: 6,000 words) ¹	3
ESI 4327C	Matrix and Numerical Methods in Systems Engineering (Critical Tracking)	4
Credits		16

Semester Five		
Select one:		3
EML 2023	Computer Aided Graphics and Design ¹	
CGN 2328	Technical Drawing and Visualization ¹	
EIN 4354	Engineering Economy ¹	3
ESI 4312	Operations Research 1 ¹	4
STA 4321	Introduction to Probability ¹	3
Technical elective ⁴		3
Credits		16

Semester Six		
EIN 4360C	Facility Planning and Work Design ¹	4
ESI 4313	Operations Research 2 ¹	4
ESI 4356	Decision Support Systems for Industrial and Systems Engineers ¹	4
STA 4322	Introduction to Statistics Theory ¹	3
Credits		15

Semester Seven		
EIN 4343	Inventory and Supply Chain Systems ¹	3
EML 3100	Thermodynamics ¹	3
ESI 4221C	Industrial Quality Control ¹	3
ESI 4523	Industrial Systems Simulation ¹	3
Financial accounting course ¹		3
Credits		15

Semester Eight		
EEL 3003	Elements of Electrical Engineering ¹	3
EIN 4335	Senior Design Project ^{1,5}	3
EIN 4451	Lean Production Systems ¹	3
ESI 4357	Web-Based Decision Support Systems for Industrial and Systems Engineers ¹	4
Technical elective ⁴		2
Credits		15
Total Credits		125

- Minimum grade of C required. A C- will not satisfy this requirement.
- The curriculum requires the completion of both the Diversity (D) component and the International (N) component.
- Students with deficient backgrounds in physics should first take a lower-level course such as PHY 2020. After successful remediation, they can begin the physics sequence: PHY 2048/PHY 2048L and PHY 2049/PHY 2049L.
- The curriculum requires five technical elective credits. Students should choose technical electives that are related to one another and provide expertise in an ISE concentration area. Several minors provide such concentrations; information is available in 368 Weil.
- As an alternative, students can participate in the Integrated Product and Process Design (IPPD) program. Multidisciplinary teams of engineering students in this program work closely with a liaison engineer to design a new product or process for an industry sponsor. The program requires students to take, typically in their senior year, a sequence of two 3-credit courses, EIN 4912 in fall and EIN 4913 in spring. The former is a course approved for a technical elective and the latter can replace EIN 4335.

Fundamentals of Engineering Exam Preparation

Approximately 10 percent of the members of the Institute of Industrial Engineers pursue a professional engineer (PE) license. A PE license is especially desirable for engineers who want to start their own businesses. The industrial and systems engineering curriculum does not require certain courses that are necessary for the Fundamentals of

Engineering (FE) exam (also known as the Engineer Intern exam). The latter is also a prerequisite for pursuing professional engineer license.

Students preparing for the FE exam should choose a set of technical electives that properly prepare them for this exam, such as EGM 3520 and EGM 3400 / EGM 3401.

Academic Learning Compact

Industrial and systems engineering prepares students for industrial practice in product design, process design, plant operation, production control, quality control, facilities planning, work system analysis and evaluation and economic analysis of operational systems. Students will be prepared to use engineering principles to solve problems that require a quantitative basis for decision making and the application of economics, operations research, statistics, mathematics and engineering analysis, with dependence on the computer.

Accredited by the Engineering Accreditation Commission of ABET.

Before Graduating Students Must

- Pass an assessment by two or more faculty and/or industry practitioners of performance on a major design experience.
- Pass assessment in two courses of individual assignments targeted to each learning outcome. Assessment will be provided by the instructor of the course according to department standards.
- Complete an exit interview in your final semester.
- Complete requirements for the baccalaureate degree, as determined by faculty.

Students in the Major Will Learn to

Student Learning Outcomes (SLOs)

Content

1. Apply knowledge of mathematics, science and engineering principles to industrial and systems engineering problems.
2. Design and conduct experiments relevant to industrial and systems engineering processes and problems, as well as to analyze and interpret the data.

Critical Thinking

3. Design industrial engineering decision support systems and manufacturing/service system processes to meet desired needs within realistic economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability constraints.

Communication

4. Communicate technical information effectively in speech and in writing to other industrial engineers and managers.

Curriculum Map

I = Introduced; R = Reinforced; A = Assessed

Courses	SLO 1	SLO 2	SLO 3	SLO 4
COP 2271 and COP 2271L	I			
EIN 3101C				I
EIN 3314C	R	R	R	R
EIN 4321	R	R	R	
EIN 4335	A	A	A	A

EIN 4343	R		R	
EIN 4354	I			
EIN 4401	R		R	
EIN 4905	R	I	R	R
ESI 4221C	R	I	R	R
ESI 4312 and ESI 4313	I		I	
ESI 4327C	I			
ESI 4356 and ESI 4357	A	A	A	A
STA 4321 and STA 4322				

Assessment Types

- Instructor's outcome scorecards
- Senior design project evaluations
- Additional assessments include:
 - Exit interviews
 - Co-op/internship evaluations
 - Alumni survey