

# ENGINEERING MANAGEMENT (ENG MGT)

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## **ENG MGT 5000 Special Problems** (IND 0.0-6.0)

Problems or readings on specific subjects or projects in the department. Consent of instructor required.

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## **ENG MGT 5001 Special Topics** (LEC 0.0-6.0)

This course is designed to give the department an opportunity to test a new course. Variable title.

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## **ENG MGT 5070 Teaching Engineering** (LEC 3.0)

Introduction to teaching objectives and techniques. Topics include: using course objectives to design a course; communication using traditional and cutting-edge media; textbook selection; assessment of student learning; grading; student learning styles; cooperative/active learning; and student discipline. Prerequisite: Graduate standing. (Co-listed with Env Eng 5070, Comp Eng 5070, Elec Eng 5070, Civ Eng 5070).

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## **ENG MGT 5099 Research** (IND 0.0-15)

Investigations of an advanced nature leading to the preparation of a thesis or dissertation. Consent of instructor required.

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## **ENG MGT 5110 Managerial Decision Making** (LEC 3.0)

Individual and group decision making processes and principles for engineers and technical managers with emphasis on the limitations of human rationality and the roles of social influence and organizational contexts; principles and skills of negotiation. Prerequisite: Senior or graduate standing.

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## **ENG MGT 5111 Management for Engineers and Scientists** (LEC 3.0)

The transition of the engineer or scientist to manager; study of management roles and theory, organizational systems and behavior, managing and motivating technical personnel, leadership, communication, processes, and customer focus. Prerequisite: Graduate standing.

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## **ENG MGT 5210 Economic Decision Analysis** (LEC 3.0)

Comprehensive treatment of engineering economy including effects of taxation and inflation; sensitivity analysis; decisions with risk and uncertainty; decision trees and expected value, normally includes solutions on personal computer and student problem report. Prerequisite: Graduate students without previous course in engineering economy because of partial overlap.

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## **ENG MGT 5212 Intelligent Investing** (LEC 3.0)

An overview of the essential elements of intelligent investing. Coverage includes stocks, bonds, exchange traded funds, mutual funds, stock screening, fundamental and technical analysis, valuation, market and industry analysis, macroeconomic indicators, investing strategies, and portfolio construction. Prerequisites: Senior or Graduate Standing.

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## **ENG MGT 5312 Advanced Risk Assessment and Reduction** (LEC 3.0)

Safe, secure manufacturing facilities protect the health of employees and the public, preserve the environment, and increase profitability. Methods for systematically identifying hazards and estimating risk improve the safety performance and security of manufacturing facilities. Prerequisite: Senior or Graduate Standing.

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## **ENG MGT 5313 Packaging Management** (LEC 3.0)

Provides a comprehensive background in the field of packaging and its place in productive systems. Emphasizes the design or economics of the system. Analyzes the management of the packaging function and interrelationship with other functions of an enterprise.

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## **ENG MGT 5316 Safety Engineering Management** (LEC 3.0)

This course is an introduction to the principles of safety engineering applied to industrial situations. Job safety analysis, reduction of accident rates, protective equipment, safety rules and regulations, environmental hazards, health hazards, and ergonomic hazards are covered. Prerequisite: Senior or graduate standing.

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## **ENG MGT 5320 Project Management** (LEC 3.0)

Organization structure and staffing; motivation, authority and influence; conflict management; project planning; network systems; pricing, estimating, and cost control; proposal preparation; project information systems; international project management. Prerequisite: Graduate Standing. (Co-listed Sys Eng 5105).

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## **ENG MGT 5330 Advanced Human Factors** (LEC 3.0)

An in-depth review of the foundations of human factors, focusing on the interaction of people with various forms of technology in a variety of environments. Topics include research and evaluation methods, displays (e.g., visual, auditory), attention and information processing, decision making, motor skills, anthropometry, and biomechanics. (Co-listed with PSYCH 5710).

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## **ENG MGT 5410 Industrial System Simulation** (LEC 3.0)

Simulation modeling of manufacturing and service operations through the use of computer software for operational analysis and decision making. Prerequisite: Stat 3115 or Stat 3117.

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**ENG MGT 5411 Engineering Design Optimization** (LEC 3.0)

This course is an introduction to the theory and practice of optimal design as an element of the engineering design process. The use of optimization as a tool in the various stages of product realization and management of engineering and manufacturing activities is stressed. The course stresses the application of nonlinear programming methods. Prerequisite: Math 3304 or 3329.

