ENGINEERING MANAGEMENT
GRADUATE PROGRAM

Engineering Management Graduate Programs
KU Edwards Campus

KU’s Engineering Management (EMGT) program is pioneering global education by teaming with industry to provide a delivery method that will allow professionals to access the highest quality training regardless of their location or current job assignment.

The M.S. program provides a superior graduate education for technical managers from engineering, science, mathematics, and computer science. EMGT graduates are more effective managers in technology-based organizations and are better able to promote entrepreneurial activities for new businesses.

The EMGT program integrates management with technology by focusing on 3 dimensions:

1. Technical: an understanding of and proficiency in engineering and science.
2. Human: the ability to build a collaborative effort within a group.
3. Conceptual: the ability to apply analytical thought to the management process and to the enterprise as a total system.

The EMGT program offers these emphasis areas: consulting engineering services, manufacturing/process engineering and systems and information technology.

Courses are taught on weekday evenings or Saturdays on the KU Edwards Campus (http://edwardscampus.ku.edu) by Graduate Faculty members of the School of Engineering. All courses are available by e-learning.

The Project Management (PMGT) program will help fill the rising demand for project management expertise in science, information technology, manufacturing, business, construction and engineering.

Project Management responsibilities include creating clear and attainable project objectives, building the project requirements, and managing the triple constraint for projects: cost, time and scope. Project Management involves cross-functional teams to assist in the process of planning, organizing, securing, leading, delegating and controlling of resources to achieve specific goals to meet project objectives. A project manager is often also a client representative and has to determine and implement the exact needs of the client based on knowledge of the firm they are representing.

Program Options:

Master of Engineering, Project Management (M.E.) provides the engineering manager with the skills and knowledge to successfully bridge the fields of engineering, technology, people and business.

Master of Science, Project Management (M.S.) provides the management knowledge and performance competencies which can be used by graduates from multiple disciplines involved in managing a variety of projects.

Courses

EMGT 608. Principles of Engineering Management. 3 Hours.
A study of the principles used by the engineer in managing a technology-based enterprise. Topics include planning, organizing, staffing, directing, and controlling. Prerequisite: Senior or graduate standing in an engineering curriculum or consent of the instructor. LEC.

EMGT 800. Special Topics in Engineering Management. 1-4 Hours.
Advanced or experimental work of a specialized nature representing unique or changing needs and resources in engineering management. RSH.

EMGT 801. Management Theory and Practice for Engineers. 3 Hours.
This course is intended to introduce the student to the basic concepts of management and motivation for the engineering manager and general behavior of technical organizations. This course presents a history of the schools of management thought through the modern research that began the participative management movement. The course will investigate classical motivational theories and management style principles. The student will perform research to determine how their employer or clients apply these theories. LEC.

Applied statistical methods to engineering systems will be introduced in this course for analyzing engineering and management systems. Emphasis will be given to applied regression analysis, analysis of variance, analysis of time dependence by smoothing, Bayes method, time series analysis, auto-regressive moving averages and forecasting model. Prerequisite: Skills in probability, statistics, and computer application. LEC.

EMGT 803. Technological Forecasting and Assessment. 3 Hours.
This course focuses on the impact of technology on society. Techniques of technology forecasting such as Delphi, cross-impact analysis, trend projection, decision trees, and scenarios are discussed. Case studies of technology assessments are presented. Each student is asked to conduct a preliminary technology assessment which is a systematic study of the effects on society which may occur when a technology is introduced or modified. Prerequisite: Elementary skills in statistics, computer programming, and linear algebra. LEC.

EMGT 804. Business Development and Marketing of Professional Services. 3 Hours.
Principles and theories of business development and marketing as applicable to professional engineering and architectural practices. LEC.

EMGT 805. Management of Innovation. 3 Hours.
Management of technology and technological change through innovation, imitation, and obsolescence; planning, organizing, motivation, and control for innovation; organizational climate and its effects on innovative ideas and entrepreneurship; project/product decisions and RD strategies in small and large companies; innovation in multinational corporations. LEC.
EMGT 806. Finance for Engineers. 3 Hours.
A study of finance including financial planning and management in technological based organizations. Topics covered include financial statement analysis, present value of financial markets, capital budgeting, taxes, investment decisions, replacement decisions, cash flow budgets, and sources of capital. LEC.

