# INDUSTRIAL AND SYSTEMS ENGINEERING

Not all courses are offered every semester. Refer to the schedule of courses for each term's specific offerings.
More Info (https://one.uf.edu/soc/)

*Unless otherwise indicated in the course description, all courses at the University of Florida are taught in English, with the exception of specific foreign language courses.*

## Department Information

The Department of Industrial and Systems Engineering strives to be a resource for comprehensive ISE education and research training; a department with research thrusts and coursework covering a breadth of disciplines; a department making use of advanced computing technology, cutting-edge programming languages, social media, data mining, AI, etc. to best support needs, interests, and training of students.
**Website (https://www.ise.ufl.edu/)**

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### Curriculum

- Combination Degrees
- Industrial and Systems Engineering

## Courses

**COP 2271 Computer Programming for Engineers 2-3 Credits**
**Grading Scheme:** Letter Grade
Computer programming and the use of computers to solve engineering and mathematical problems. Emphasizes applying problem solving skills; directed toward technical careers in fields employing a reasonably high degree of mathematics. The programming language used depends on the demands of the departments in the college. Several languages may be taught each semester, no more than one per section. Those required to learn a specific language must enroll in the correct section.
**Prerequisite:** MAC 2312 with minimum grade of C.
**Attributes:** Artificial Intelligence

**COP 2271L Computer Programming for Engineers Laboratory 1 Credit**
**Grading Scheme:** Letter Grade
Optional laboratory for COP 2271. Required for ISE majors.
**Prerequisite:** MAC 2312;
**Corequisite:** COP 2271.
**Attributes:** Artificial Intelligence

**EGN 1935 Special Topics in Freshman Engineering 1-3 Credits**
**Grading Scheme:** Letter Grade
Laboratory, lectures or conferences cover selected topics in engineering.

**EGN 4912 Engineering Directed Independent Research 0-3 Credits**
**Grading Scheme:** S/U
Provides firsthand, supervised research with a faculty advisor or postdoctoral or graduate student mentor. Projects may involve inquiry, design, investigation, scholarship, discovery, or application.
**Prerequisite:** Department permission.

**EGN 4930 Sales Engineer Seminar 1 Credit**
**Grading Scheme:** S/U
Intended for those interested in pursuing a career in sales engineering (required for students enrolled in the sales engineering certificate program). Lectures and discussions on practice-oriented sales engineering topics.

**EGS 1006 Introduction to Engineering 1 Credit**
**Grading Scheme:** Letter Grade
Introduces the 11 departments that offer undergraduate degrees at UF. Students break into groups of 20, rotating weekly through each department. During these visits, students participate in hands-on experiments to help them make informed decisions about career alternatives.

**EIN 2002 Introduction to Industrial and Systems Engineering 1 Credit**
**Grading Scheme:** Letter Grade
Introduction to the field of industrial and systems engineering. Provides an overview of methodological and application areas as well as career paths.

**EIN 3241 Human Factors & Ergonomics 3 Credits**
**Grading Scheme:** Letter Grade
Introduces the techniques/concepts to understand users and workplace requirements for the design of sociotechnical systems. Topics covered include methods for work measurement, human cognitive and physical capabilities and limitations, and workplace requirements. Applications for design, including computer displays, noise, repetitive and high physical effort tasks are presented.
**Prerequisite:** ESI 3215C with minimum grade of C.

**EIN 3354 Engineering Economy 3 Credits**
**Grading Scheme:** Letter Grade
Basic principles and applications of economic decision-making between alternatives encountered in engineering systems projects. Analysis includes methodologies of economics and finance in addition to engineering fundamentals.
**Prerequisite:** MAC 2312 with a minimum grade of C.

**EIN 4210 Occupational Safety Engineering 3 Credits**
**Grading Scheme:** Letter Grade
Safety history and litigation; accident causation; safety organizations and agencies. Approaches to occupational safety and risk management. Product defects and safety program development; product liability; consumer product safety commission. Hazard communication standard. Workers' compensation. OSHA safety standards and codes; OSHA record keeping. Common occupational hazards.
**Prerequisite:** PHY 2049 and ESI 3215C with minimum grades of C.

**EIN 4242C Workplace Ergonomics and Biomechanics 3 Credits**
**Grading Scheme:** Letter Grade
Covers advanced topics on human factors and usability concepts and methods including prototyping and design, usability testing, design of experiments, forensics, and systems design applied to typical human factors domains such as IT, healthcare, transportation, and command and control.
**Prerequisite:** EIN 3241 with a minimum grade of C and EGM 2511 with a minimum grade of C.