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**ENG MGT 5412 Operations Management Science** (LEC 3.0)

Application of management science with an emphasis on supporting managerial decision-making. Design and operations of systems are modeled and analyzed using quantitative and qualitative techniques implemented using modern technology. Specific approaches include mathematical modeling and optimization, probabilistic/statistical analysis, and simulation. Prerequisites: Graduate standing.

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**ENG MGT 5414 Introduction To Operations Research** (LEC 3.0)

Mathematical methods for modeling and analyzing industrial systems, topics including linear programming, transportation models, and network models. Prerequisite: Stat 3115 or Stat 3117. Senior or graduate standing.

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**ENG MGT 5510 Industrial Marketing Systems Analysis** (LEC 3.0)

An analysis of the factors of engineered products, customers, communication, promotion, personal selling, persuasion and management within a dynamic industrial sales environment. Prerequisites: Senior or graduate standing.

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**ENG MGT 5511 Technical Entrepreneurship** (LEC 3.0)

Student teams develop a complete business plan for a company to develop, manufacture and distribute real technical/product service. Lectures & business fundamentals, patents, market/ technical forecasting, legal and tax aspects, venture capital, etc., by instructor and successful technical entrepreneurs. Prerequisite: Senior or graduate standing.

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**ENG MGT 5512 Legal Environment** (LEC 3.0)

Study of the effect of the legal environment on the decisions which the engineering manager must make. The course investigates the social forces that produced this environment and the responsibilities incumbent upon the engineer. Prerequisites: Senior or graduate standing.

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**ENG MGT 5513 Energy and Sustainability Management Engineering** (LEC 3.0)

This course explores strategic processes and partnership required for the management of sustainable energy infrastructures and innovation in energy systems. Topics relate to renewable energy, energy efficiencies, energy conversion, energy technology, and economic efficiency of energy sources. Prerequisite: Senior or Graduate Standing.

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**ENG MGT 5514 Patent Law** (LEC 3.0)

A presentation of the relationship between patent law and technology for students involved with developing and protecting new technology or pursuing a career in patent law. Course includes an intense study of patentability and preparation and prosecution of patent applications. Prerequisite: Senior or graduate standing.

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**ENG MGT 5515 Integrated Product And Process Design** (LEC 3.0)

Emphasize design policies of concurrent engineering and teamwork, and documenting of design process knowledge. Integration of product realization activities covering important aspects of a product life cycle such as "customer" needs analysis, concept generation, concept selection, product modeling, process development, and end of product life options. Prerequisites: Junior or above standing. (Co-listed with MECH ENG 5757).

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**ENG MGT 5610 Advanced Facilities Planning & Design** (LAB 1.0 and LEC 2.0)

An integrated approach to the planning and design of facilities; examination of advanced techniques and tools for facility location, space allocation, facility layout materials handling system design, work place design; e.g. mathematical programming and simulation modeling. Prerequisites: Graduate standing.

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**ENG MGT 5613 Value Analysis** (LEC 3.0)

An organized effort at analyzing the function of goods or services for the purpose of achieving the basic functions at the lowest overall cost, consistent with achieving the essential characteristics. Covers the basic philosophy, function analysis, FAST diagramming, creativity techniques, evaluation of alternatives, criteria analysis, and value stream mapping. Prerequisite: Senior or graduate standing.

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**ENG MGT 5614 Supply Chain Management Systems** (LEC 3.0)

This course focuses on the development of logistics management skills related to global supply chains. Particular attention will be given to supply chain systems management as part of the firm's strategic positioning, cultural interactions and transportation sourcing decisions. Prerequisite: Stat 3115 or Stat 3117.

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**ENG MGT 5615 Production Planning And Scheduling** (LEC 3.0)

Introduction to basic techniques of scheduling, manufacturing planning and control, just-in-time systems, capacity management, master production scheduling, single machine processing, constructive Algorithms for flow-shops, scheduling heuristics, intelligent scheduling systems are the topics covered. Prerequisite: Eng Mgt 3310.

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**ENG MGT 5710 Six Sigma** (LEC 3.0)

This course is an introduction to the principles of implementing the Six Sigma philosophy and methodology. Topics include tools and methods including process flow diagrams, cause and effect diagrams, failure mode and effects analysis, gage R&R, capability studies, design of experiments and strategy for organizing six sigma techniques in industry. Prerequisite: Graduate standing.

