

# ENGINEERING MANAGEMENT (EMEN)

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## Courses

### EMEN 3100 (3) Introduction to Engineering Management

Examines topics important to the management of engineering activities within organizations. Topics include the relationship of engineering to business and management disciplines, the functions of an engineering manager, principles and techniques for managing financial resource and business ownership. Explores best practices in global engineering management, process management, legal issues, ethics, organizational behavior and communications.

**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) College of Engineering students only.

### EMEN 4030 (3) Project Management Systems

Immerses students in project management, emphasizing practical application throughout a semester-long project. Key topics include project initiation, planning, execution, monitoring, controlling, and closure, along with risk management, communication, and stakeholder engagement. Students work on real or simulated projects, applying project management principles and tools while developing essential skills. Evaluation includes project milestones, presentations, assignments, and a final project report.

**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

### EMEN 4050 (3) Leadership and Professional Skills

Accelerate your personal and professional growth with the essential skills required to become an effective leader/manager. Conduct personal development through exercises in communication and leadership effectiveness. Explore leadership styles, managing commitments, change management, negotiation, conflict resolution, organizational culture, emotional intelligence, team dynamics and business ethics.

**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

### EMEN 4055 (3) Designing for Diversity, Equity and Inclusion in Engineering

Students will focus on the historical narrative of institutions and structures that have shaped instances of inclusion and exclusion in engineering, how their own identity and background shape their thoughts and actions, how transformational leadership is enacted for diversity, equity, and inclusion (DEI), and how involving DEI in the strategic planning process of designing can create additional innovations and opportunities.

**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

### EMEN 4100 (3) Engineering Economics

Introduces engineering cost concepts, financial statements and the corporate economic environment. Includes concepts and methods of analysis of the time value of money, project cost estimation, cash flow analysis, replacement analysis, risk management and financial case statements.

**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

### EMEN 4110 (3) Supply Chain Management

Explores the key issues related to the design and management of supply chains. Covers the efficient integration of suppliers, production facilities, warehouses, and stores so that the right products in the right quantity reach customers at the right time. Focuses on the minimization of the total supply chain cost subject to service requirements imposed by a variety of industries.

**Equivalent - Duplicate Degree Credit Not Granted:** MGMT 4110

**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

### EMEN 4120 (3) Managing Business Processes

Covers the concepts and tools to design and manage business processes. Emphasizes modeling an analysis, information technology support for process activities, and management of process flows. Graphical simulation software is used to create dynamic models of business processes and predict the effect of changes. Prepares students for a strong management or consulting career path in business processes.

**Equivalent - Duplicate Degree Credit Not Granted:** MGMT 4120 and MGMT 5120

**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

### EMEN 4200 (3) Engineering and Entrepreneurship for the Developing World

Use your engineering and problem solving skills, combined with market/industry research, customer interviews, design for manufacturability, stakeholder management and financial modeling to promote entrepreneurship and sustainable change in the developing world. Explore alternative energy, medical devices, phones, internet, recycling, cook stoves, clean water, sanitation and infrastructure.

**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

### EMEN 4400 (3) Quality Management

Examine the concepts, tools, and techniques used in managing and measuring quality and productivity in business. Topics include foundational concepts of quality, customers, the workforce, and processes. Apply the tools and techniques associated with the quality sciences, including statistical methods, design quality, measurement, control, process improvement, six sigma. Discover the basics of performance excellence management, Baldrige Award criteria, strategic planning, leadership, and daily management. Specific examples, case studies from modern companies will be studied.

**Equivalent - Duplicate Degree Credit Not Granted:** MGMT 4400

**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

### EMEN 4405 (3) Systems Engineering

Examines the disciplined process of designing a complex system to meet a specified customer need. We begin with identifying the needed capability through operational and functional analysis, then progress through defining requirements that articulate operational and environmental capabilities that address reliability, maintainability, and producibility considerations across the system lifecycle. The course also introduces technical management tasks to include risk management, technology readiness assessment, and program controls using real-world, current aerospace industry examples.

**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**EMEN 4800 (3) Technology Ventures and Marketing**

Offers an in-depth exploration of technology entrepreneurship through the lens of "The Lean Startup" methodology. You'll gain a comprehensive understanding of key startup concepts like Minimum Viable Product (MVP), venture capital, and the dynamics of early-stage companies. The curriculum combines lectures, workshops, and hands-on projects to equip you with the critical thinking skills and practical experience needed to identify and seize business opportunities in the tech world. Guest speakers from leading FAANG tech companies will occasionally enrich the classroom as guest speakers, providing industry insights.

