ENGINEERING MANAGEMENT

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

The program offers a Master of Engineering, five engineering dual degrees, graduate certificates and Six Sigma certification. 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) (catalog.colorado.edu/graduate/colleges-schools/engineering-applied-science/programs-study/engineering-management/master-engineering-me)

Certificates

- Engineering Entrepreneurship (catalog.colorado.edu/graduate/colleges-schools/engineering-applied-science/programs-study/engineering-management/engineering-entrepreneurship-graduate-certificate)
- Engineering Management (catalog.colorado.edu/graduate/colleges-schools/engineering-applied-science/programs-study/engineering-management/engineering-management-graduate-certificate)
- Leadership and Management (catalog.colorado.edu/graduate/colleges-schools/engineering-applied-science/programs-study/engineering-management/leadership-management-graduate-certificate)
- Managing Applied Research in Technology (catalog.colorado.edu/graduate/colleges-schools/engineering-applied-science/programs-study/engineering-management/managing-applied-research-technology-graduate-certificate)
- Performance Excellence in Technology Management (catalog.colorado.edu/graduate/colleges-schools/engineering-applied-science/programs-study/engineering-management/performance-excellence-technology-management-graduate-certificate)
- Project Management (catalog.colorado.edu/graduate/colleges-schools/engineering-applied-science/programs-study/engineering-management/project-management-graduate-certificate)
- Quality Systems for Product and Process Engineering (catalog.colorado.edu/graduate/colleges-schools/engineering-applied-science/programs-study/engineering-management/quality-systems-product-process-engineering-graduate-certificate)
- Six Sigma Statistical Practitioner (catalog.colorado.edu/graduate/colleges-schools/engineering-applied-science/programs-study/engineering-management/six-sigma-statistical-practitioner-graduate-certificate)
- Technology Ventures & Product Management (catalog.colorado.edu/graduate/colleges-schools/engineering-applied-science/programs-study/engineering-management/technology-ventures-product-management-graduate-certificate)
- Renewable and Sustainable Energy (http://www.colorado.edu/emp/programs/graduate-program/certificates/renewable-and-sustainable-energy)
- Water Engineering and Management (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
Instructor

Bailey, Wendy Lynn (https://experts.colorado.edu/display/fisid_154942)
Instructor

Bozic, Christy L (https://experts.colorado.edu/display/fisid_155482)
Professor, Lecturer; PhD, Purdue University

Buzzard, Frank
Instructor; MS, University of Houston

Cass, Stein
Instructor; PhD, Colorado Technical University

Dasan, Vasa
Instructor; PhD, Colorado State University

Duren, Ronald
Instructor; MS, University of Colorado

Gibson, Elizabeth
Professor; PhD, Portland State University

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

Littlejohn, Ray Lynn (https://experts.colorado.edu/display/fisid_151752)
Professor; PhD, University of Oklahoma Norman Campus

MacMillan, Megan
Instructor; PhD, University of Colorado Boulder

McCluskey, Alyssa
Instructor; PhD, University of Colorado

McDonald, Patricia
Instructor; MBA, Southern Illinois University at Edwardsville

Moorer, Daniel Fuller (https://experts.colorado.edu/display/fisid_151590)
Professor; PhD, University of Colorado Boulder

Murray, Seth (https://experts.colorado.edu/display/fisid_148038)
Instructor; ME, University of Colorado Boulder
EMEN 5000 (3) Engineering Principles
Provides an appreciation, understanding, and perspective of the tasks and challenges faced in engineering disciplines. Offers 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.

EMEN 5005 (3) Introduction to Applied Statistical Methods
Covers statistical reasoning and statistical analysis for applications related to business and engineering decision making. Topics include an introduction to engineering and applied research, descriptive statistical analysis and its foundations, 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.

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.

EMEN 5020 (3) Finance and Accounting for Engineering Managers
Learn concepts and skills necessary to assess financial performance, including the analysis of income statements, balance sheets and cash flow statements. Apply the concepts and skills of corporate finance to your personal finance, including the creating of a diversified investment portfolio. Enhance your management credentials by being knowledgeable in corporate finance.