**ENG MGT 5711 Total Quality Management** (LEC 3.0)

Examination of various quality assurance concepts and their integration into a comprehensive quality management system: statistical techniques, FMEA's, design reviews, reliability, vendor qualification, quality audits, customer relations, information systems, organizational relationships, motivation. Prerequisite: Senior or graduate standing.

**ENG MGT 6000 Special Problems** (IND 0.0-6.0)

Problems or readings on specific subjects or projects in the department. Consent of instructor required.

**ENG MGT 6001 Special Topics** (LEC 0.0-6.0)

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**ENG MGT 6010 Seminar** (IND 0.0-6.0)

Discussion of current topics.

**ENG MGT 6040 Oral Examination** (IND 0.0)

After completion of all other program requirements, oral examinations for on-campus M.S./Ph.D. students may be processed during intersession. Off-campus M.S. students must be enrolled in oral examination and must have paid an oral examination fee at the time of the defense/comprehensive examination (oral/ written). All other students must enroll for credit commensurate with uses made of facilities and/or faculties. In no case shall this be for less than three (3) semester hours for resident students.

**ENG MGT 6050 Continuous Registration** (IND 1.0)

Doctoral candidates who have completed all requirements for the degree except the dissertation, and are away from the campus must continue to enroll for at least one hour of credit each registration period until the degree is completed. Failure to do so may invalidate the candidacy. Billing will be automatic as will registration upon payment.

**ENG MGT 6099 Research** (IND 0.0-15)

Investigations of an advanced nature leading to the preparation of a thesis or dissertation. Consent of instructor required.

**ENG MGT 6101 Advanced Research Methodology in Engineering Management** (LEC 3.0)

An advanced study of research methodology techniques and theories in conducting research activities. The research problems, hypotheses, literature search, data requirements and analyses, interpretation and presentation of results are examined. Prerequisite: Graduate standing. (Co-listed with Sys Eng 6101).

**ENG MGT 6110 Case Studies In General Management** (LEC 3.0)

A quantitative study of engineering management problems related to the functioning of the industrial enterprise through case studies. Prerequisite: Graduate standing.

**ENG MGT 6112 Leadership for Engineers** (LEC 3.0)

Provides engineers with a background in leadership concepts and principles; enables students to develop practical skills in leading and managing through multiple personal assessment. Topics include leadership styles, managing commitments, conflict resolution, change management, emotional intelligence, team dynamics and business ethics. Prerequisite: Eng Mgt 5110.

**ENG MGT 6113 Advanced Personnel Management** (LEC 3.0)

Current practices of procurement and maintenance of technical personnel in research, development, and design organizations. Adaptation of such personnel to the technological enterprise, current practices in personnel administration, labor management relationships.

**ENG MGT 6211 Advanced Financial Management** (LEC 3.0)

Principles of financial organization and management in the technological enterprise; demands for funds; internal and external supply of funds; budgetary control; reserve and dividends policy. Emphasizes systems approach and problems of engineering design and automation as they influence financial decisions. Prerequisite: Graduate standing.

**ENG MGT 6212 Investment** (LEC 3.0)

An introduction to the theory and practice of investment, including financial markets and instruments, security trading, mutual funds, investment banking, interest rates, risk premiums, the capital asset pricing model, arbitrage pricing theory, market efficiency, bonds and the fixed income market, equity valuation, fundamental and technical analysis. Prerequisite: Eng Mgt 1210 or 5210. (Co-listed with Sys Eng 6612).

**ENG MGT 6213 Financial Engineering** (LEC 3.0)

An introduction to financial engineering, with an emphasis on financial derivatives, including the future markets, the pricing of forwards and futures, forward rate agreements, interest and exchange rate futures, swaps, the options markets, option strategies, the binomial and Black-Scholes models for option valuation, the option Greeks, and volatility smiles. Prerequisites: Eng Mgt 1210 or 5210. (Co-listed with Sys Eng 6613).

**ENG MGT 6215 Financial Risk Management** (LEC 3.0)

Techniques and methods for managing financial risk, including portfolio theory, Monte Carlo methods, ARIMA, time series forecasting, Value-at-Risk, stress testing, extreme value theory, GARCH and volatility estimation, random variables and probability distributions, real options, decision trees, utility theory, statistical decision techniques, and game theory. Prerequisite: Eng Mgt 1210 or 5210. (Co-listed with Sys Eng 6615).