EMGT 807. Labor and Employee Relations for the Engineering Manager. 3 Hours.
This course is an introduction to labor relations and human resources, including employment practices in unionized and non-union organizations. The course will examine labor relations, human relations and collective bargaining with emphasis on the negotiation and administration of labor agreements. Included will be a survey of the historical, legal, and structural environments that influence the collective bargaining process. Research topics focus on some of the most important issues in the workplace: protecting jobs, increasing productivity, computerization, worker participation, expanding and declining labor markets, and new methods of decision making in the human resources field. LEC.

EMGT 808. Quality Management. 3 Hours.
The overwhelming challenge that faces the U.S. today is the need to regain its competitive position in the world marketplace. This course offers a broad view of Quality Management in that it focuses on the managerial aspects of quality, rather than just the technical. For example, students will learn the Malcolm Baldridge award criteria which focuses on leadership, data analysis, human resources, quality assurance, quality results, and customer satisfaction. In addition, a review of the theory and approaches of the major quality leaders such as Deming, Juran, and Crosby will be covered. Practical applications of TQM concepts in a technological environment will be stressed throughout the course. LEC.

EMGT 809. Personal Development for the Engineering Manager. 4 Hours.
Includes the study of theories, tests for, and objectives of engineering and management ethics. Explores personal values. Measures personality profile and preferred communication style for each student. Includes management of stress, time, and career. Each student prepares career and personal development plans. Managerial writing and communication skills are developed through weekly projects including report and proposal preparation, internal correspondence concerning praise and reprimand, and organizational policy preparation. Interpersonal and nonverbal communication styles are studied. Relies heavily on instructor-assisted peer mediation of topics after introduction of constructive techniques of interpersonal communication. LEC.

EMGT 810. Applications of Quantitative Analysis in Decision Making. 3 Hours.
This course emphasizes the use of general system theory, classical optimization and optimality conditions, model development, and theory and application of mathematical programming, to include: linear programming, dynamic programming, queuing models, integer and non-linear programming, and introduction to decision analysis. Prerequisite: Elementary skills in linear algebra, probability, calculus, and computer application. LEC.

EMGT 811. Engineering Systems Simulation. 3 Hours.
Methods of developing, implementing, and using computer simulations for management processes such as inventory control, waiting lines, project monitoring, and capital investment decisions are covered. Extensive use is made of simulation languages and interactive graphic-supported gaming and decision analysis. Engineering systems and chemical processes are studied under deterministic and stochastic conditions. Two hours lecture, three hours laboratory per week. LEC.

EMGT 812. Law and the Design Professional. 3 Hours.
This course covers: legal doctrines relating to owners, design professionals, and contractors; sources of law, forms of association, and agency; contracts, including formation, rights and duties, interpretation, performance problems, disputes, and claims; standards of care and the management of construction claims; duties and obligations of the design professional, the owner, and the contractor; surety bonds and insurance. Prerequisite: Admission to graduate study in engineering or architecture. LEC.

EMGT 813. Design Project Management in Professional Practice. 3 Hours.
Includes planning, organizing, staffing, directing, and controlling design projects. Treats those topics from viewpoints of profit, cost control, client satisfaction, and project team human relations. Also covers delegation, motivation, team building, performance reviews, conflict resolution, and group dynamics. Presents the project manager's job from an augmented model of the Blake-Mouton grid. Prerequisite: Admission to graduate study in engineering or architecture. LEC.

EMGT 814. Leadership Techniques and Methods for the Engineering Manager. 3 Hours.
Leadership is a balancing act. It requires communicating a compelling vision, convincing others to buy in to that vision, and marshaling resources and talent to make it happen. This course will help new leaders master the complex art of the leadership role by improving decision making and communications, earning trust and building momentum, and inspiring and enabling others to excel. Managers are under increasing pressure to deliver better results faster than the competition. But meeting today's tough challenges requires complete mastery of a full array of management skills, form communications and coaching to public speaking and managing people. LEC.

EMGT 815. Business Relationships and Selling Skills. 3 Hours.
This course will introduce students to the Fundamentals of Business Relationships and Professional Selling. It is suitable for any technical professional who would like to be more effective in "getting their message across" to external or internal customers. Students will learn and connect through class lectures on relationship management including ethical issues in business relationships, experimental exercises on conducting and evaluating dialogues/presentations with groups of Customers/Internal Audiences/Upper Management and through assignments via Blackboard. LEC.

EMGT 816. Energy Management. 3 Hours.
One of the most critical topics for an engineering manager is effective energy cost cutting. This class will be an introduction to the latest strategies for improving lighting, combustion processes, steam generation/distribution, and industrial waste re-utilization. Topics include distributed generation, energy auditing, rate structures, economic evaluation techniques, lighting efficiency improvement, HVAC optimization, combustion and use of industrial wastes, steam generation and distribution system performance, control systems and computers, energy systems maintenance, and renewable energy. LEC.