EMEN 5030 (3) Fundamentals of Project Management
Provides an in-depth introduction to the project management discipline, including the concepts, tools and techniques used in the management and leadership of projects small and large alike. Key topics covered include the role of the project manager; project team selection and management; cost, schedule and risk management; quality in projects; introduction to creating and maintaining project plans through the project lifecycle.

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).

EMEN 5032 (3) Advanced Topics in Project Management
Covers advanced topics in project management from a systems view based on the Project Management Body of Knowledge (PMBOK); spans the entire project life cycle. Non-EMP students require instructor consent.

EMEN 5040 (3) Quality, Strategy, and Value Creation
Introduces the fundamentals of Business Performance Excellence (BPE including theories of leadership, theories of business, core competencies, Deming's theory of Profound Knowledge, strategic differentiation and all of the elements of strategy development.) Addresses strategic planning and policy deployment to map the company's strategy to all parts of the organization, a process strengthened through employee empowerment.

EMEN 5041 (3) Advanced Topics in Value Creation
Focuses on the advanced study of methods designed to maximize excellence in business performance. Includes a model to understand process and product tradeoffs, interactions with supplies, integrated manufacturing systems and meeting customer requirements while maximizing profitability. These characteristics are addressed both strategically and tactically through the use of case analysis, field study and experiential learning for production and service sectors.

EMEN 5042 (3) Methods for Quality Improvement
Develop in-depth expertise in the concepts, tools and techniques used in the management and measurement of quality and productivity. Apply statistics and probability to the topics of process variation and statistical process control and capability analysis for process, product, and measurement systems. Explore an introduction to design of experiments (DOE) in business and industry to improve both quality and performance.

Courses

**EMEN 5000 (3) Engineering Principles**
Provides an appreciation, understanding, and perspective of the tasks and challenges faced in engineering disciplines. Offers 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.

**EMEN 5005 (3) Introduction to Applied Statistical Methods**
Covers statistical reasoning and statistical analysis for applications related to business and engineering decision making. Topics include an introduction to engineering and applied research, descriptive statistical analysis and its foundations, 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.

**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.

**EMEN 5020 (3) Finance and Accounting for Engineering Managers**
Learn concepts and skills necessary to assess financial performance, including the analysis of income statements, balance sheets and cash flow statements. Apply the concepts and skills of corporate finance to your personal finance, including the creating of a diversified investment portfolio. Enhance your management credentials by being knowledgeable in corporate finance.

**EMEN 5030 (3) Fundamentals of Project Management**
Provides an in-depth introduction to the project management discipline, including the concepts, tools and techniques used in the management and leadership of projects small and large alike. Key topics covered include the role of the project manager; project team selection and management; cost, schedule and risk management; quality in projects; introduction to creating and maintaining project plans through the project lifecycle.

**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).

**EMEN 5032 (3) Advanced Topics in Project Management**
Covers advanced topics in project management from a systems view based on the Project Management Body of Knowledge (PMBOK); spans the entire project life cycle. Non-EMP students require instructor consent.

**EMEN 5040 (3) Quality, Strategy, and Value Creation**
Introduces the fundamentals of Business Performance Excellence (BPE including theories of leadership, theories of business, core competencies, Deming's theory of Profound Knowledge, strategic differentiation and all of the elements of strategy development.) Addresses strategic planning and policy deployment to map the company's strategy to all parts of the organization, a process strengthened through employee empowerment.

**EMEN 5041 (3) Advanced Topics in Value Creation**
Focuses on the advanced study of methods designed to maximize excellence in business performance. Includes a model to understand process and product tradeoffs, interactions with supplies, integrated manufacturing systems and meeting customer requirements while maximizing profitability. These characteristics are addressed both strategically and tactically through the use of case analysis, field study and experiential learning for production and service sectors.