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**ENG MGT 6310 Human Systems Integration** (LEC 3.0)

This course considers Human Systems Integration (HSI) in a variety of applications including systems acquisition and training, HSI tools, techniques, and procedures. Prerequisite: Eng Mgt 4330 or Psych 4710.

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**ENG MGT 6322 Case Studies in Project Management** (LEC 3.0)

Includes the main components of the Project Management Institute (PMI) Body of Knowledge; case studies in project management including project implementation, organizational structures, project estimating, project scheduling, project risk management, and conflict management. Prerequisite: Eng Mgt 5320 or equivalent.

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**ENG MGT 6323 Global Project Management** (LEC 3.0)

In depth and advanced topics in project management including project management methodologies, strategic planning for excellence, project portfolio management, integrated processes, culture, and behavioral excellence; normally includes a hands-on group project. Prerequisite: Eng Mgt 5320 or equivalent.

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**ENG MGT 6410 Markov Decision Processes** (LEC 3.0)

Introduction to Markov Decision Processes and Dynamic Programming. Application to Inventory Control and other optimization and control topics. Prerequisite: Graduate standing in background of probability or statistics. (Co-listed with Comp Eng 6310, Mech Eng 6447, Aero Eng 6447, Sys Eng 6217 and Comp Sci 6202).

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**ENG MGT 6412 Mathematical Programming** (LEC 3.0)

Linear optimization and its engineering applications; problem modeling, search-based optimization, the simplex method for solving linear problems, multi-objective optimization, discrete dynamic programming. Applications of optimization in the fields such as transportation, project management, manufacturing and facility location will be discussed. Prerequisites: One of the following: Stat 3113, Stat 3115, or Stat 3117; Math 3108. (Co-listed with Math 6665 and Sys Eng 6412).

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**ENG MGT 6413 Advanced Engineering Management Science** (LEC 3.0)

Solving of managerial problems utilizing management science techniques. Problems are analyzed, modeled and solved using such techniques as linear, goal, dynamic, programming, simulation, statistical analysis or other non-linear methods. Solutions will involve the use of personal or mainframe computers. A study of the current literature in management science will also be conducted. Prerequisite: Eng Mgt 5414 or graduate standing.

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**ENG MGT 6415 Optimization under Uncertainty** (LEC 3.0)

Optimization in the presence of model uncertainty or system stochasticity is discussed. The course covers fundamentals of stochastic programming, robust optimization, and dynamic programming. Prerequisites: Graduate standing. (Co-listed with Sys Eng 6110).

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**ENG MGT 6510 Technological Innovation Management** (LEC 3.0)

Technological innovation is new technology creating new products and services. This course studies the issues of managing technological innovation under four topics: 1) Innovation; 2) New Ventures; 3) Corporate Research & 4) R&D Infrastructure. Prerequisite: Graduate standing.

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**ENG MGT 6511 Advanced Marketing Management** (LEC 3.0)

Study of marketing decision areas in the technically based firm, including product selection and development, marketing research, market development, distribution, advertising, and promotion. Pricing policies including legal aspects and problems in selecting, training and controlling field sales force. Examination of interaction within consumer and industrial marketing environments. Prerequisites: Eng Mgt 5111, Econ 1200.

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**ENG MGT 6610 Advanced Production Management** (LEC 3.0)

Examination of responsibilities of production manager in the technological enterprise for providing finished goods to meet the quality, price, quantity and specification needs of the market place. Study of functions of production manager. Quantitative approach to decision making in production management. Prerequisites: Senior or graduate standing and advanced mathematical modelling competence.

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**ENG MGT 6611 Lean Systems** (LEC 3.0)

Lean Systems embodies a total enterprise philosophy built on removing waste. Concepts such as flow, just-in-time, lead times, inventory turns, standardized work, pull system, value streams, quick changeover, workplace organization, and visual controls are discussed to improve system performance. Prerequisite: Graduate standing.

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**ENG MGT 6710 Design for Six Sigma** (LEC 3.0)

Principles of Design for Six Sigma for product development. Topics include tools and methods including quality function deployment, concept generation, concept selection, product modeling, process development, DFX strategies, failure mode and effects analysis, design of experiments, TRIZ, and robust design. Prerequisite: Eng Mgt 5710.

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