**Requisites:** Requires prerequisite course of EMEN 4820 (minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**EMEN 4820 (3) Entrepreneurial Product Development**

Organizations are increasingly looking for employees with training and experience in design thinking and innovation. This course will look at product development through a design thinking lens. In addition, this course will be teamwork-oriented, but you will also complete readings and independent activities that will support the group work and ensure your depth of knowledge.

**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**EMEN 4825 (3) New Venture Creation**

Relevant to students seeking to acquire an entrepreneurial toolkit of knowledge and skills for working in the startup world or launching a new venture. Covers the techniques for evaluating the probability of success for a new venture and develops a methodology for entrepreneurial thinking that provides benefits for big and small ventures. The final deliverable is a professional pitch to a group of seasoned investors and the submission of a complete business plan.

**Equivalent - Duplicate Degree Credit Not Granted:** ESBM 4830

**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**EMEN 4830 (3) Special Topics**

**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.

**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**EMEN 4840 (1-3) Independent Study Project**

Available only through approval of Engineering Management Program. Subjects arranged to fit the needs of the particular student.

**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**EMEN 4850 (3) Entrepreneurial Leadership**

Investigate the importance of entrepreneurship, value creation, and the entrepreneurial leader's role in driving innovation and growth. Explore and discuss building a culture of practical, ethical, and empowered leaders, developing a shared purpose, understanding the meaning of values in an organizational setting, and identifying potential negative issues in different roles within an entrepreneurial team. Essential skills learned will facilitate the development of capabilities to adapt leadership approaches/practices in various business and organizational contexts.

**Repeatable:** Repeatable for up to 6.00 total credit hours.

**EMEN 4875 (3) Entrepreneurial Finance**

Teaches the importance of company formation, what metrics are important to investors, types of investments and their pros and cons, company valuation as well as when and how to fundraise.

**EMEN 5005 (3) Introduction to Applied Statistical Methods**

Covers statistical reasoning and analysis in support of business and engineering decision making. Topics include: engineering and applied research, descriptive and inferential statistics to include estimation and hypothesis testing using both traditional parametric as well as nonparametric procedures for research situations involving one or two groups of treatment conditions. The R statistical analysis and programming system is used.

**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5015 (3) Engineering Communication**

Enables students to communicate their thoughts and ideas in written and oral form in professional environments. Understand and demonstrate the ability to write a correctly-formed document. Develop active listening skills, particularly when providing and receiving feedback. Learn to orally communicate ideas by speaking clearly, persuasively, energetically, and with appropriate non-verbal elements. Present in various environments and to various audiences.

**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5020 (3) Finance for Engineering Managers**

This course empowers technical managers to make better financial management decisions about issues like capital budgeting, project selection, financial planning, and working capital management. The course also covers topics essential to engineering managers communicating outside of engineering, including interpreting financial statements, the time value of money, and determining financial metrics of NPV and IRR in project valuation. Special topics covered include triple bottom line accounting and sustainability reporting as part of corporate risk management initiatives.

**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**Recommended:** Prerequisites beginning algebra and familiarity working with Excel spreadsheets.

**EMEN 5030 (3) Fundamentals of Project Management**

Project managers work cross-functionally to plan, monitor, and manage projects to successful completion. This course provides an introduction to the project management discipline, including the processes, tools and techniques used in the management and leadership of projects. Key topics covered include the role of the project manager; the project team; stakeholder communications and management; cost, schedule and risk management; quality in projects; and the project lifecycle.

**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5032 (3) Advanced Project Management**

Advances and elevates the practice of leading technical teams in pursuit of challenging timeline and budget objectives. Emphasizes the study of real-world, judgment-intensive decision-making via case studies drawn from well-known engineering projects. Acquire industry skills and knowledge relevant throughout one's career as engineering manager. Sophisticated tools such as Monte Carlo Analysis are investigated and assessed for real-world utility.

**Requisites:** Requires prereq courses of EMEN 5030 or MBAX 6440 (all min grade B). Restricted to Coll of Engineering grad students, Grad Certificate Engineering (CRTGE), Engr EMEN BAM students students w/ subplans C-ASENEMEN, C-ECENEMEN, C-EEEN-EME or C-MCENEMEN.

