Campuses: **Twin Cities**   Crookston   Duluth   Morris   Rochester   Other Locations

Search U of M Web sites   Search

University Catalogs

Search

Search Undergraduate Programs

Search University Catalogs

University Catalogs

Courses

Majors & Minors

Policies & General Information

Faculty & Administration

Order or Download a Catalog

Catalog PDF Archives

Frequently Asked Questions

Abbreviation Key (opens a new window)

Contact Us

Related Links

Admission and Application

One Stop for tuition, course registration, financial aid, academic calendars, and more

Twin Cities Home

Twin Cities Courses

Future effective dates indicate the first term the course may be available.

Find out when a particular course is offered using the Class Schedule.

Register for classes online.

INDUSTRIAL ENGINEERING (IE)

College of Science and Engineering
Industrial and Systems Engineering

IE 3041 **- Industrial Assignment I**
(2.0 cr; Prereq-ME upper division, registration in ME co-op program; A-F or Aud, spring, every year)
Industrial work assignment in engineering intern program. Evaluation based on student's formal written report covering semester's work assignment.

IE 4042 **- Industrial Assignment II**
(2.0 cr; Prereq-ME upper div, registration in ME co-op program; A-F or Aud)
Industrial work assignment in engineering intern program. Evaluation based on student's formal written report.

IE 4043 **- Industrial Assignment III**
(4.0 cr; Prereq-4042; A-F or Aud, spring, every year)
Solution of system design problems that require developing criteria, evaluating alternatives, and generating a preliminary design. Final report emphasizes design communication and describes design decision process, analysis, and final recommendations.

IE 4521 **- Statistics, Quality, and Reliability**
(4.0 cr; Prereq-Upper div or grad student or CNR; fall, spring, summer, every year)
Random variables/probability distributions, statistical sampling/measurement, statistical inferencing, confidence intervals, hypothesis testing, single/multivariate regression, design of experiments, statistical quality control, quality management, reliability, maintainability, availability.

IE 5080 **- Topics in Industrial Engineering**
(1.0 - 4.0 cr [max 4.0 cr]; Prereq-Upper div or grad student; fall, spring, offered periodically)
Topics vary each semester.

IE 5111 **- Systems Engineering I**
(2.0 cr; Prereq-CSE upper div or grad student; A-F or Aud, fall, every year)
Overview of systems-level thinking/techniques in context of an integrated, design-oriented framework. Elements of systems engineering process, including lifecycle, concurrent, and global engineering. Framework for engineering large-scale, complex systems. How specific techniques fit into framework.

IE 5112 - Introduction to Operations Research
(3.0 cr; Prereq-[Math 2243 or Math 2373 or equiv], [one semester of probability or statistics], [CSE upper div or grad student]; A-F or Aud, fall, spring, every year)
Survey of Operations Research models/methods in deterministic/stochastic settings. Linear programming, integer programming, networks, forecasting, Markov chains, and queuing systems. Examples from various application areas, such as systems engineering, logistics, design, and project management.

IE 5113 - Systems Engineering II
(4.0 cr; Prereq-5111, a course on basic probability, [CSE upper div or grad student]; A-F or Aud, spring, every year)
Systems engineering thinking/techniques presented in 5111. Hands-on techniques applied to specific problems. Topics pertinent to effectiveness of design process. Practices and organizational/reward structure to support collaborative, globally distributed design team.

IE 5441 - Financial Decision Making
(4.0 cr; Prereq-CSE upper div or grad student; A-F only, fall, spring, summer, every year)
Evaluating investment options, capital budgeting. Accounting for inflation, depreciation, and taxes. Evaluating financing options, cost of capital. Financial reporting, analysis of statements. Cost analysis. Financial markets/securities. Accounting for uncertainty, risk-return.

IE 5511 - Human Factors and Work Analysis
(4.0 cr; =[ME 5211, HUMF 5211]; Prereq-Upper div CSE or grad student; A-F or Aud, fall, every year)
Human factors engineering (ergonomics), methods engineering, and work measurement. Human-machine interface: displays, controls, instrument layout, and supervisory control. Anthropometry, work physiology and biomechanics. Work environmental factors: noise, illumination, toxicology. Methods engineering, including operations analysis, motion study, and time standards.

