Engineering Management (EM)

EM 501/EGR 501 Engineering Leadership and Strategic Change (3 credit hours)
In the current business environment, an understanding of leadership and change management is essential to career success. The objective of this course is to provide practitioners in technical fields the knowledge to lead, align and transform the human element, individuals and teams, to achieve organizational performance excellence. The class includes both individual and collaborative (team) learning. An engineering, technical, or scientific undergraduate degree is required.

Typically offered in Fall and Spring

EM 506/EGR 506 Managing New Hi Tech Product Launches (3 credit hours)
This course covers new high-tech product development and launch from the perspective of the technical manager responsible for developing and launching new products and new lines of business within the high tech firm. Topics cover the entire spectrum of the new products development and launch process starting from concept generation and ideation and concept evaluation all the way through market testing and product launch. Each phase of the new products management process will be covered and illustrated by case studies. Students will generate a new product development and launch plan as a course project..3 credit hours.

Requirement: Graduate standing in Engineering
Typically offered in Spring and Summer

EM 507/EGR 507 Product Life Cycle Management (3 credit hours)
This course covers the management of complex technical products during all phases of the product life cycle. It is a broad survey of all the tools needed by the technical product manager throughout the life cycle of a complex product. The course is taught with a systems approach and from the engineering manager's viewpoint. The product life cycle includes all aspects of managing products from launch through maturity.

Requirement: Graduate standing in Engineering
Typically offered in Fall, Spring, and Summer

EM 508/EGR 508 Managing New Product Creation (3 credit hours)
The purpose of this course is to cover the best practices and methods for creating and innovating new high-tech products, for management of the design process, and for the management of the development and prototyping of new engineering products. This course is for engineering graduate students aspiring to be product managers, product designers and engineering managers. The course covers the sources of new product ideas including customer feedback, technology evolution, technology brokering, scenario analysis, customer problem solving, focus groups, and group brainstorming. Next the design process will be addressed. A method known as "design thinking" will be covered in depth, and students will complete a project in an area of interest based on design thinking. Students will be required to complete a design thinking project, a draft of a patent disclosure, a management plan for its development, and "pitch" the idea and plan.

This course is for graduate students with a technical undergraduate. This course is part of 3 course sequence on management of engineering products. The other two are EGR506 and EGR507 which may be taken in any order. (Sequentially advised; not required)
Typically offered in Fall and Summer

EM 517/EGR 517 Facilities Engineering Systems (3 credit hours)
This course covers the multi-disciplinary Facilities Engineering functions, as would be found in a municipal public works department, university facilities engineering organization, medical complex, various State government agencies, departments of transportation, airports, port authorities, and facilities engineering organizations at both the installation level and the headquarters level of certain Federal Government agencies. Engineering practice in Facilities Engineering is by nature broad, requiring engineers to understand underlying principles of related engineering disciplines to address the cross-cutting issues in the practice. Facilities engineering as covered in this course begins with the planning phase and continues through the full lifecycle of buildings and infrastructure. Engineering topics include electrical and mechanical systems, structural and architectural features, electrical distribution systems, and protection from physical and cyber threats.

R: Graduate Standing in Engineering
Typically offered in Fall only

EM 518/EGR 518 Environmental Compliance for Facilities Engineers (3 credit hours)
Facilities Engineering is the application of multidisciplinary engineering required to effectively manage the technical aspects of a portfolio of physical assets. Practitioners in the public sector include city and town engineers, university facilities engineering organizations, Federal and State government installations, and port authorities, among others. Engineers in the industrial sector include those in the petrochemical industry, pharmaceutical plants, food/poultry and meat processing plants, IT and manufacturing plants, all of which are subject to environmental regulation. There are literally thousands of such regulations spread across Federal, State, and local jurisdictions. The Facilities Engineer must, from an engineering perspective, know how to identify and comply with these regulations. Environmental compliance may very well be the only aspect of engineering where an individual can incur both civil and criminal liability for violation of these laws. This course will teach the student the gamut of environmental regulations across the engineering disciplines.

R: Graduate Standing in Engineering

EM 530 Project Management (3 credit hours)
This project management course takes an expansive view of project management concepts, methods, processes, and tools, with the understanding that the discipline of project management crosses traditional industry and functional boundaries. Course material considers project management from multiple perspectives, including executive management, the project manager, the project team, and the larger set of project stakeholders. We will examine projects from technical, business, and strategic perspectives. A survey of the Project Management Institute's (PMI(R)) Guide to the Project Management Body of Knowledge (PMBOK(R)) is included.

Typically offered in Fall, Spring, and Summer

EM 534/ISE 534 Artificial Intelligence for Engineering Managers (3 credit hours)
This course is designed for engineering managers to develop the skills necessary to manage AI and machine learning projects. It covers a broad range of AI topics including the various methods and algorithms (such as machine learning, deep learning, and large language models) and associated applications in different industries. The focus is on understanding the technical aspects of AI sufficient to manage teams, make informed decisions on AI adoption, and create project plans that estimate resources, costs, and timelines. The course aims to equip managers with the knowledge to assess the impact of AI on their firms and the broader economy. It is not a technical course for becoming an AI/ML engineer, but rather a management-oriented course to help in the deployment and oversight of AI projects.

Typically offered in Fall, Spring, and Summer

EM 538/ISE 538 Practical Machine Learning for Engineering Analytics (3 credit hours)
Machine learning has become integral to engineering analytics, significantly improving predictive capabilities and providing valuable insights from complex datasets. In engineering, machine learning models can analyze vast amounts of data from multiple sources to identify patterns and make accurate predictions. These predictions can optimize system performance, predict equipment failures, and improve maintenance schedules. Machine learning techniques transform how engineers approach problem-solving, enabling them to make more informed decisions and implement more effective solutions. One of the critical aspects of this course is the focus on practical examples and hands-on experience with machine learning tools and techniques. Through lectures, case studies, interactive assignments, and projects, students will gain a comprehensive understanding of machine learning applications in engineering analytics. The course will cover fundamental machine learning concepts, such as supervised and unsupervised learning, classification, regression, anomaly detection, and clustering.

Typically offered in Fall and Spring

EM 589 Special Topics in Engineering Management (1-6 credit hours)
New or special course on recent developments in some phase of engineering management using traditional course format. Identification of various specific topics and prerequisites for each section from term to term.

Typically offered in Fall, Spring, and Summer

EM 675 Engineering Management Masters Project (3-6 credit hours)
Individual or team project work with faculty mentorship in engineering management resulting in written report and oral presentation. This is one of the approved courses to fulfill engineering management practicum requirements. Maximum of three (3) credits to be earned for MEM degree with the exception of Professional Practice concentration students who may earn six (6) credits. Practical experience in applying EM knowledge to real-world problems at either an industrial site or at NC State.

Restriction: Reserved for students enrolled in the Masters of Engineering Management
Typically offered in Fall, Spring, and Summer

EM 677 Engineering Management Masters Project (3 credit hours)
Individual or team project work with faculty mentorship in engineering management resulting in written report and oral presentation to gain practical experience in applying EM knowledge to real-world problems. This is one of the approved courses to fulfill engineering management practicum requirements. Maximum of three (3) credits to be earned for MEM degree.

Restriction: Reserved for students enrolled in the Masters of Engineering Management
Typically offered in Fall, Spring, and Summer