INDUSTRIAL AND ENTERPRISE SYSTEMS ENGINEERING

Undergraduate Program Office: 104 Transportation Building
Fax: (217) 244-5705

Part of a nationally top-ranked engineering college on a premier Big Ten university campus, the Department of Industrial & Enterprise Systems Engineering offers students a blend of intellectual challenge, excitement, and energy that is transformational—this is a campus where you can learn from a world-renowned faculty, study in the most technologically advanced engineering library in the nation, and contribute to research that has real impact. The University attracts the best students from across the country and around the world. You can choose from about 4,000 courses as well as a variety of sports, the arts, and student activities—you’ll never lack amazing things to do.

You can explore your personal interests and goals in more than 50 professional and honor engineering societies, or the more than 1,000 other organizations across campus. These student-run groups offer opportunities to develop leadership skills, test technical competence, and serve society through volunteer projects.

Many students choose a study-abroad experience to gain a better understanding of other cultures, while also developing skills that make them more marketable in the global workplace. The Office of International Programs in Engineering coordinates travel and fellowships to countries all over the world. Engineering at Illinois is the only U.S. institution to offer an international minor in engineering as part of a regular degree program.

- Major in Systems Engineering and Design (formerly General Engineering [http://catalog.illinois.edu/undergraduate/engineer/departments/ind-gen-engin/gen-engin])
- Major in Industrial Engineering [http://catalog.illinois.edu/undergraduate/engineer/departments/ind-gen-engin/ind-engin]

GE Class Schedule (https://courses.illinois.edu/schedule/DEFAULT/GE)

IE Class Schedule (https://courses.illinois.edu/schedule/DEFAULT/DEFAULT/IE)

Industrial Engineering Courses

IE 199 Undergraduate Open Seminar credit: 1 to 5 Hours.
May be repeated.

IE 297 Independent Study credit: 1 to 4 Hours.
Individual investigations of any phase of Industrial Engineering. May be repeated in separate terms. Prerequisite: Consent of instructor.

IE 300 Analysis of Data credit: 3 Hours.
Nature of probabilistic models for observed data; discrete and continuous distribution function models; inferences on universe parameters based on sample values; control charts, acceptance sampling, and measurement theory. Credit is not given for both IE 300 and CEE 202. Prerequisite: MATH 241.

IE 310 Deterministic Models in Optimization credit: 3 Hours.
Linear Optimization - Simplex method, duality, and sensitivity analysis, Transportation and Assignment Problems, Network Optimization Models, Dynamic Programming, Nonlinear optimization, and Discrete optimization. Credit is not given for both IE 310 and CEE 201. Prerequisite: MATH 415.

IE 311 Operations Research Lab credit: 1 Hour.
Applications of OR models with the use of software tools. Prerequisite: Concurrent registration in IE 310.

IE 330 Industrial Quality Control credit: 3 Hours.
Contemporary concepts and methods for quality and productivity design and improvement; philosophies of Deming, Taguchi, and others leading the quality management and engineering movement; Shewhart’s methods for statistical process control; process capability analysis; statistical methods for tolerance assessment; process control methods employing attribute data; design of experiments, concepts, and methods. Prerequisite: IE 300.

IE 340 Human Factors credit: 4 Hours.
Introduction to human factors, ergonomics, engineering psychology, history of ergonomics, human-machine relations, displays and controls, human-computer interaction, industrial and aviation systems, physiology of work and anthropometrics, cognitive ergonomics, human reliability, human as manual controller, human-machine systems design, prototyping, professional practice and ethics, laboratory exercises. Same as PSYC 358. Prerequisite: PSYC 100, PSYC 103, or consent of instructor.

IE 360 Facilities Planning and Design credit: 3 Hours.
Facility planning, plant layout design, and materials handling analysis; determination of facilities requirements, site selection, materials flow, use of analytical and computerized techniques including simulation, and applications to areas such as manufacturing, warehousing, and office planning. Prerequisite: Credit or concurrent enrollment in IE 310.

IE 361 Production Planning & Control credit: 3 Hours.
Scope of production systems and activities involved in their design, establishment, management, operation, and maintenance; mathematical and computer models for planning and control of facilities, human resources, projects, products, material, and information in production systems. Prerequisite: IE 310.

IE 370 Stochastic Processes and Applications credit: 3 Hours.
Introduction to stochastic processes with applications in decision-making under uncertainty. Topics include newsvendor problem, discrete-time Markov chain (including classification of states, stationary distribution, absorbing states), Poisson processes (including time-homogenous, time-nonhomogeneous, thinning Poisson), continuous-time Markov chain (including Markov property, generator matrix, stationary distribution), queueing theory (including M/M/k queue, open Jackson network), and Markov decision processes (including finite-horizon models, infinite-horizon models). Prerequisite: IE 300 and IE 310.

IE 397 Independent Study credit: 1 to 4 Hours.
Individual investigations or studies of any phase of Industrial Engineering. May be repeated in separate terms. Prerequisite: Consent of instructor.