EMGT 817. Mathematics for the Engineering Manager. 3 Hours.
This comprehensive math course is designed for the needs of the Engineering Manager who may need a "refresher" or to gain greater understanding of math concepts and the relationship to Engineering Management decision-making. LEC.
EMGT 818. Advanced Mathematics for the Engineering Manager. 2 Hours.
This math course is designed to supplement Engineering Management students' math skill and knowledge that is relevant to both the program needs and career needs. This course begins with a higher level of trigonometry and ends with differential equations. LEC.

EMGT 821. Strategic Analysis of Technology Projects. 3 Hours.
A study of the economic feasibility of competing engineering projects including the application of break-even analysis, decisions under uncertainty, decision trees, stochastic models, risk vs. return, and forecasting. A study of the financial figures of merit used to evaluate competing engineering projects including the DuPont rate of return method, the accounting rate of return, the operating return method, return on equity, earnings per share, margin on sales, selling price of stock, corporate credit rating, total sales, market share, market entry, and proforma year-end statements. A study of the strategic evaluation of a project including the proposed product or service, the organization, the environment, and the venture in general. Prerequisite: Admission to the M.S. Engineering Management program or consent of instructor, EMGT 806, a course in applied statistics. LEC.

EMGT 823. Management of Internal Engineering Projects. 3 Hours.
The purpose of this course is to introduce the student to all aspects of managing a project within a company or organization. The entire project life cycle will be covered from inception to close-out, and many practical considerations will be discussed including material procurement, working with contractors and consultants, selecting software, and managing the project team. The course will focus on how to manage project scope, schedule budget, and resources using personal computer software. A semester project is required presenting an example of project management or investigating some aspect of project management in detail. LEC.

EMGT 824. Product Marketing for Engineering Managers. 3 Hours.
Basic principles of marketing as applicable to engineering managers in the production- or operations-based enterprise. Includes a broad overview of the major components of marketing (competition, product, price, promotion, and distribution). Also details the integration of those components into the marketing plan. The students will develop a group marketing plan for an agreed-upon product. Prerequisite: Admission to a graduate program in engineering or Pittsburgh State's technology management program. LEC.

EMGT 830. Case Studies in Engineering Management. 2-3 Hours.
A capstone course for the program which provides an integration of the material presented in the other courses through the utilization of several engineering management case studies. Note: Research paper and presentation are part of the 3 credit hour option. Prerequisite: Completion of a minimum of 21 credit hours in the Engineering Management program. LEC.

EMGT 835. Field Project (M.S.). 1-3 Hours.
A problem in engineering management, the satisfactory completion of which satisfies the project requirement for the degree of Master of Science in Engineering Management. THE.

EMGT 840. Systems Approach to Engineering. 3 Hours.
This is a first course at the graduate level introducing the formal methods and processes in bringing complex systems into being and improving existing systems. Systems include both products and services. Emphasis is placed on: the definition of customer needs, the entire life cycle of systems, and introduction to formal specification methods, the value to cost ratio and the management of the systems engineering process. LEC.

EMGT 844. Managing Software Development Projects. 3 Hours.
This course investigates the area of managing software development and presents the management process as a means of optimizing business considerations and project demands. Uncertainties in product/service specifications, technology risks, cost and delivery requirements impact the management functions. Cost and schedule estimation techniques are presented together with project planning, risk control and measurement technologies. The techniques presented in this course are directly applicable to management in other industry segments. Guest speakers are used to demonstrate applications in this course. LEC.

EMGT 848. Information Technology for Management. 3 Hours.
This course is intended to bring the student up to date on developments in the field of information technology (IT) and to prepare the student to apply those technologies in the workplace. To this end, the course is divided into two components. First, current hardware, software, and networking technologies will be presented. Topics include relational databases, object oriented design and programming, client-server technologies, the Internet, and emerging communication technologies. Second, approaches to evaluating and implementing the range of information technology alternatives available to business will be presented. Topics in this area include software development, management and evaluation, IT project management, information integrity and security, and the effects of IT on people and the organization. LEC.

EMGT 850. Environmental Issues for Engineering Managers. 3 Hours.
This course provides a survey of the environmental regulations, environmental problems, and environmental solutions that must be dealt with by engineering managers regardless of their function or industry. A historical perspective on the environment is presented followed by discussion of pollution generation (sources), transportation, fate, and effects. The quantity and quality of various types of pollutants emitted to various media and the risk posed by these pollutants is analyzed. The regulatory process is examined from the perspective of the legislator, the regulator, the regulated, the engineer, and the public. LEC.

