HUM 4610* Advanced Landscape Garden Design Laboratory 0(3) Non-credit laboratory to accompany HORT 4610. Coreq: HORT 4610.

HORT 4650* Plant Molecular Biology 3(3) Study of fundamental plant processes at both the cellular and molecular levels. Topics include genome structure and organization (both nuclear and organelar); regulation of gene expression and its role in cellular and whole-plant processes; transposable genetic elements; applications for biotechnology. Preq: Junior standing and 3020; and either BIOL 3040 or BIOL 3050.

HORT 4710* Advanced Internship 1-6(1-6) Preplanned work experience under competent supervision in approved agency dealing with horticultural endeavors. Gives advanced students on-the-job learning opportunities to apply acquired knowledge and skills. Monthly reports and final departmental seminar required. Undergraduates may accumulate a maximum of six credits for participation in HORT 2710 and/or 4710. Preq: Junior standing.

HORT 4720* Landscapes + Health 3(3) Explores the role of landscapes in human health and wellness. Historical healing places and contemporary urban environments are examined for evidence of psychological and physiological impacts. Readings include interdisciplinary research. Preq: Senior standing.

HUMANITIES

Professor: S.K. Eisiminger; Associate Professor: A. Bennett

HUM 3010 Humanities 3(3) Introduction to humanistic studies focusing on relationships among disciplines: painting, sculpture, architecture, music, literature, philosophy, and drama—beginning with prehistoric and continuing to the Renaissance.

HUM 3020 Humanities 3(3) Introduction to humanistic studies focusing on relationships among disciplines: painting, sculpture, architecture, music, literature, philosophy, and drama—beginning with the 17th century and continuing to the present.

HUM 3060 Creative Genius in Western Culture 3(3) Investigation of creativity through study of great innovators in art, literature, music, and ideas. May be repeated once for credit.

HUM 3090 Studies in Humanities 3(3) Interdisciplinary approach to the humanities. Special subject matter varies according to the instructor and as approved by the chair of the English Department. May be repeated once for credit.

HUM (ENGL) 4560* Literature and Arts of the Holocaust 3(3) Addresses the Holocaust through literature, art, architecture, music, and film. Beginning with historical, political, and economic forces that contributed to the Holocaust, course then focuses on highly diverse creative responses to this event - responses that often reflect the difficulties and politics of these commemorative gestures. May also be offered as ENGL 4560. Preq: ENGL 3010.

INDUSTRIAL ENGINEERING


IE 2000 Sophomore Seminar in Industrial Engineering 1(1) Addresses the industrial engineering program, best student practices, and career paths. Invited lecturers, as needed, and faculty provide lectures and demonstrations. Preq: ENGR 1060 or ENGR 1090, each with a C or better.

IE 2100 Design and Analysis of Work Systems 3(2) Introduction to the tools and techniques used to design and analyze work systems for human use, including process improvement, workplace design and an introduction to the field of human factors and ergonomics. Preq: ENGR 1060 with a C or better; and either ENGL 1020 or ENGL 1030 with a C or better. Coreq: IE 2101.

IE 2101 Design and Analysis of Work Systems Laboratory 0(3) Non-credit laboratory to accompany IE 2100. Coreq: IE 2100.

IE 2680 Creative Inquiry Seminar in Industrial Engineering 1(1) Students are introduced to creative inquiry methods, resources, and current activities in a seminar format. To be taken Pass/No Pass only. Includes Honors sections.

IE 2800 Deterministic Operations Research 3(3) Introduction to operations research models, including linear programming, integer linear programming, transportation and assignment problems, and network flows. Preq: MATH 1060 or MATH 1070 with a C or better.

IE 3000 Junior Honors Seminar 1(1) Acquaints students enrolled in the Departmental Honors Program with current research issues in the profession. This assists students in preparing a research proposal for the senior thesis. Preq: Junior standing and admission to Departmental Honors Program.

IE 3010 Systems Design 1 4(3) Introduction to the design of industrial engineering systems. Design methodologies are introduced in the context of a design process that includes identifying user needs; developing a design specification; evaluating, refining, and selecting design concepts; detail design; constructing, testing, and refining prototypes; and delivering the product to the customer. Preq: ENGR 1060 with a C or better; and ENGL 1020 or ENGL 1030 with a C or better. Coreq: IE 3011.

IE 3011 Systems Design 1 Laboratory 0(3) Non-credit laboratory to accompany IE 3010. Coreq: IE 3010.

IE 3600 Industrial Applications of Probability and Statistics I 3(3) Introduces central concept that overall system performance can be improved by taking uncertainty into account, especially through the reduction of variability. Specific industrial applications, such as decision analysis, reliability and probabilistic inventory models, are emphasized. Preq: MATH 2600.