**EMEN 5033 (3) Aerospace Program Management**

Addresses project/program management as it is implemented in the aerospace industry. A significant portion of the aerospace industry is project based and these projects typically have responsibilities to two distinct primary stakeholders: the sponsor/customer and the business executing the project. This course expands on the traditional project management scope, specifically studying how the traditional scope of project management is tailored to aerospace projects, and studies how projects fit within the context of an aerospace business. A common, but not exclusive, theme of the course is the management of projects for which the U.S. Government (NASA, Department of Defense) is the customer.

**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**Recommended:** Prerequisite EMEN 5030 Fundamentals of Project Management.

**Grading Basis:** Letter Grade

**EMEN 5042 (3) Quality Management**

Focuses on the principles and practices of quality management in modern organizations. Students will develop an understanding of theories, methodologies, and tools used to achieve and maintain high levels of quality in products and services. Topics covered include Total Quality Management, Six Sigma, Lean Management, ISO 9001, and Continuous Improvement. Students will learn how to design and implement quality management systems, conduct process improvement initiatives, measure / analyze performance data, lead organizational change.

**Requisites:** Restricted to graduate students and Engineering Management BAM students only.

**EMEN 5050 (3) Leading Oneself**

The "Leading Oneself" course offers a comprehensive blueprint for professional's keen on honing their leadership capabilities, starting with the cornerstone of personal excellence. The curriculum delves into essential areas such as personal accountability, genuine leadership traits, individual brand development, enhanced self-awareness, fostering a growth mindset, mastering emotional intelligence, and achieving personal mastery. This content lays the foundation for all leadership to follow.

**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5052 (3) Leading Others**

Understand and apply leadership techniques that develop and sustain a high-powered technical organization. Specifically, students evaluate qualities associated with successful leaders, learn practical leadership skills such as defining roles and responsibilities, setting vision, coaching, and dealing with conflicts. The course then addresses team building, from hiring the right team members, to managing the team, and conducting effective team meetings.

**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5053 (3) Leading Technical Organizations**

Leadership of technical, complex organizations is challenged by the pace of technology development, innovation, hyper competition by new entrants and a workforce that demands to be engaged and recognized. Examining relevant technical organization leadership skills using the context of stakeholder value creation is the basis of this course. The class explores how leaders multiply their abilities by leading through others, develop an accountable team, build enduring relationships, exhibit leadership presence, and create executable strategies.

**Repeatable:** Repeatable for up to 3.00 total credit hours.

**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5054 (3) Neuroscience of Leadership**

Examines leadership techniques through the lens of social cognitive neuroscience and psychology. Utilizing the latest research, we develop a leadership practice based on neuroscience. Consideration for leading oneself, leading others and leading organizations is covered. Topics include neuroplasticity, psychological safety, resilience, mental toughness, primal power of storytelling, improv and creativity, as well as the subtle power of influence.

**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5055 (3) Leading for Diversity, Equity and Inclusion in Engineering**

This course focuses on the importance of embedding diversity equity inclusion (DEI) in engineering workplace environments. Students focus on the historical narrative of institutions and institutional structures that have shaped instances of inclusion and exclusion in engineering, how their own identity and background shape their thoughts and actions, and how transformational leadership is enacted for DEI in a challenging atmosphere.

**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5065 (3) Global Topics in Aerospace**

Examining current international space topics including civil, military, and commercial activities forms the basis for this course. The origins and evolution of space policy and laws, current organizational and governance structures, space economics, space sustainability, human exploration strategies, the future of space exploration, and recent developments in the commercial space sector will be analyzed. The course exposes students to the current context of the industry to prepare them for a career in the space economy.

**Repeatable:** Repeatable for up to 6.00 total credit hours.

**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5080 (3) Ethical Decision-Making in Engineering Management**

Learn how to recognize ethical issues and dilemmas affecting managers in the workplace. Understand various models and practices offering solutions to these issues and how to create a culture of ethics and integrity in supporting and/or building a profitable, healthy and responsible organization.

**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5090 (3) Marketing and Technology Ventures**

Why do great products often lose in tech markets? This course analyzes processes for developing the customer bases essential for commercial success. Student teams develop strategic launch programs for actual tech startups of their choosing. Students will analyze and discuss real-world case studies and alternative strategies. Structured towards professional applicability for engineers in large enterprises as well as startups.

**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5094 (3) Technology Entrepreneurship**

This course is designed for engineers, project managers, and technical leaders interested in learning how to leverage technology to solve problems and meet emerging market demands. Students learn how to apply a holistic approach that engages an entrepreneurial mindset with methods like entrepreneurial systems thinking and opportunity pattern recognition to identify and address target customer needs. The course empowers students with the knowledge, skills, and methods needed to create and launch a new technology company.