EMGT 854. Management of Business Intelligence and Security for Strategic Planning. 3 Hours.
Management of competitive intelligence and security in business strategic planning is a first course at the graduate level that introduces the formal methods, concepts, and processes of competitive intelligence and security which are vital to both strategic business planning and day-to-day business operations. This course provides access to the tools used to identify what is happening in the business environment including legislation, economics, regulatory changes, competition, customers, etc. that affect a business’ strategy and operations. Further, these tools are applied to determining what will likely happen in the future and how to use those forecasts to optimize strategic and operational plans. LEC.

EMGT 860. Special Problems in Engineering Management. 1-4 Hours.
Graduate-level investigation requiring original, independent research on problems or subjects of immediate interest to a student or faculty member. Intended to develop a student’s capability in coordinating two or more of the following: technology, finance, economics, applied mathematics, and managerial communication. EMGT 860 may be repeated for credit to a maximum of four hours in the degree program. Prerequisite: Approval of an outline of the proposed project by the instructor and the program director. RSH.
EMGT 862. Manufacturing Systems Integration. 3 Hours.
This course develops the rationale and need for the integration of manufacturing systems, and deals with the multitude of practical problems involved with manufacturing systems integration. Topics covered include intelligent manufacturing subsystems and vendor-specific islands of automation, on-line and off-line information sources, and end users of information in the manufacturing enterprise. Engineering details covered include the types of communication links available between systems, communication standards, network and protocol alternatives, and hardware platform alternatives. Management concepts covered include the top-down design/bottom-up implementation approach to system integration, long-range planning and management of integration projects, reliability and security issues, and human factors. LEC.

EMGT 867. Advanced Operations Management. 3 Hours.
This course provides the student with up-to-date information of the management of manufacturing operations. Emphasis is on quantitative methods for designing and analyzing manufacturing processes, simulation of manufacturing processes, and recent paradigms in manufacturing including just-in-time production, synchronous manufacturing, and agile manufacturing. A semester project is required covering some aspect of operations management in detail. LEC.

Courses
PMGT 800. Special Topics: ___. 3 Hours.
Advanced or experimental work of specialized nature representing unique or changing needs and resources in project management. Prerequisite: PMGT 816, Project Management-Master of Engineering plan code, or PMP Certified. LEC.

PMGT 806. Finance for Project Manager. 3 Hours.
A study of finance including financial planning and management in technological based organizations. Topics covered include financial statement analysis, present value of financial markets, capital budgeting, taxes, investment decisions, replacement decisions, cash flow budgets and sources of capital. LEC.

PMGT 809. Personal Development for Project Managers. 4 Hours.
Concepts and skills development in the primary areas of communication methods, ethical behavior, conflict resolution, workforce diversity, and continuous learning, and secondary areas of basic project and project team contexts and related interpersonal relations. Career development is emphasized. LEC.

PMGT 816. Project Management Fundamentals I. 3 Hours.
Managerial concepts and skills development in relation to the project-oriented business environment, project lifecycle, integrated project management, project selection, and project initiation. Focus is on management of a single project. LEC.

PMGT 817. Project Management Fundamentals II. 3 Hours.
Planning concepts and skills development in relation to developing needed information on project scope, time, cost, and risk, and making direct use of such information to develop key documentation such as the project schedule and budget. Examples of specific topics considered include project work content and change, documentation, and resource requirements. Planning content is complementary to that of PMGT 818. Prerequisite: PMGT 816. LEC.

PMGT 818. Project Management Fundamentals III. 3 Hours.
Concepts and skills development in relation to planning for management of communications, human resource aspects of project team formation and development, procurement, and quality. Examples of specific topics considered include information handling, reporting, and stakeholder relationships. Planning content is complementary to that of PMGT 817. Prerequisite: PMGT 817. LEC.

PMGT 819. Project Management Fundamentals IV. 3 Hours.
Concepts and skills development in relation to project execution, including processes monitoring and controlling, and project closure. Examples of specific topics considered include handling change requests, procurement, teamwork and team development, and cost management. Course content represents systematic treatment of all aspects of project management beyond planning—but is, in project execution and closing phrases. Prerequisite: PMGT 818. LEC.

PMGT 820. Management of New Product Development Projects. 3 Hours.
This course discusses how to properly manage new product development processes using project management tools and techniques. New products are not projects until they are analyzed, planned, scheduled, budgeted, managed, and controlled by managers. It is not typically technical process issues that result in failed new product introductions, but rather a failure in their management and marketing. Prerequisite: PMGT 816, Project Management-Master of Engineering plan code, PMP Certified. LEC.

