INDUSTRIAL ENGINEERING (INDSTENG)

INDSTENG 6060 Decision & Risk Analysis 3 Credits
This course is an introductory treatment of modern perspective on analytical methodologies to support decision-making. Concepts of how to formulate, structure, analyze, and solve complex decision problems will be studied. These concepts will make use of: (1) influence diagrams and decision trees for modelingdecision problems, (2) Bayesian analysis as applied to decision analysis, (3) the concept and use of subjective probability, (4) the value of information, and finally (5) the use of probability models for solving decision problems.
Components: Class
Prereqs/Coreqs: P. C- or better in ENGRG 6050 OR in an undergraduate calculus-based statistics course OR consent of the instructor

INDSTENG 6150 Facilities Design & Management 3 Credits
This course provides an in-depth exploration of the principles and practices involved in the planning and design of facilities, providing insights into the intricacies of detailed facilities layout design. Key topics include flow systems, space-activity relationships, layout planning models, warehouse management, and their integration with manufacturing and support operations. Through case studies, design projects, and simulations, students will develop the skills needed to optimize facility design across both manufacturing and service environments.
Components: Class

INDSTENG 7030 Simulation Modeling of Engineering Systems 3 Credits
This introductory course is applied simulation taught at the graduate level. It is also a system analysis course. Students learn how to analyze systems and how to represent them in the simulation model. Students are expected to bring topics and problems to class and to contribute in significant discussion about the material. This is a hands-on course. Students are taught simulation theory through practice in developing more and more complex models. The course includes a range of simulation styles including: basic manual simulation (rolling dice, random number tables); simple automated simulation (use of general purpose software like BASIC, spreadsheets, macros); traditional simulation (coded programs with tabular results); real time monitoring (graphic displays during simulation); and state-of-the-art object oriented software (including two and three dimensional animation). No prior knowledge of simulation is required, nor is any computer programming experience. Basic familiarity with computing in general is needed (files, folders, basic editing operations, etc.), but nothing advanced. A fundamental understanding of probability and statistics is needed.
Components: Class
Prereqs/Coreqs: P. ENGRG 6050 or a calculus-based statistics course or consent of instructor

INDSTENG 7070 Optimization with Engineering Applications 3 Credits
Students will be able to solve a variety of optimization problems using optimization software or the optimization routines available in spreadsheets. Linear, non-linear, and discrete problems will be solved. Students will learn the theory of improving search methods, which are the basis for all optimization algorithms. An emphasis will be placed on the need for the modeler to examine the practicality of program results. Also, students will perform a Life Cycle Analysis, which is an optimization procedure that minimizes the impacts on the environment.
Components: Class

INDSTENG 7800 Engineering Management 3 Credits
Introduce the student to fundamental concepts of management and management theories. Discuss timely topics and issues of business ethics including environmental, safety, and product liability. The student will gain an understanding of differences between engineering and management roles with specific application to motivating, and managing technical personnel. The student will develop an understanding and application of the specific tools of engineering management including basic forecasting, planning, scheduling and decision-making models.
Components: Class

INDSTENG 7810 Advanced Production and Operations Analysis 3 Credits
Tools and techniques associated with planning and controlling in the production environment including forecasting, aggregate planning, master production scheduling, materials requirement planning, and shop floor control. Integrated aspects of manufacturing resource planning and enterprise resource planning as well as the effects of just-in-time management and theory of constraints.
Components: Class

INDSTENG 7820 Quality Engineering and Management 3 Credits
This course provides practical tools for planning and completing quality improvement projects. The first part of the course deals with an introduction to quality management philosophies, tools, and approaches. The second part (about 70%) of the course is devoted to the Six-Sigma (SS) philosophy, roadmap, tools, and techniques of planning and executing quality improvement projects. The course concludes with the application of the Design for Six Sigma (DFSS) approach to design or improve products and processes.
Components: Class
Prereqs/Coreqs: P. ENGRG 6050 or a calculus-based statistics course or consent of the instructor

