ENGINEERING MANAGEMENT

Courses

ENM 500. Probability & Statistics for Engineers. 3 Hours
This is an introductory course in the concepts and applications of probability and statistics. Emphasis is on applications and examples that an engineer or analyst would encounter in practice. Probability is presented as the fundamental tool for modeling uncertainty as well as the logical connection between a population of data and its samples. Descriptive statistics are introduced to describe and characterize data. Inferential statistics provide the means of generalizing to a population from a sample, thus enabling solutions and conclusions that otherwise would not be obtained. Modern software provides the leverage to tackle problems of realistic size and complexity. The concepts and methods covered have direct application to forecasting, queuing, inventory, production, scheduling, equipment replacement, reliability, availability, quality control, experimental design, robust engineering, six sigma, and more. Prerequisitie(s): An undergraduate course sequence in calculus.

ENM 503. Engineering Analysis - Methods & Models. 3 Hours
Mathematical methods and models used in the study and solution of decision problems found in engineering and operations research/management science. The methods and models presented build on the student's mathematical foundation and are motivated by their use in solving real-world problems. This is not a concept-theory course but rather a course designed to enhance the modeling and analysis skills of the student. Prerequisite(s): An undergraduate course sequence in calculus.

ENM 505. Systems Engineering Fundamentals. 3 Hours
This course addresses systems engineering concepts, processes, and tools for developing system solutions to meet stakeholder needs. Topics include systems thinking, structure of complex systems, systems lifecycle, system development processes, engineering design and development, systems engineering competencies, and standards of system engineering documentation. The course emphasizes the interdisciplinary and cross-functional nature of systems engineering.

ENM 515. Human Factors Engineering. 3 Hours
Treatment of theory, data, and methods that can be applied to improve the interface between humans and the systems and products that they us. Human capabilities and limitations are studied to support the design of systems and products for safe and efficient use by the human operator.

ENM 516. Human Factors Engineering in Aviation. 3 Hours
Human factors engineering applies principles of human-machine interaction to the design of advanced automated systems. Safety is the most important aspect of automated systems that the study of human factors strives to improve. Human factors in aviation principles can be applied to various engineering domains. Human factors in aviation examines the cognitive and physical characteristics of users and the systems in which they work. Aviation-related human factors topics include aircraft cockpit design and maintenance, and procedures to complex activities. Human factors engineering is the major component of systems design and evaluation, accident investigation and prevention, and training.

ENM 517. Legal Aspects of Engineering. 3 Hours
This is an introductory course which provides the engineer with insight into the areas of law that will impact an engineer's professional practice. Special emphasis is given to the study of intellectual property including patents, trademarks and copyrights. The course covers points to be considered in entering into contracts, legal options for setting up a business, and the engineer's legal exposure in the design of products, and legal responsibilities as an engineering employee or employer. Students will have the opportunity to participate in a mock trial through interaction with the law school and local judges.

ENM 520. Engineering Management Fundamentals. 3 Hours
This course provides a fundamental knowledge of engineering management, which is an essential function of any engineering development effort. Topics include leadership, organization management, strategic planning and management, financial resource management, project management, quality management, operations management, supply chain management, management of technology, research, and development, systems engineering, engineering management, and professional codes of conduct and ethics.

ENM 525. Global Supply Chain Management. 3 Hours
This course educates students on the fundamental roles played by supply chain management in the global economy. Students will understand the management of local and global supply chain functions and their impact on industries, customers, and suppliers. Students will learn to optimize supply chain resources to reduce costs and improve revenue. Students will learn to utilize data and contemporary tools to make informed decisions in a global supply chain environment.

ENM 530. Engineering Economy. 3 Hours
This is an introductory course in the concept of time value of money and financial management for engineering managers. The course includes learning curves, cost estimating, managerial accounting, balance sheet and income statement, financial ratios, investment alternatives, depreciation, inflation, capital budgeting and other related topics.

ENM 534. Decision Analysis. 3 Hours
Introduction to decision analysis with applications. Topics explored include structuring decisions under uncertainty, influence diagrams, decision trees, risk analysis, sensitivity analysis, value of information, utility theory, and practical decision making. Prerequisite(s): ENM 500 or equivalent.

ENM 539. Project Management. 3 Hours
This course addresses the concepts, techniques and procedures used to manage engineering programs and projects using an integrated approach for planning, execution, and control. It includes an introduction to the systems approach to project management; project screening and selection; multiple-criteria methods for evaluation; work breakdown structures (WBS) and organization; configuration selection, management and control; project scheduling; project budgets; and resource management. A key goal is to provide the student with sufficient knowledge and tools to confidently manage a project or contribute effectively as a project team member.

ENM 540. Lean Production Systems. 3 Hours
This course includes the principles and current practices using Lean Manufacturing to integrate humans, machines, and materials in producing a marketable product. The use of lean methods to design, develop, and implement the production system are covered. Topics include just-in-time, kaizen, 5s, inventory and production control, and assembly line balancing. The Toyota Production System (TPS) framework will be used as the basis for problem solving and continuous improvement applications for production systems. Graduate standing.