IE 3610 Industrial Applications of Probability and Statistics II 3(3) Introduces central concept that apparent conflict between productivity and quality can be resolved through improvements in processes by introducing statistical thinking. Specific industrial applications, such as (static) simulation, quality control and reliability models, are emphasized. Preq: IE 3600.

IE 3680 Professional Practice in Industrial Engineering 1(1) Seminar to orient students to issues of professional development and professional practice of industrial engineering.

IE 3810 Probabilistic Operations Research 3(3) Probabilistic modeling of engineering systems. Topics include calculus-based probability, Markov processes, Poisson processes, queuing, and other selected topics. Preq: IE 2800 and IE 3600.


IE 3860 Production Planning and Control 3(3) Fundamentals of forecasting demand, scheduling production, and controlling the movement and storage of material associated with production are studied. State-of-the-art manufacturing techniques are discussed. Preq: IE 2800 or MATH 4400.

IE 4000* Honors Thesis 1-6(1-6) Individual or joint research project performed with a faculty mentor or committee of faculty. May be repeated for a maximum of six credits. Preq: IE 2880 and consent of mentor.

IE 4040 Creative Inquiry Research 1-6(1-6) Research experience promoting reasoning, critical thinking, ethical judgment, communication skills, and an understanding of the scientific method and engineering design. These applied/basic research experiences are usually undertaken with a team under the mentorship of a faculty member or advanced graduate student.

IE 4300* Human Factors Engineering in Healthcare 3(3) Focuses on how industrial engineers help improve the quality and safety of patient care. Students learn how healthcare is different from traditional industrial engineering sectors. A substantial part of the course is focused on learning how to apply industrial engineering tools, specifically those grounded in human factors, to healthcare problems. Preq: IE 2100 or IE 4880 or PSYC 3640 or PSYC 3680 or PSYC 4350.
IE 4400* Decision Support Systems in Industrial Engineering 3(2) Study of design of decision support systems for production and service systems based on operations research models. Includes use of spreadsheets, databases, and integrated software development environments to implement decision support systems. Preq: ENGR 1090; or both CE 1300 and one of CPSC 1010 or CPSC 1110 or CPSC 1610. Coreq: IE 4401.

IE 4401* Decision Support Systems in Industrial Engineering Laboratory 0(3) Non-credit laboratory to accompany IE 4400. Coreq: IE 4400.

IE (MGT) 4440 International Perspectives in Industrial Management 1-6(1-6) Provides an international perspective to industrial management via organized plant visits to businesses in a foreign country and lectures by and discussions with senior operations managers. Cultural visits and lectures are also organized to provide a holistic perspective to cover cultural and economic environment of the host country. Students are responsible for travel costs. May be repeated for a maximum of six credits. May also be offered as MGT 4440. Preq: Consent of instructor.

IE 4460* Modeling and Analysis of Manufacturing Systems 3(3) Promotes competence in developing and applying quantitative models to improve the design and operation of manufacturing and assembly systems. Emphasis is placed on the underlying principles and analytical models for guiding how resources (humans, machines, tools, information) should be utilized to facilitate the flow of production jobs through a facility. Preq: IE 2800 and IE 3810 and IE 4400.

IE 4520* Reliability Engineering 3(3) Probabilistic approach to assessing system reliability. Methods for analyzing serial, parallel, and complex systems. Reliability life testing and its acceleration are covered. Essential elements of maintainability are identified and related to system availability. Preq: IE 3610; or MATH 3020 and MATH 4000.

IE 4560* Supply Chain Design and Control 3(3) Industrial engineering aspects of supply chains, including design and control of material and information systems. Preq: IE 3610 and IE 3860.

IE 4570* Transportation and Logistics Engineering 3(3) Introduces transportation and logistics systems analysis from both analytical and practical perspectives. Covers methods for identifying level-of-service metrics and measuring system performance. Discusses key aspects of modeling, simulation, and other techniques for economic and quantitative analysis of transportation and logistics planning issues. Preq: Senior standing in an engineering, science, or management program; and MATH 1020 or MATH 1060 or MATH 1070.

IE 4600* Quality Improvement Methods 3(3) Study of modern quality improvement techniques presented in an integrated, comprehensive context. Preq: MATH 1020 or MATH 1060 or MATH 1070; and junior standing.

IE 4610* Quality Engineering 3(3) Design aspects of quality and the engineer's role in problems of quality in production systems. Preq: IE 3610.

IE 4620* Six Sigma Quality 3(3) Study of DMADV (Define, Measure, Analyze, Improve, and Control) elements of Six Sigma, project management, process analysis, quality function deployment, hypothesis testing, gage R & R, data analysis, multi-varian-analysis, design of experiments, statistical process control, and process capability analysis. Preq: One of STAT 3100 or STAT 4110 or IE 3600 or MATH 3010 or MATH 3020 or MATH 3090 or CHE 3070.