INDSTENG 7830 Advanced Cost and Value Analysis 3 Credits
Introduction to the concepts of value within the manufacturing environment. Investigation of various methods of increasing value and defining value are considered. Emphasis is on creating value for the customer through application of sound economic analysis and manufacturing methods improvements. Value Engineering including function analysis. Value Stream Mapping and 5S applications are studied in the context of Lean Manufacturing methods.
Components: Class

INDSTENG 7840 Systems Engineering Management 3 Credits
New technologies and time constraints need to meet the challenges of satisfying customer needs such as performance, quality, and over-all cost effectiveness. This sets up a framework for effective system engineering and management of complex systems. The systems engineering effort needs to integrate a wide variety of key design disciplines, apply robust design methods and tools in a manner as to achieve system engineering objectives, assess and control through design reviews, evaluations, feedback and corrective action. The management issues pertaining to the application of systems engineering to various projects is equally important. Principles of System Engineering Management Plan (SEMP), organizational aspects of Systems Engineering such as functional, product line, and matrix structures, and interfaces between the customer, the producer, and suppliers are some key topics that need to be addressed as part of Systems Engineering Management.
Components: Class

INDSTENG 7900 Thesis & Capstone Preparation 1 Credit
Prepares student for either the Thesis or Capstone experience. Focus is placed on the skills necessary to undertake the Thesis or Capstone work. This includes writing a project proposal that is supported by scholarly literature, preparing a project timeline, budgeting for the proposed project, recognizing project stakeholders, and identifying specific deliverables from the project. Course culminates in a written Thesis/Capstone proposal for committee approval.
Components: Research
Cross Offering: CIVILENG 7900, ELECTENG 7900, MECHENG 7900
Prereqs/Coreqs: P. Full admittance as a degree-seeking graduate student; C: MECHENG 5000

INDSTENG 7910 Thesis & Capstone Extension 1 Credit
Course is a 1-credit extension of a student's thesis research or capstone project design course. Cannot be taken until the maximum six credits of Thesis Research or Capstone Design Project have been completed. Will require approval of the Faculty Advisor and Program Coordinator before permission for this course will be granted and students allowed to register. Will not count toward degree requirements.
Components: Thesis Research
Cross Offering: CIVILENG 7910, ELECTENG 7910, MECHENG 7910
Prereqs/Coreqs: P. (CIVILENG 7990, ELECTENG 7990, INDSTENG 7990, or MECHENG 7990) OR (CIVILENG 7970, ELECTENG 7970, INDSTENG 7970, or MECHENG 7970)

INDSTENG 7970 Capstone Design Project 3 Credits
Students will draw upon and synthesize knowledge and skills learned throughout the program by applying it to an industry-sponsored project. Capstone work (minimum 150 hours) will be completed in partnership with industry and academic mentor/supervisors. A substantive work project deliverable demonstrating summative application of coursework taken in the program will be expected. The project is expected to be completed in the student's last semesters in residence. Three credits can be taken in a single semester. Can be repeated but only a total of six credits can be applied to degree completion. (Contact advisor for prior approval and registration instructions)
Components: Research
Cross Offering: CIVILENG 7970, ELECTENG 7970, MECHENG 7970
Prereqs/Coreqs: P. CIVILENG 7900, ELECTENG 7900, INDSTENG 7900, or MECHENG 7900

INDSTENG 7990 Thesis Research 3 Credits
Completion and defense of a carefully delineated scholarly work advancing an original point of view as a result of research. The topic chosen must reflect the student's area of emphasis and must be approved by a thesis committee. Three credits taken in a single semester. Can be repeated but only a total of six credits can be applied to degree completion. Thesis work is expected to be completed in the student's last semesters in residence. (Contact advisor for prior approval and registration instructions)
Components: Thesis Research
Cross Offering: CIVILENG 7990, ELECTENG 7990, MECHENG 7990
Prereqs/Coreqs: P. CIVILENG 7900, ELECTENG 7900, INDSTENG 7900, or MECHENG 7900