ENM 541. Production Engineering. 3 Hours
Study of the integration of man, machine, and material in producing a marketable product. The use of engineering techniques to design, develop, and implement the production system are covered. Topics include break-even analysis, learning curve theory, forecasting, resource balancing, inventory and production control, facility layout and location, job sequencing and scheduling, and assembly line balancing. Modern production techniques such as just-in-time (JIT), MRP systems flexible manufacturing, and computer-integrated manufacturing are discussed. Prerequisites: ENM 500 or permission of instructor.

ENM 560. Quality Assurance. 3 Hours
Introduction to the fundamental concepts and methods of modern approaches to quality management, quality control, and quality assurance. This course provides an overview of quality management philosophies and implementation strategies. Statistical methods for process control and variety of quality assurance tools are introduced. Prerequisite(s): ENM 500 or equivalent.

ENM 561. Design & Analysis of Experiments. 3 Hours
This course introduces advanced topics in experimental design and analysis, including full and fractional factorial designs, response surface analysis, multiple and partial regression, and correlation. Prerequisite(s): ENM 500 or equivalent.

ENM 563. Advanced Engineering Design. 3 Hours
This graduate-level course seeks to develop in students the ability to integrate dynamic mechanisms (i.e., heat transfer, fluid dynamics, electrical responses, etc.) into system modeling and analyses with uncertainty supporting the verification and validation of systems. Additionally, statistically-based analysis, design, and optimization will be addressed through open-ended problems with explicit considerations of system-level impacts, engineering tradeoffs, and system integration. A course project is required that must demonstrate application of the statistically-based design process. Prerequisite(s): ENM 561 or equivalent; Instructor permission.

ENM 564. Lean Six Sigma for Engineers. 3 Hours
This course will provide a broad exposure to topics in quality improvement that encompass the body of knowledge for Six Sigma Black Belts in both manufacturing and service industries, including hospitals, banks and retailers. Essential concepts, practices, methods and tools for quality improvement, lean management, and effective teamwork are examined, along with the Six Sigma DMAIC problem solving approach. Students will be equipped to help organizations achieve operational excellence by applying what is learned within an improvement project case study. Required background: descriptive statistics, confidence intervals, and hypothesis testing.

ENM 565. Reliability Engineering I. 3 Hours
An introduction to reliability engineering concepts and methodology. The reliability, maintainability, and availability of components and multi-component systems are analyzed. Topics include exponential, Weibull, lognormal and normal failure laws, static reliability, hazard rate functions, state dependent failure rate models, redundancy, censoring, empirical models, curve fitting to failure data, and reliability growth testing. Prerequisite(s): ENM 500 or equivalent.

ENM 576. Simulation Modeling for Engineering Managers. 3 Hours
This course is intended to enhance the student's ability to effectively manage simulation projects and use the results to inform and support organizational problem solving and decision making. Students will learn concepts and methods that underlie each major phase of a simulation project while also learning how to build valid models of basic systems. Simulation software will be used to provide students with hand's on experience in designing, building, analyzing and interpreting the results of basic computer simulation experiments and in communicating those results with stakeholders. Prerequisites: ENM 500.

ENM 582. Engineering Organizational Development. 3 Hours
This course addresses individual, group behavior, and organizational design examined within the structure of technical operations, including the systems engineering environment. The objectives are to provide the participants with an understanding of behavioral science and design principles, their effect on organizational performance, and how one applies this science in the management of technical personnel and projects, especially in the systems engineering environment.

ENM 583. Leadership and Engagement for Engineering Diversity. 3 Hours
This course will provide students with an awareness of the barriers, biases and challenges to diversity in engineering, provide strategies that can be used to improve satisfaction in the engineering workplace and in academia; and provide principles and practices that can enhance the students' leadership skills for the engineering workplace.

ENM 585. Engineering Organizational Systems. 3 Hours
Introduction to organizational theory and practice with emphasis on the design of organizational structures for the effective integration of production, research and development, and engineering activities. Special topics include high performing systems, the technical ad-hoc committee, matrix organization, and project management and other current issues.

ENM 587. Leading in Technical Environments. 3 Hours
Understanding and utilizing the keys to leading in technical organizations represents a distinct advantage to individuals and the institutions they serve. Students will be exposed to the underpinning of leadership in engineering environments including tenets,theories,debates, strategies, and innovative techniques. Opportunities to interact with technical leaders from government and industry will be provided. Practical application skills will be developed.

ENM 590. Case Studies in Engineering Management. 3 Hours
This capstone course emphasizes the completion of an engineering management project or study under the direction of a faculty advisor. A well-written report is required. Prerequisite(s): Completion of the engineering management core courses or equivalent.

ENM 595. Special Problems in Engineering Management. 1-3 Hours
SPECIAL PROBLEMS IN ENGINEERING MANAGEMENT This course covers special assignments in engineering management as arranged and approved by the advisor and the program director.

ENM 598. ENM Thesis. 1-6 Hours
Thesis in Engineering Management. Prerequisites: Approval of the thesis prospectus by the student's Advisory Committee and Approval of Program Director.