**EMEN 5042 (3) Methods for Quality Improvement**
Develop in-depth expertise in the concepts, tools and techniques used in the management and measurement of quality and productivity. Apply statistics and probability to the topics of process variation and statistical process control and capability analysis for process, product, and measurement systems. Explore an introduction to design of experiments (DOE) in business and industry to improve both quality and performance.
EMEN 5043 (3) Advanced Topics in Quality Systems/Engineering
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. Non-EMP students require instructor consent.
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
Provides working engineers a background in leadership concepts and methods and enables students to develop practical leadership skills through numerous in-class exercises and experimentation based assignments. Topics include authentic leadership, motivating self and others, cultivating emotional intelligence, personal mastery, creating accountability, conflict resolution, leading change and organizational culture. Required for all Engineering Management degree students.
Equivalent - Duplicate Degree Credit Not Granted: TLEN 5050
Requisites: Restricted to College of Engineering graduate students or to Graduate Certificate Engineering (CRTGE) students only.

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 or to Graduate Certificate Engineering (CRTGE) students only.

EMEN 5090 (3) Marketing and Technology Ventures
Learn the basics of marketing for developing a technology innovation as a commercially successful product, including customer development as a part of product development. Designed to be of interest to engineers in existing companies and startups. The format includes in-depth discussions of real-world case studies and marketing strategies for the high tech environment. Non-EMP students require instructor consent.

EMEN 5094 (3) Entrepreneurship for Engineers
Explores the process of new venture creation as it relates to both launching a technology-based startup (entrepreneurship), and the integration of new products and services within an existing high tech environment. The format includes in-depth discussions of real-world case studies and marketing strategies for the high tech environment. Non-EMP students require instructor consent.

EMEN 5405 (3) Fundamentals of Systems Engineering
Examines the disciplined processes of designing and managing complex systems over their life cycle. Requirements engineering, reliability, logistics, team leadership, testing and evaluation, maintainability and other disciplines are examined with focus on the system engineering of small spacecraft.
Requisites: Restricted to College of Engineering graduate students or Graduate Certificate Engineering (CRTGE) students only.

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 or Graduate Certificate Engineering (CRTGE) students only.

EMEN 5610 (3) Advanced Statistical Methods for Engineering Research
Combines intermediate and advanced statistical methods (Two- and Three-Way ANOVA and post hoc analyses for a large variety of specific designs). Real data sets are employed permitting a focus on engineering research in support of business decision making through the integration of cost benefit analysis and process performance. Parametric as well as nonparametric methods of analysis are included.
Requisites: Requires prerequisite course of EMEN 5900 (minimum grade B). Restricted to College of Engineering graduate students or Graduate Certificate Engineering (CRTGE) students only.

EMEN 5620 (3) Data Mining and Screening Experiments for Engineering Research
Combines intermediate and advanced statistical methods with practical research applications. Develops commonly used statistical models such as Two and Three-Way Analysis of Variance and the analysis of Fractional Factorial Designs for the solution of common business and industrial research problems. The statistical models are implemented and interpreted in the context of actual data sets using available statistical software.
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 5710 (3) Applied Business Decisions
Team up with fellow classmates to launch a high-tech company as part of an eight quarter project in a competitive, simulated business environment. Make decisions in product development, marketing, operations and finance based on results of the previous quarter. Prepare a business pitch and executive summary to justify additional venture capital or a bank loan. Non-EMP students require instructor consent.
Requisites: Requires prerequisite course of EMEN 5020 (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
Non-EMP students require instructor consent.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering graduate 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 graduate students in Engineering Management Program (EMEN) only.

EMEN 5900 (3) Research Methods and Experimental Design
Explores commonly used research methods including analytical, agreement, descriptive and relational methods; experimental design including incorporation, nesting, blocking and controlling; threats to the internal and external validity of research. Also reviewed are sampling procedures and considerations, measurement validity and reliability, and managing the research study.
**Requisites:** Requires prerequisite course of EMEN 5005 (minimum grade B). Restricted to College of Engineering graduate students or Graduate Certificate Engineering (CRTGE) students only.

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 (2) Capstone Completion
Continues EMEN 6805 as the second half of a two-course sequence for the engineering management capstone project. Students conduct agreed-upon research, research and analyze results, develop recommendations, write a final report, and present the project to the committee for evaluation.
**Requisites:** Requires prerequisite course of EMEN 6805 (minimum grade C+). Restricted to graduate students in Engineering Management Program (EMEN) only.

EMEN 6940 (1) Master's Degree Candidate
**Requisites:** Restricted to graduate students in Engineering Management Program (EMEN) only.
**Grading Basis:** Pass/Fail