IE 5512 - Applied Ergonomics
(4.0 cr; Prereq-Upper div CSE or grad student, 5511; A-F or Aud, summer, offered periodically)
Small groups of students work on practical ergonomic problems in local industrial firms. Projects cover a variety of ergonomic issues: workstation design, equipment and tool design, back injuries and material handling, cumulative trauma disorders, illumination and noise, and safety.

IE 5513 - Engineering Safety
(4.0 cr; Prereq-Upper div CSE or grad student; A-F or Aud, fall, spring, every year)
Occupational, health, and product safety. Standards, laws, and regulations. Hazards and their engineering control, including general principles, tools and machines, mechanics and structures, electrical safety, materials handling, fire safety, and chemicals. Human behavior and safety, procedures and training, warnings and instructions.

IE 5522 - Quality Engineering and Reliability
(4.0 cr; Prereq-[4521 or equiv], [upper div or grad student or CNR]; fall, spring, offered periodically)
Quality engineering/management, economics of quality, statistical process control design of experiments, reliability, maintainability, availability.

IE 5531 - Engineering Optimization I
(4.0 cr; Prereq-Upper div or grad student or CNR; fall, every year)
Linear programming, simplex method, duality theory, sensitivity analysis, interior point methods, integer programming, branch/bound/dynamic programming. Emphasizes applications in production/logistics, including resource allocation, transportation, facility location, networks/flows, scheduling, production planning.

IE 5541 - Project Management
(4.0 cr; Prereq-Upper div or grad student; fall, spring, every year)
Introduction to engineering project management. Analytical methods of selecting, organizing, budgeting, scheduling, and controlling projects, including risk management, team leadership, and program management.

IE 5545 - Decision Analysis

IE 5540 - Decision Analysis
(4.0 cr; Prereq-4521 or equiv)
Normative theories of decision making. Emphasizes structuring of hard decision problems arising in business and public policy contexts. Decision trees, expected utility theory, screening prospects by dominance, assessment of subjective probability, multiple attribute utility, analytic hierarchy process, benchmarking with data envelopment analysis, basics of game theory.

IE 5551 - Production Planning and Inventory Control
(4.0 cr; Prereq-CNR or upper div or grad student; fall, spring, every year)
Inventory control, supply chain management, demand forecasting, capacity planning, aggregate production and material requirement planning, operations scheduling, and shop floor control. Quantitative models used to support decisions. Implications of emerging information technologies and of electronic commerce for supply chain management and factory operation.

IE 5552 - Design and Analysis of Manufacturing Systems
(4.0 cr; Prereq-Upper div or grad student)
Flow lines, assembly systems, cellular manufacturing systems, and flexible manufacturing systems. Emphasis is on methodologies for modeling, analysis and optimization. Lead time analysis, capacity and workload allocation, scheduling and shop floor control, work-in-process management, facilities planning and layout, and information management.

IE 5553 - Simulation
(4.0 cr; Prereq-Upper div or grad student; familiarity with probability/statistics recommended; fall, spring, offered periodically)
Discrete event simulation. Using integrated simulation/animation environment to create, analyze, and evaluate realistic models for various industry settings, including manufacturing/service operations and systems engineering. Experimental design for simulation. Selecting input distributions, evaluating simulation output.

IE 8333 - FTE: Master's
(1.0 cr; Prereq-Master's student, adviser and DGS consent; No Grade, fall, spring, summer, every year)
(No description)

IE 8444 - FTE: Doctoral
(1.0 cr; Prereq-Doctoral student, adviser and DGS consent; No Grade, fall, spring, summer, every year)
(No description)

IE 8531 - Discrete Optimization
(1.0 - 4.0 cr [max 8.0 cr]; fall, spring, every year)
Topics in integer programming and combinatorial optimization. Formulation of models, branch-and-bound. Cutting plane and branch-and-cut algorithms. Polyhedral combinatorics. Heuristic approaches. Introduction to computational complexity.