**EIN 4245 Human Factors Applications 3 Credits**
**Grading Scheme:** Letter Grade
Focuses on applications of advanced topics in human factors and design within various industrial engineering related domains. Students will be introduced to important domains for human factors work in industry and academia, such as user experience in information technology, healthcare human factors, traffic safety and driving, aviation, and command and control. Students will apply human factors methods and concepts to problems within these domains through case study projects and assignments.
**Prerequisite:** EIN 3241 with a minimum grade of C and ESI 3215C with a minimum grade of C.

**EIN 4335 Senior Design Project 3 Credits**
**Grading Scheme:** Letter Grade
Integration of industrial and systems engineering methodologies; emphasizes methods of successful implementation. Project and case-study oriented.
**Prerequisite:** ESI 3312, ESI 4313, ESI 4523, ESI 4356, EIN 3354, and EGS 4034 all with minimum grades of C.

**EIN 4343 Inventory and Supply Chain Systems 3 Credits**
**Grading Scheme:** Letter Grade
Develops analytic abilities to formulate and solve inventory and logistics problems faced by today's firms. Learn to take a comprehensive view of complex inventory and supply-chain systems; develop abilities to model, optimize and design such systems.
**Prerequisite:** ESI 3312.

**EIN 4360 Facility Planning and Material Handling 3 Credits**
**Grading Scheme:** Letter Grade
Introduces fundamental concepts in several main areas of industrial engineering such as facility planning, material handling systems, unit loading and warehouse picking. Topics such as analysis and design of workspace and flow, facility location and layout, material handling systems, and optimization of picking processes are covered.
**Prerequisite:** ESI 3312 (C) and (EML 2023 or equivalent) with minimum grades of C.

**EIN 4451 Lean Production Systems 3 Credits**
**Grading Scheme:** Letter Grade
Design of flow line, cellular and flexible manufacturing systems. Design and control of lean manufacturing systems. Continuous improvement, small lot production, setup-time reduction, equipment improvement and maintenance. Principles and control of push and pull manufacturing systems. Production planning and operations scheduling.
**Prerequisite:** ESI 3312 (C) and ESI 3215C (C).

**EIN 4905 Special Problems in Industrial and Systems Engineering 1-4 Credits**
**Grading Scheme:** Letter Grade
Problems and systems studies associated with honors programs representing undergraduate research. Selected advanced topics including new developments and techniques in industrial and systems engineering.

**EIN 4912 Integrated Product and Process Design 1 3 Credits**
**Grading Scheme:** Letter Grade
The first part of a two-course sequence in which multidisciplinary teams of engineering and business students partner with industry sponsors to design and build authentic products and processes-on time and within budget. Working closely with industry liaison engineers and a faculty coach, students gain practical experience in teamwork and communication, problem solving and engineering design, and develop leadership, management and people skills.
**Prerequisite:** EIN 4354 and EIN 4360C with minimum grades of C;
**Corequisite:** ESI 4221C with minimum grade of C.

**EIN 4913 Integrated Product and Process Design 2 3 Credits**
**Grading Scheme:** Letter Grade
Second part of a two-course sequence in which multidisciplinary teams of engineering and business students partner with industry sponsors to design and build authentic products and processes-on time and within budget.
**Prerequisite:** EGS 4034 with a minimum grade of C and Engineering major of junior standing or higher.

**EIN 4937 Industrial and Systems Engineering Seminar 1 Credit**
**Grading Scheme:** S/U
Lectures and discussions on general and specific engineering problems. Individual investigations and research reports on assigned topics. Orientation for an industrial career.
**Prerequisite:** 3EG or 4EG standing in industrial and systems engineering.

**EIN 4944 Practical Work in Industrial and Systems Engineering 1-3 Credits**
**Grading Scheme:** S/U
One term of industrial employment, including extra work according to a preapproved outline. Practical engineering work under industrial supervision as set forth in the Herbert Wertheim College of Engineering regulations.
**Prerequisite:** 4EG classification and EGS 4034 with a minimum grade of C.

**ESI 3215C Data Anal. for Indus. Apps. 4 Credits**
**Grading Scheme:** Letter Grade
Focuses on analysis of data encountered in ISE applications including system reliability, demand forecasting and inventory control, simulation, and quality control. Specific engineering applications are discussed through case studies. Introduction and use of computational tools to implement various data analysis techniques is an important component of this course.
**Prerequisite:** MAC 2312 with minimum grade of C.

**ESI 3312 Operations Research 1 3 Credits**
**Grading Scheme:** Letter Grade
Introduces deterministic optimization modeling, algorithms, and software to aid in the analysis and solution of decision-making problems.
**Prerequisite:** ESI 3327C with minimum grade of C.

