

ENGINEERING MANAGEMENT

The Lockheed Martin Engineering Management Program (EMP) is a management and leadership program that prepares students in the engineering and technical fields for early to mid-career positions. It is designed for students who are looking to advance in management, successfully contribute to the overall business or venture, and develop leadership skills.

The program offers a Master of Engineering, four engineering dual degrees and graduate certificates. Courses are offered both on campus and online (available in real-time distance class participation, as well as recorded videos for later viewing) to meet the needs of busy professionals. Courses are taught by faculty whose expertise in the engineering and technical industry and business leadership bring real-world experiences to the classroom.

For more information, visit the Lockheed Martin Engineering Management Program (EMP) (<http://www.colorado.edu/emp/>) website.

Course code for this program is EMEN.

Master's Degree

- Engineering Management - Master of Engineering (ME) (<https://catalog.colorado.edu/graduate/colleges-schools/engineering-applied-science/programs-study/engineering-management/engineering-management-master-engineering-me/>)

Certificates

- Design for the Circular Economy (<https://catalog.colorado.edu/graduate/colleges-schools/engineering-applied-science/programs-study/engineering-management/design-circular-economy-graduate-certificate/>)
- Design for the Circular Economy (Online) (<https://catalog.colorado.edu/graduate/colleges-schools/engineering-applied-science/programs-study/engineering-management/engineering-management-master-engineering-me-online/design-circular-economy-graduate-certificate-online/>)
- Engineering Management in the Aerospace Industry (<https://catalog.colorado.edu/graduate/colleges-schools/engineering-applied-science/programs-study/engineering-management/engineering-management-aerospace-industry-graduate-certificate/>)
- Innovation and Entrepreneurship in Engineering (<https://catalog.colorado.edu/graduate/colleges-schools/engineering-applied-science/programs-study/engineering-management/innovation-entrepreneurship-engineering-graduate-certificate/>)
- Leadership and Management (<https://catalog.colorado.edu/graduate/colleges-schools/engineering-applied-science/programs-study/engineering-management/leadership-management-graduate-certificate/>)
- Project Management (<https://catalog.colorado.edu/graduate/colleges-schools/engineering-applied-science/programs-study/engineering-management/project-management-graduate-certificate/>)

Partnership Certificate

- Water Engineering and Management (<https://catalog.colorado.edu/graduate/colleges-schools/interdisciplinary-programs/water-engineering-management-graduate-certificate/>)

Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Angel, George
Lecturer; BS, University of Albuquerque

Bozic, Christy L. (https://experts.colorado.edu/display/fisid_155482/)
Scholar in Residence, Endowed/Named Professor, Faculty Director; PhD, Purdue University

Crofton, Karen (https://experts.colorado.edu/display/fisid_164479/)
Scholar in Residence; MBA, Rice University

Dietrich, Alex
Scholar in Residence; MBA, George Washington University

Duren, Ron G. Jr. (https://experts.colorado.edu/display/fisid_157263/)
Teaching Associate Professor; ME, University of Colorado Boulder

Egan, Kristen
Lecturer; ME, University of Colorado Boulder

Gazarik, Michael
Lecturer; PhD, Georgia Institute of Technology

Katz, Tami
Lecturer; PhD, Colorado State University

Kirschling, Wayne (https://experts.colorado.edu/display/fisid_123149/)
Professor Emeritus; DBA, University of Colorado Boulder

Kramer, Amy
Lecturer; JD, University of Colorado Boulder

Leeker, Eric
Lecturer; MBA, Purdue University

Leeker, Jessica Rush (https://experts.colorado.edu/display/fisid_167166/)
Endowed/Named Professor, Faculty Director, Scholar in Residence; PhD, Purdue University

Martin, Wendy Lynn (https://experts.colorado.edu/display/fisid_154942/)
Teaching Associate Professor; ME, University of Colorado Boulder

McCluskey, Alyssa
Lecturer; PhD, University of Colorado Boulder

Moorer, Daniel F. Jr. (https://experts.colorado.edu/display/fisid_151590/)
Scholar in Residence; PhD, University of Colorado Boulder

Murray, Seth (https://experts.colorado.edu/display/fisid_148038/)
Teaching Assistant Professor; ME, University of Colorado Boulder

Ouellette, Steven M. (https://experts.colorado.edu/display/fisid_131150/)
Lecturer; ME, University of Colorado