IE 398 Special Topics credit: 1 to 4 Hours.
Subject offerings of new and developing areas of knowledge in industrial engineering intended to augment the existing curriculum. See Class Schedule or departmental course information for topics and prerequisites. May be repeated in the same or separate terms if topics vary.

Information listed in this catalog is current as of 05/2018
IE 400  Design & Anlys of Experiments  credit: 3 or 4 Hours.
Concepts and methods of design of experiments for quality design,
improvement and control. Simple comparative experiments, including
concepts of randomization and blocking, and analysis of variance
techniques; factorial and fractional factorial designs; Taguchi's concepts
and methods; second-order designs; response surface methodology.
Engineering applications and case studies. 3 undergraduate hours. 3 or 4
graduate hours. Prerequisite: IE 300.

IE 410  Stochastic Processes & Applic  credit: 3 or 4 Hours.
Modeling and analysis of stochastic processes. Transient and steady-
state behavior of continuous-time Markov chains; renewal processes;
models of queuing systems (birth-and-death models, embedded-Markov-
chain models, queuing networks); reliability models; inventory models.
Familiarity with discrete-time Markov chains, Poisson processes, and
birth-and-death processes is assumed. Same as CS 481. 3 undergraduate
hours. 4 graduate hours. Prerequisite: IE 310.

IE 411  Optimization of Large Systems  credit: 3 or 4 Hours.
Practical methods of optimization of large-scale linear systems including
extreme point algorithms, duality theory, parametric linear programming,
generalized upper bounding technique, price-directive and resource-
directive decomposition techniques, Lagrangian duality, Karmarkar's
algorithm, applications in engineering systems, and use of state-of-
the-art computer codes. 3 undergraduate hours. 3 or 4 graduate hours.
Prerequisite: IE 310 and MATH 415.

IE 412  OR Models for Mfg Systems  credit: 3 or 4 Hours.
Operations research techniques applied to problems in manufacturing
and distribution. Single and multi-stage lot sizing problems, scheduling
and sequencing problems, and performance evaluation of manufacturing
systems. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite:
IE 310.

IE 413  Simulation  credit: 3 Hours.
Use of discrete-event simulation in modeling and analysis of complex
systems. Data structures and event-list management; verification and
validation of simulation models; input modeling, including selection
of probability distributions and random variate generation; statistical
analysis of output data. Same as CS 482. 3 undergraduate hours. 4
graduate hours. Prerequisite: CS 101 and IE 310.

IE 420  Financial Engineering  credit: 3 or 4 Hours.
Introduction to the theory and practice of financial engineering: basics
of derivative securities and risk management; Markowitz portfolio theory
and capital asset pricing model; interest rate and bonds; forward and
futures contracts, hedging using futures contracts; option contracts and
arbitrage relationship; binomial model, no-arbitrage pricing, risk-neutral
pricing, and American options pricing; Brownian motion, Black-Scholes-
Merton model, delta hedging, Greek letters, implied volatility, and volatility
smile. 3 undergraduate hours. 4 graduate hours. Prerequisite: IE 300.

IE 430  Economic Found of Quality Syst  credit: 3 or 4 Hours.
Total quality systems for planning, developing, and manufacturing world-
class products. Economic foundations of total quality. Product value,
cost, pricing, environmental quality, activity-based costing, design for
assembly, organization structure, lead time, innovation, Taguchi methods,
simulation-based significance testing, Strategic Quality Deployment,
statistical process control, and conjoint analysis. 3 undergraduate hours.
3 or 4 graduate hours. Prerequisite: IE 300.

IE 431  Design for Six Sigma  credit: 3 Hours.
Quality Engineering principles and the Six Sigma Define-Measure-
Analyze-Improve-Control (DMAIC) process. Application of concepts
and methods of statistical process control, designed experiments, and
measurement systems analysis to cases of quality and productivity
improvement; application of the fundamentals of quality engineering
and the Six Sigma to areas of produce development, service enterprise,
and manufacturing processes. 3 undergraduate hours. 3 graduate hours.
Prerequisite: IE 300.

IE 445  Human Performance and Cognition in Context  credit: 3 or 4
Hours.
Same as EPSY 456 and PSYC 456. See EPSY 456.

IE 497  Independent Study  credit: 1 to 4 Hours.
Independent study of advanced problems related to industrial
engineering. 1 to 4 undergraduate hours. 1 to 4 graduate hours. May be
repeated. Prerequisite: Consent of instructor.

IE 498  Special Topics  credit: 1 to 4 Hours.
Subject offerings of new and developing areas of knowledge in
industrial engineering intended to augment the existing curriculum.
See Class Schedule or departmental course information for topics and
prerequisites. 1 to 4 undergraduate hours. 1 to 4 graduate hours. May be
repeated in the same or separate terms if topics vary to a maximum of 9
hours.

Information listed in this catalog is current as of 05/2018