**ESI 3327C Matrix and Numerical Methods in Systems Engineering 3 Credits**
**Grading Scheme:** Letter Grade
Theory and application of vector, matrix and other numerical methods to systems problems. Simultaneous linear equations, characteristic values, quadratic forms, error analysis, use of series, curve fitting, nonlinear equations, discrete methods. The laboratory sessions will emphasize numerical solutions using common programming languages.
**Prerequisite:** MAC 2313 and MAS 3114 with minimum grades of C.

**ESI 4221C Industrial Quality Control 3 Credits**
**Grading Scheme:** Letter Grade
Factors affecting variation in product quality; use of control charts to evaluate and control manufacturing processes. Techniques for acceptance and reliability testing. Laboratory exercises illustrate the operation and control of manufacturing processes and hazard function. Typical failure distributions, redundant systems, models of repair and maintenance.
**Prerequisite:** ESI 3215C with a minimum grade of C.

**ESI 4313 Operations Research 2 3 Credits**
**Grading Scheme:** Letter Grade
Introduces stochastic models and methodologies for analyzing and providing solutions to decision-making problems with uncertainties.
**Prerequisite:** ESI 3327C and ESI 3215C with minimum grades of C.

**ESI 4317 Advanced Topics in Operations Research 3 Credits**
**Grading Scheme:** Letter Grade
Discusses advanced operations research topics on non-linear optimization, convex optimization, dynamic programming, and stochastic optimization. Study large or complex problems from two different perspectives: Static approach and Dynamic approach.
**Prerequisite:** ESI 3312 (with a minimum grade of C) and ESI 4313 (with a minimum grade of C).

**ESI 4356 Decision Support Systems for Industrial and Systems Engineers 4 Credits**
**Grading Scheme:** Letter Grade
Applications of decision support systems in industrial and systems engineering; developing and implementing decision support systems arising in industrial and systems engineering using popular database management and spreadsheet software.
**Prerequisite:** COP2273 or COP2271 with a minimum grade of C.
**Corequisite:** ESI 3312 will minimum grades of C.
**Attributes:** Artificial Intelligence

**ESI 4357 Web-Based Decision Support Systems for Industrial and Systems Engineers 4 Credits**
**Grading Scheme:** Letter Grade
Introduces the Internet and e-commerce; Internet tools and technologies necessary for the development of web-based decision support systems; designing and implementing web-based decision support systems arising in the practice of industrial and systems engineering using popular software packages.
**Prerequisite:** COP 2271 and ESI 4312 with minimum grades of C.
**Attributes:** Artificial Intelligence

**ESI 4523 Industrial Systems Simulation 3 Credits**
**Grading Scheme:** Letter Grade
Simulation methodology and languages, such as General Purpose Simulation System (GPSS). Design and analysis of simulation experiments as well as applications to solutions of industrial and service system problems.
**Prerequisite:** COP2273 or COP2271 and ESI 3215C with minimum grades of C.

**ESI 4610 Introduction to Data Analytics 3 Credits**
**Grading Scheme:** Letter Grade
Provides a basic understanding of the skills necessary for managing and analyzing data. The concepts covered include exploratory data analysis, data manipulation, data cleaning, data wrangling, and machine learning models. A basic understanding of data management with SQL is also provided. All the technical skills will be motivated by different examples involving data. Python is the programming language used.
**Prerequisite:** COP2273 or COP2271 and ESI 3215C with minimum grades of C.
**Attributes:** Artificial Intelligence

**ESI 4611 Advanced Data Analytics 3 Credits**
**Grading Scheme:** Letter Grade
Second course in the data analytics ISE sequence that focuses on how and why algorithms work using an application-oriented approach. Studies advanced analytical and learning models that enhance decision making by converting data to information. Provides insights into how to choose the most effective tool for implementing a specific model.
**Prerequisite:** ESI 4610 with a minimum grade of C.

**ESI 4614 Decision Analytics Design 3 Credits**
**Grading Scheme:** Letter Grade
Studies methods for designing and evaluating analytics systems for optimizing decision making. Teaches technical and programming skills for implementation and feedback of an analytics pipeline from input data curation, processing, and validation, to prescribing outcomes.
**Prerequisite:** ESI 3312 with a minimum grade of C and (ESI 4610 or COP 2273 both with a minimum grade of C).

**ESI 4949 Co-Op Work Experience 1 Credit**
**Grading Scheme:** S/U
Practical engineering work under industrial supervision, as set forth in the Herbert Wertheim College of Engineering regulations.
**Prerequisite:** EGS 4034 with a minimum grade of C.