IE 8532 - Stochastic Processes and Queuing Systems

(4.0 cr; Prereq-4521 or equiv; fall, every year)
Introduction to stochastic modeling and processes. Random variables, discrete and continuous Markov chains, renewal processes, queuing systems, Brownian motion, and elements of reliability and stochastic simulation. Applications to design, planning, and control of manufacturing and production systems.

IE 8533 - Advanced Stochastic Processes and Queuing Systems
(4.0 cr; Prereq-8532 or #; spring, offered periodically)
Renewal/generative processes, Markov/semi-Markov processes, martingales, queuing theory, queuing networks, computational methods, fluid models, Brownian motion.

IE 8534 - Advanced Topics in Operations Research
(1.0 - 4.0 cr [max 8.0 cr]; Prereq-5531, 8532; fall, spring, every year)
Special topics determined by instructor. Examples include Markov decision processes, stochastic programming, integer/combinatorial optimization, and queueing networks.

IE 8536 - Advanced Topics in Engineering Management
(4.0 cr [max 8.0 cr]; A-F or Aud, spring, offered periodically)
Areas such as financial engineering, revenue management, management of health systems, service operations, management of technology, and public policy.

IE 8538 - Advanced Topics in Information Systems
(4.0 cr; Prereq-8541, college-level computer programming course; A-F or Aud)
Decision support methods. Case studies of specific systems. Methods for testing usability/performance. Trust/over-reliance, their impact on system performance. System-level issues, general planning, design, information analysis, problem paradigms. How to frame problems. Techniques to combine engineering and information technology.

IE 8541 - Decision Support Systems
(4.0 cr; =[HUMF 8541]; A-F or Aud, spring, every year)
Decision Support Systems (DSSs) to assist people in making better decisions, interpreting complex information, and managing complex situations safely/effectively. Principles of human-centered design, cognitive engineering, and evaluation. Applications in projects of students' own choosing.

IE 8552 - Advanced Topics in Production, Inventory, and Distribution Systems
(4.0 cr [max 8.0 cr]; Prereq-5551; fall, spring, offered periodically)
Cutting edge research issues in production, inventory, and distribution systems. Topics vary: stochastic models of manufacturing systems, stochastic inventory theory, multi-echelon inventory systems and supply chains, supplier-retailer and supplier-manufacturer coordination, supplier and warehouse networks, business logistics, transportation.

IE 8666 - Doctoral Pre-Thesis Credits
(1.0 - 6.0 cr [max 12.0 cr]; Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr; No Grade, fall, spring, summer, every year)

IE 8773 - Graduate Seminar
(1.0 cr; S-N or Aud, fall, spring, every year)
Recent developments.

IE 8774 - Graduate Seminar
(1.0 cr; Prereq-8773; S-N or Aud, fall, spring, every year)

Recent developments.

IE 8777 - Thesis Credits: Master's
(1.0 - 18.0 cr [max 50.0 cr]; Prereq-Max 18 cr per semester or summer; 10 cr total required (Plan A only); No Grade, fall, spring, summer, every year)
(No description)

IE 8794 - Industrial Engineering Research
(1.0 - 6.0 cr [max 10.0 cr]; Prereq-#; fall, spring, summer, every year)
Directed research.

IE 8888 - Thesis Credit: Doctoral
(1.0 - 24.0 cr [max 100.0 cr]; Prereq-Max 18 cr per semester or summer; 24 cr required; No Grade, fall, spring, summer, every year)
(No description)

IE 8951 - Plan B Course
(1.0 cr; S-N or Aud)
Structured environment in which students can complete M.S. Plan B project.

IE 8953 - Plan B
(2.0 cr; Prereq-8951; A-F or Aud, spring, every year)
Structured environment in which students can complete M.S. Plan B project.

Twin Cities Campus: Parking & Transportation   Maps & Directions

Directories   Contact U of M   Privacy