Engineering Management Graduate Program

Engineering Management Graduate Programs
KU Edwards Campus

KU’s Engineering Management (EMGT) program pioneers global education by teaming with industry to provide a delivery method that allows professionals access to 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 at 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 uses 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.** Principles used by the engineer in managing technology-based organizations, focusing on core management functions. 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 study of a specialized nature representing unique or changing engineering management knowledge. RSH.

**EMGT 801. Management Theory and Practice for Engineering Managers. 3 Hours.** Foundation for managing in technology-based organizations. Topics include essential management functions, schools of management thought, motivation, and management style. LEC.

**EMGT 802. Statistical Analysis and Prediction of Engineering Systems. 3 Hours.** Production of required statistical analyses and predictions for engineering and management systems. Content from probability through regression and analysis of variance. Prerequisite: Skills in probability, statistics, and computer application. LEC.

**EMGT 803. Technological Forecasting and Assessment. 3 Hours.** Methods of technology assessment and forecasting. Topics include scenario analysis, cross-impact analysis, judgmental mental forecasting methods such as Delphi, and foundational time series forecasting methods such as trend projection and auto-aggressive moving averages. Prerequisite: Elementary skills in statistics, computer programming, and linear algebra. LEC.

**EMGT 804. Business Development and Marketing of Professional Services. 3 Hours.** A broad review of the major components of marketing and integration of these components, culminating in students developing marketing plans for services. Theories, principles, and practices of business development and marketing applied to consulting oriented professional engineering and architectural firms. LEC.

**EMGT 805. Management of Innovation. 3 Hours.** Preparation for managing technological change involving innovation. Topics include essential management functions, innovation types, impact of organizational structure and climate, and change management. LEC.

**EMGT 806. Finance for Engineers. 3 Hours.** An introduction to finance in technology-based organizations. Topics include financial statements analysis, valuation of future cash flows, capital budgeting, risk and return, capital structure, and working capital management. LEC.

**EMGT 807. Labor and Employee Relations for the Engineering Manager. 3 Hours.** Foundation for negotiation and administration of labor agreements. Topics include labor relations; human resources management; employment practices in unionized and non-union organizations; and historical, legal, and structural environments influencing collective bargaining processes. LEC.
EMGT 808. Quality Management. 3 Hours.
Practical application of total quality management (TQM) concepts from planning through customer acceptance in technology-based organizations, focusing on understanding the concepts of the total supply chain, managerial aspects of quality, and improvement methodologies throughout. LEC.

EMGT 809. Personal Development for the Engineering Manager. 4 Hours.
Objectives, theories, and tests of engineering and management ethics and the relationship to personal values, and communications strategies. Development of career and life plans, and personal brand. Strong emphasis on the creation of both written papers and oral presentations. LEC.

EMGT 810. Applications of Quantitative Analysis in Decision Making. 3 Hours.
Practitioner-oriented presentation of managing and implementing optimization methods for improving design and decision making. Focus on methods of mathematical programming (linear, integer, and non-linear), queuing analysis, and decision analysis. Prerequisite: Elementary skills in linear algebra, probability, calculus, and computer application. LEC.

EMGT 811. Engineering Systems Simulation. 3 Hours.
Practitioner-oriented presentation of developing and using discrete-event simulation to improve engineering analysis and design, and management decision making processes, including instruction in a chosen simulation language. LEC.

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

EMGT 813. Design Project Management in Professional Practice. 3 Hours.
Managing design projects, integrating perspectives of profitability and cost control, client satisfaction, and project team relations. Topics include explanation of a project manager's job via 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.
Formulating and communicating a compelling vision, convincing others to pursue that vision, and marshaling resources and talents. Coaching and public speaking. Improving decision making and communications, earning trust and building momentum, and inspiring and enabling others to excel. LEC.

EMGT 815. Business Relationships and Selling Skills. 3 Hours.
Fundamentals of business relationships and professional selling for any technical professional who would like to be more effective in "getting their message across" to external or internal customers. Relationship management, including ethical issues in business relationships. Experimental exercises on conducting and evaluating dialogues/presentations with customers, internal audiences, and upper management. LEC.

EMGT 816. Energy Management. 3 Hours.
Latest strategies for improving lighting, combustion processes, steam generation and distribution, and industrial waste re-utilization. Topics include distributed generation, energy auditing, rate structures, economic evaluation techniques, control systems, and maintenance. LEC.

EMGT 817. Mathematics for the Engineering Manager. 3 Hours.
Comprehensive math course addressing engineering managers' need for a greater understanding of mathematical concepts. LEC.

EMGT 818. Advanced Mathematics for the Engineering Manager. 2 Hours.
Supplements Engineering Management students' mathematical skills and knowledge as relevant to career needs. LEC.

EMGT 821. Strategic Analysis of Technology Projects. 3 Hours.
Strategic assessment of developmental projects, focusing on the proposed product or service, the organization, project details, and the environment. Topics include application of financial figures of merit, feasibility of competing projects, decisions under uncertainty, risk vs return, and forecasting. Prerequisite: Admission to the M.S. Engineering Management program or consent of instructor, EMGT 806, a course in applied statistics. LEC.

EMGT 822. Management of Internal Engineering Projects. 3 Hours.
Managing organizations' technology-oriented projects, both as inside staff and outside consultant. Covers the entire project life cycle as reflected in the Project Management Book of Knowledge. Practical considerations addressed include material procurement, work with contractors and consultants, selecting software, and managing the project team. LEC.