PMGT 821. Management of Consulting Projects. 3 Hours.
Application area course exposing students to specialized knowledge, standard, and regulations involved in managing consulting projects. Attention is directed to unique characteristics of consulting project environments, major project phases-from selection to closing and related management processes. Prerequisite: PMGT 816, Project Management-Master of Engineering plan code, or PMP Certified. LEC.

PMGT 822. Management of Governmental Projects. 3 Hours.
Application area course exposing students to specialized knowledge, standards, and regulations involved in managing projects for governmental entities. Attention is directed to unique characteristics of the governmental project environments, major project phases-from selection to closing and related management processes. Prerequisite: PMGT 816, Project Management-Master of Engineering plan code, or PMP Certified. LEC.

PMGT 823. Risk Management for Project Managers. 3 Hours.
Advanced study of risk management theory and practice as applied in managing projects. Basic concepts and methods of risk management are reviewed—such as qualitative and quantitative risk assessment—and details then examined. Prerequisite: PMGT 816, Project Management-Master of Engineering plan code, or PMP Certified. LEC.

PMGT 824. Project Cost Estimation, Analysis, and Control. 3 Hours.
Advanced study of cost estimation methodology, cost engineering, and cost control applicable in project management. Includes review of commonly used supportive software. Prerequisite: PMGT 816, Project Management-Master of Engineering plan code, or PMP Certified. LEC.

PMGT 825. Portfolio Analysis for Project Managers. 3 Hours.
Concepts and methods of intra-and inter-project finance including inter-organization funding, project evaluation and selection, project cost accounting, portfolio formulation and modification, and performance tracking. Introduces fundamentals of investment theory and real options analysis. Prerequisite: PMGT 816, Project Management-Master of Engineering plan code, or PMP Certified. LEC.
PMGT 826. Program Management. 3 Hours.
Examination of program definition, structuring, and management in the context of organizational strategy, and the critical resources and skills required in long-term program evolution and execution. Facilitation of efforts across multi-tiered organizations will be stressed. Prerequisite: PMGT 816, Project Management-Master of Engineering plan code, or PMP Certified. LEC.

PMGT 827. Project Team Management and Development. 3 Hours.
Concepts and methods of team and team member development, achieving higher-performance teams while satisfying organizational expectations. Specific topics include management concepts and practices, team dynamics, and interpersonal skills in negotiation and conflict resolution. Prerequisite: PMGT 816, Project Management-Master of Engineering plan code, or PMP Certified. LEC.

PMGT 828. Management of Global Projects. 3 Hours.
Survey of management challenges in conducting international projects, emphasizing cross-culture issues. Differences across world regions and selected key countries in relation to communication and interpersonal norms, business conventions, and legal systems will receive particular attention. Prerequisite: PMGT 816, Project Management-Master of Engineering plan code, or PMP Certified. LEC.

PMGT 829. Management of Distributed Project Teams. 3 Hours.
Concepts and methods of conducting high-performance, multi-site team operations, focusing on intra-team communication, coordination, and control. Incorporates review of practical technologies with emphasis on web-enabled approaches. Prerequisite: PMGT 816, Project Management-Master of Engineering plan code, or PMP Certified. LEC.

PMGT 830. Case Studies in Project Management. 2 Hours.
Reinforcement and demonstration of developing project management skills through case analysis and discussion. Goal is integration of learning across all core courses, and also drawing on content from general management, applications area, and advanced project management elective courses taken. Emphasis is on integrated project management. The students will document their project in a written report and present their project during the final oral examination to the Project Management faculty and student’s employer or representative if practical. LEC.

PMGT 833. Management of Internal Projects for Scientists and Technical Professionals. 3 Hours.
The purpose of this course is to introduce the student to all aspects of managing a project within a company or organization. The entire project life cycle will be covered from inception to close-out, and many practical considerations will be discussed including material procurement, working with contractors and consultants, selecting software, and managing the project team. The course will focus on how to manage project scope, schedule budget, and resources using personal computer software. A semester project is required presenting an example of project management or investigating some aspect of project management in detail. LEC.

PMGT 835. Project Management Capstone. 3 Hours.
The capstone serves as a culminating experience for this degree. Students will develop an applied workforce project or benefit to in the student’s place of employment for full time students. The students will document their project in a written report and present their project during the final oral examination to the Project Management facility and student’s employer or representative if practical. Prerequisite: Must complete 21 credit hours. LEC.