Peters, Damien
Lecturer; MBA, Massachusetts Institute of Technology

Readey, Michael J. (https://experts.colorado.edu/display/fisid_157363/)
Scholar in Residence, Endowed/Named Professor, Associate Faculty Director; PhD, Case Western Reserve University

Svoboda, John D. (https://experts.colorado.edu/display/fisid_154884/)
Teaching Assistant Professor; MBA, University of California-Los Angeles

Thomas, John (https://experts.colorado.edu/display/fisid_167167/)
Scholar in Residence; PhD, Arizona State University

Tobey, Kathryn
Scholar in Residence; ME, University of Colorado Boulder

Van Atten, Bill
Lecturer; MS, Johns Hopkins University

Courses

EMEN 5000 (3) Engineering Principles

Provides an appreciation, understanding, and perspective of the tasks and challenges faced in engineering disciplines. This introductory course offers non-engineers insight into how engineers think and approach problems. Explores different engineering disciplines by evaluating the tools used, main concepts, and how the discipline impacts daily life. Through a series of case studies, students will review successful and unsuccessful engineering projects.

Requisites: Restricted to graduate students in Engineering Management Program (EMEN) only.

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 5010 (3) Introduction to Engineering Management

Learn concept, methods, activities and philosophies of business and be encouraged to utilize them in your professional activities. Interact with engineering management faculty who share what works based upon their engineering management experiences. Engage with our classmates on their business experience, thereby preparing you to interact more thoughtfully and knowledgeably with your professional colleagues.

Requisites: Restricted to Engineering Management (EMEN) graduate students or Graduate Certificate Engineering (CRTGE) students only.

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 5031 (3) Software Project Management

Introduces software project management as a critical element of software development activities throughout every area of human endeavor. Learn the software life cycle, software configuration management, code reviews, architectural influences and quality assurance with automated testing. Explore the impact on project success of the Capability Maturity Model (CMM) and United Modeling Language (UML).

Requisites: Restricted to College of Engineering graduate students or Graduate Certificate Engineering (CRTGE) students only.

Recommended: Prerequisite software development experience.

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 5043 (3) Systems for Quality Improvement

Advanced study of methods, tools, techniques and systems associated with advanced quality applications. Includes a survey of advanced process control technologies, control schemes and measurement system analysis.

Requisites: Requires prerequisite course of EMEN 5042 (minimum grade B). Restricted to College of Engineering graduate students or Graduate Certificate Engineering (CRTGE) 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 2R, 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 5316 (3) Engineering and the Legal Process

Provides engineering students the experience of working through a product litigation case, beginning with understanding why products fail, to the various stages of the litigation process culminating in a mock trial where engineers are on the stand as expert witnesses. This course meets concurrently with LAWS 7343, engaging both engineering and law students in the same learning environment.

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 5710 (3) Enterprise Strategic Management

Student Teams launch a virtual company in a simulated tech-driven manufacturing industry. Plot your strategic direction and make tactical choices in product development, marketing, manufacturing, operations and finance. Present a business pitch and executive summary to secure venture capital or angel funding. The course focuses on the interplay among organizational functions. Targeted towards future general management and entrepreneurial roles.

Requisites: Requires prerequisite course of EMEN 5610 (minimum grade B). Restricted to College of Engineering graduate students or Graduate Certificate Engineering (CRTGE) students only.

EMEN 5825 (3) Intrapreneurship & Innovation

Learn a comprehensive set of business concepts, skills and tools to launch and manage intrapreneurial ventures. Engage with faculty, classmates, guest speakers, industry professionals, potential customers and one's leadership team to help you launch your venture. Develop the necessary skills, tools and awareness to be successful colleagues, managers and leaders in scientific and engineering industries. Gain valuable business acumen using a hands-on and learning environment.

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.

EMEN 6805 (1) Capstone Preparation

Students determine capstone research question, conduct literature review, develop research methodology and project plan, write a proposal, and select capstone committee.

Requisites: Requires prerequisite course of EMEN 5825 or EMEN 5900 (minimum grade C+). Restricted to graduate students in Engineering Management Program (EMEN) only.

EMEN 6810 (3) Capstone

Students use skills developed from their previous EMP courses to conduct an agreed-upon project (applied research, critical review, business proposal, management tool, etc.) on a topic of their interest. The course instructor and a specialized technical advisor will help guide the student to produce a high-quality project to be presented to the capstone committee for evaluation.

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.

Grading Basis: Letter Grade

EMEN 6940 (1) Master's Candidate for Degree

Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.

Requisites: Restricted to graduate students in Engineering Management Program (EMEN) only.