**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5215 (3) Applied Sustainability for Engineering Managers**

Provides students the tools to integrate sustainability into business. The course explores why social and environmental sustainability are important, and how successful companies are incorporating sustainability as a core strategy. It then addresses the engineer's role in developing sustainable products through principles of the circular economy and life cycle assessment. The course culminates with a discussion of triple bottom line accounting, and how companies use the sustainability report to demonstrate progress toward their sustainability goals.

**Repeatable:** Repeatable for up to 6.00 total credit hours.

**Requisites:** Restricted to graduate students and Engineering Management BAM students only.

**EMEN 5220 (3) Product Design for the Circular Economy**

Product Design for the Circular Economy provides the tools and knowledge necessary to implement Circular Economy (CE) principles, including design frameworks defined by Design for  $\zeta R \zeta$ , Cradle-to-Cradle, Biomimicry, ISO 14000 and several EU Directives. Products can be certified if they meet certain criteria, and the course covers the major certifications available today. Finally, the course shows how companies report their progress using methods prescribed by the Global Reporting Initiative (GRI).

**EMEN 5225 (3) Sustainable and Resilient Operations and Supply Chains**

Innovative organizations need leaders and managers who understand the complex nature of corporate social responsibility, sustainability, and resilience. In this course, students will learn strategies to become good corporate citizens while still creating value for stakeholders. Students will learn concepts and practices companies employ to manage business processes that meet business needs while reducing negative impacts on the pollution and waste. You will also learn to build a more sustainable and socially responsible supply chains.

**EMEN 5230 (3) Resilience Engineering and Leadership in Crisis**

This course examines the qualities, concepts, and methodologies of resilience leadership amid conditions of chaos, uncertainty, and catastrophic breakdowns of complex social, ecological, and technological systems. The curriculum draws on topics from resilience policy, resilience engineering, crisis leadership, contemporary literature, and current events. These components collectively build a comprehensive understanding of resilience as a dynamic blend of processes embedded within and across complex systems like critical infrastructure essential to public health, safety, security, and well-being.

**Requisites:** Restricted to graduate students and Engineering Management BAM students only.

**Grading Basis:** Letter Grade

**EMEN 5315 (3) Business Law for Engineering Managers**

Provides engineering students an introduction to important areas of business law likely to be encountered as technology and engineering managers. Topics include fundamental legal concepts, intellectual property and strategy, contracts, data privacy and product liability. The course uses experiential and practical approaches and exercises to enable the student to identify and address critical legal issues in real-world business contexts.

**Repeatable:** Repeatable for up to 6.00 total credit hours.

**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5400 (3) Technical Product Development**

Product Development introduces contemporary methods like design thinking and sustainability for the circular economy to identify and create products and services that address verified customer needs and problems. By focusing on solutions and benefits offered, the course takes a project-based approach from ideation, concept development, and prototyping to customer validation, pricing, and productization. Students learn how to present their product concepts to senior management or potential investors and showcase their prototypes in a tradeshow-like setting.

**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5405 (3) Fundamentals of Systems Engineering**

Examines the disciplined process of designing a complex system to meet a specified customer need. We begin with identifying the needed capability through operational and functional analysis, then progress through defining requirements that articulate operational and environmental capabilities that address reliability, maintainability, and producibility considerations across the system lifecycle. The course also introduces technical management tasks to include risk management, technology readiness assessment, and program controls using real-world, current aerospace industry examples.

**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5415 (3) Systems Requirements, Verification and Validation Fundamentals**

This course introduces the concepts of Requirements, Verification and Validation as applied during system development. Students completing this course will understand the terminology, usage, planning, organization roles, as well as how these methods are used during the system development lifecycle and how to determine what methods are appropriate for the type of project they may be working.

**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**Grading Basis:** Letter Grade

**EMEN 5500 (3) Lean and Agile Management**

Learn lean and agile concepts and tools to improve customer value, improve processes and reduce waste. Examine and apply lean and agile principles in diverse circumstances including hardware/software, product development/ongoing operations and manufacturing products/providing services. Apply your learning to improving performance in current responsibilities, whether as an individual contributor or as a manager.

**Equivalent - Duplicate Degree Credit Not Granted:** OPIM 6080

**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5830 (3) Special Topics**

**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.

**Requisites:** Restricted to graduate students and Engineering Management BAM students only.

**EMEN 5840 (1-3) Independent Study Project**

Available only through approval of graduate advisor. Subjects arranged to fit the needs of the particular student. Non-EMP students require instructor permission.

**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.