IE 4630* Quality in the Capital Projects Industry 3(3) Covers topics in quality and lean principles relevant to the capital projects industry. Provides a broad overview on quality concepts and philosophies, quality management and inspection tools applicable to capital projects. Six Sigma Approach, lean concepts and value stream mapping. Preq: MATH 1020 or MATH 1060 or MATH 1070; and junior standing.

IE 4650* Facilities Planning and Design 3(3) Study of the principles and techniques of facility planning and design. Discusses economic selection of materials handling equipment and integration of this equipment into the layout plan to provide effective product flow in production, distribution, and service contexts. Includes quantitative techniques for evaluation of facility design. Preq: IE 2100 and IE 2800 and IE 3810.

IE 4670 Systems Design II 4(2) Provides students with the challenge of integrating and synthesizing general engineering knowledge into creatively solving real-world, open-ended problems. This includes developing the problem statement, objectives, and criteria; data collection; technical analysis; developing and integrating recommendations; and presenting results. Preq: All of the following Industrial Engineering courses: IE 2100, 2800, 3010, 3600, 3610, 3680, 3810, 3840, 3860, 4400, 4610, 4650, and 4820. Coreq: IE 4671.

IE 4671 Systems Design II Laboratory 0(4) Non-credit laboratory to accompany IE 4670. Coreq: IE 4670.

IE 4690 Creative Inquiry Symposium in Industrial Engineering 1(1) Provides a forum for exchange of results and ideas in creative inquiry student projects. To be taken Pass/No Pass only. Preq: IE 3680.

IE 4810* Applications of Probability Models in Industrial Engineering 3(3) This second probabilistic operations research course provides a broader, more applied range of topics than the first (IE 3810 or IE 8030). Potential topics include decision making; utility theory; portfolio risk; optimization and hedging; inventory models for perishable products; revenue management; risk analysis; and static simulation. Preq: IE 2800 and IE 3600 and IE 3610 and IE 3840.

IE 4820* Systems Modeling 4(4) The purpose, theory, and techniques of modeling systems with dynamic events. Students learn a powerful analytical process to use in the analysis and improvement of systems in various industries, including transportation, logistics, manufacturing and service systems. Incorporates professional simulation software as a tool in evaluating the system performance. Preq: IE 3610 and IE 3810; or MATH 4400 and MATH 4410 and MATH 3020.

IE 4840* Applied Engineering Economics 3(3) Application of principles and techniques required to perform economic analysis of engineering projects in various sectors, such as manufacturing, public sector or the service sector. Topics include replacement analysis, project selection and selecting an analysis technique. Preq: One of CE 3520 or IE 3840; and one of IE 2800 or MATH 4400; and one of IE 3600 or MATH 4000; and one of IE 3610 or MATH 3020.

IE 4850* Survey of Optimization Methods and Applications 3(3) Survey of deterministic and stochastic optimization methods, theory and algorithms. Modeling, analysis and applications of optimization to modern industrial engineering problems. Preq: One of IE 2800 or MATH 4400; and one of IE 3810 or MATH 4410.

IE 4860* Scheduling 3(3) Introduction to the development and application of operations research approaches for sequencing and scheduling problems. Emphasis is placed on heuristic- and optimization-based solution methods and how they relate to practical approaches for scheduling and sequencing. Prior programming experience in any structured language or environment is required (e.g., C/C++, VBA, Matlab, etc.) Preq: One of IE 3860 or MGT 3900; and one of CPSC 1010 or CPSC 1110 or IE 4000 or MATH 3600 or MATH 3650.

IE 4870* Industrial Safety 3(3) Recognition and prevention of hazards; recognition and control of hazardous materials; developing and managing a safety program; designing inherently safe equipment and workplaces. Preq: MATH 1020 or MATH 1060 or MATH 1070; and junior standing.

IE 4880* Human Factors Engineering 3(3) Introduction to human performance and limitations in the design of effective and efficient systems. Covers issues related to changes in technology, impact of design on society, ethical issues in design of systems, and the cost benefits from designing systems and environments that often challenge perceived notions of benefits. Preq: Junior standing; and MATH 1020 or MATH 1060 or MATH 1070.

IE 4890* Industrial Ergonomics and Automation 3(2) Physical ergonomics and ergonomics in industrial settings, including work physiology, the physical environment, automated systems, and hybrid work systems. Preq: IE 2100. Coreq: IE 4891.

IE 4891* Industrial Ergonomics and Automation Laboratory 0(3) Non-credit laboratory to accompany IE 4890. Coreq: IE 4890.

IE 4910* Selected Topics in Industrial Engineering 3(3) Comprehensive study of any timely or special topic in industrial engineering not included in other courses. May be repeated for a maximum of 12 credits. Includes Honors sections.