EMGT 824. Product Marketing for Engineering Managers. 3 Hours.
A broad review of the major components of marketing and integration of these components, culminating in students developing marketing plans for new or existing products. Theories, principles, and practices of marketing applied to engineering managers in production or manufacturing. Prerequisite: Admission to a graduate program in engineering or Pittsburgh State's technology management program. LEC.

EMGT 825. Systems Approach to Engineering. 3 Hours.
Formal methods and processes in bringing complex systems into being, and improving existing systems. Topics include formal specification methods, definition of customer needs, systems life cycles, value-to-value analysis, and management of the systems engineering process. LEC.

EMGT 826. Service Management for the Engineering Manager. 3 Hours.
Managing service-oriented organizations. Covers a wide array of industries, addressing service management from four primary perspectives: the basics of service science, the customer encounter,
managing service operations, and the exceptional customer experience. LEC.

EMGT 848. Information Technology for Management. 3 Hours.
Developments in the field of information technology (IT), divided into two realms. First, current hardware, software, and networking technologies, involving relational databases, object-oriented design and programming, client-server technologies, and emerging communications technologies. Second, approaches to evaluating and implementing available information technology alternatives, including software development, management, and development, information integrity and security; and the effects of IT on people and organizations. LEC.

EMGT 850. Environmental Issues for Engineering Managers. 3 Hours.
Survey of environmental problems and their solution, and environmental regulations. Topics include the quantity and quality of various types of pollutants emitted to various media, and the risks posed by these pollutants; the regulatory process; and historical perspective, including pollution generation (sources), transportation, fate and effects. 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.
Original independent research on engineering management problems or subjects of immediate interest. May be repeated for credit to a maximum of four hours. Prerequisite: Approval of instructor. RSH.

EMGT 862. Manufacturing Systems Integration. 3 Hours.
Engineering and management-specific aspects of manufacturing and information systems integration. Engineering topics include agile, flexible, intelligent, and advanced manufacturing sub-systems; material handling and identification; vendor-specific automation; communication linkage between sub-systems; network and protocol alternatives; and hardware platform alternatives. Management topics include implementation approaches, quality management systems, long-range planning, support systems, and integration project management. LEC.

EMGT 867. Advanced Operations Management. 3 Hours.
Strategic issues and practical application of modern and advanced methods for designing and analyzing manufacturing processes and systems. Topics include: forecasting, product and service design, capacity planning, quality management, inventory management, scheduling, supply chain management, project management and simulation of manufacturing processes, and just-in-time, lean, synchronous, and agile systems. 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 802. Innovation and Change Management Process. 3 Hours.
This course will examine innovation models and change management process utilized by successful organizations. The course will emphasize how these concepts relate to project management within an organization and the management of technical operations. The course will address the following topics: -Key models for innovation and how they impact planned change processes -Key organizational factors that impact planning for change -Strategies for change within project work -Resistance to change within planned change process -Ethical considerations relating to change management 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 808. Lean Six Sigma. 3 Hours.
This course is an introduction to the principles of implementing the Lean Six Sigma philosophy and methodology. Lean Six Sigma is a total enterprise philosophy. Topics follow the DMAIC process and include tools and methods such as process flow diagrams, cause and effect diagrams, failure mode and effects analysis, capability studies, and design of experiments. The use of various concepts to reduce waste and improve system performance such as process flow, standardized work, value streams, workplace organization, and visual controls are covered. Course Objectives: -Understand and apply the Six Sigma DMAIC model for improvement activities. -Utilize Six Sigma knowledge and skills to lead successful improvement projects that deliver meaningful results. -Facilitate the use of improvement tools and techniques in improvement projects. 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 810. Financial Management. 3 Hours.
A study of the concepts and applications of financial planning and management for project and operational managers. Topics include time value of money, asset valuation, capital structures and budgeting, financial analysis and cash flow, and project and operational investment decision-making. Course Objectives: -Knowledge and understanding the principles of financial planning and management. -Knowledge and skills with corporate structures, financial institutions, and investments. -Knowledge and skills with financial reports including balance sheets, income statements and financial ratios. -Ability to apply time valuations, cash flows, and taxation in project and operational environments. -Ability to apply capital structures and budgeting in project and operational decisions. LEC.

PMGT 811. Project Contracts and Procurement. 3 Hours.
An advanced study of the project procurement and contract administration bodies of knowledge and their applications. The project procurement's place in a supply chain life cycle is covered from needs identification to contract closeout with emphasis on requirements definition, vendor selection, contract negotiation and award, service delivery, and performance monitoring. Course Objectives: -Knowledge and understanding of the theories, principles, and benefits of the project procurement life cycle. -Knowledge and application of procurement planning and contract administration best practices, processes, and tools. -Practical application of the project management body of knowledge
specific to project procurement management. Practical application of the supply chain and commercial business body of knowledge specific to contract award, execution, and closeout. 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, or 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. 1-2 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. 1-3 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. This course can be taken up to three times for a maximum of three credits. Prerequisite: Must complete 21 credit hours. LEC.

PMGT 860. Project Management Independent Study. 1-4 Hours.
Graduate-level independent study of problems or subjects of immediate interest to a student or faculty member. Project topic to be agreed upon in advance with supervising faculty member. May be repeated for credit up to a maximum of four hours in the degree program. Prerequisite: Consent of instructor. IND.