

# Engineering & Science Mgmt (ESM)

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## Courses

### ESM A450 Economic Analysis and Operations 3 Credits

Introduces fundamentals of engineering economy, project scheduling, estimating, legal principles, professional ethics and human relations. Prepares students to successfully complete engineering economy questions on the Fundamentals of Engineering licensing exam.

**Special Note:** Not available for credit toward the Master of Science in engineering management or science management.

**Prerequisites:** (MATH A151 with a minimum grade of C or MATH A152 with a minimum grade of C or MATH A155 with a minimum grade of C or MATH A221 with a minimum grade of C or MATH A251 with a minimum grade of C or MATH A251F with a minimum grade of C or MATH A252 with a minimum grade of C or MATH A252F with a minimum grade of C or MATH A253 with a minimum grade of C) and (WRTG A211 with a minimum grade of C or WRTG A212 with a minimum grade of C or WRTG A213 with a minimum grade of C or WRTG A214 with a minimum grade of C or WRTG A2W with a minimum grade of C).

### ESM A601 Engineers and Scientists in Organizations 3 Credits

Introduces contemporary organization structures and the techniques needed to manage engineering and scientific effort. Includes discussion and application of technical leadership theory related to group dynamics and personnel practices in an engineering or scientific organization. Demonstrates the leadership and management skills required to organize, motivate, evaluate, develop and coordinate technical professionals.

**Registration Restrictions:** Graduate standing or instructor permission

### ESM A605 Engineering Economy 3 Credits

Introduces methods for economic justification used to select science or engineering projects and programs and to effectively manage organizational assets. Develops students' capability to define, model and solve practical problems using discounted cash-flow analysis.

**Registration Restrictions:** Graduate standing or instructor permission

### ESM A608 Legal Environment for Engineering, Science and Project Management 3 Credits

Introduces aspects of design, management and construction law applicable to engineers, contractors, project managers and owners. Covers contract law, tort liability and statutory applications for most common legal situations. Emphasizes methods to avoid litigation. Discusses actual cases and outcomes dealing with factually based examples.

**Registration Restrictions:** Graduate standing or instructor permission

### ESM A610 Cost Estimating 3 Credits

Introduces methods used to estimate costs and resources required by the scope of an asset investment option, activity or project. Discusses risks and uncertainties in estimating costs. Demonstrates how the outputs of cost estimating are used as inputs for budget, cost or value analysis; decision-making in business, asset and project planning; and project control processes.

**Registration Restrictions:** Graduate standing or instructor permission

### ESM A617 Technology Management 3 Credits

Explores technology management models and practices. Presents the nature and importance of technological change. Introduces tools to analyze and manage changes in technology-driven organizations.

**Registration Restrictions:** Graduate standing or instructor approval  
**Crosslisted With:** BA A617

### ESM A619 Computer Simulation of Systems 3 Credits

Introduces simulation concepts and methods applied to engineering and science management systems. Introduces most commonly used simulation languages and tools in a hands-on environment. Presents examples of simulation tools applied within a range of professional environments, such as transportation, health care, financial services, etc. Demonstrates how animated simulation models can be used to represent complicated systems to support decision making.

**Registration Restrictions:** Graduate standing or instructor permission

### ESM A620 Statistics for Engineering, Science and Project Management 3 Credits

How to make practical engineering/science/project management decisions through data sampling, using statistical software and interpreting the statistical results. Tools covered include statistical inference, regression analysis, design of experiments, and non-parametric methods.

**Registration Restrictions:** Graduate level standing or instructor permission

### ESM A621 Operations Research 3 Credits

Introduces mathematical techniques for aiding managerial decision making. Topics include linear programming, non-linear programming, network optimization problems, decision analysis, inventory models, dynamic programming, PERT/CPM, queueing models and computer simulation basics. Emphasis is on the application of techniques to engineering and science management situations.

**Registration Restrictions:** Graduate standing or instructor permission

### ESM A623 Total Quality Management 3 Credits

Introduces the concepts and practice of quality management as it relates to sustainability, reliability, maintainability/availability and quality functions within an organization. Demonstrates how quality practices impact business, customer requirements and ongoing operational results. Covers quality management tools including quality management as a system, Kaizen, statistical process control, Lean Six Sigma and creative problem-solving tools.

**Registration Restrictions:** Graduate standing or instructor permission

### ESM A684 ESM Project 3 Credits

Individual study of an actual engineering or science management problem or opportunity, resulting in a written report and presentation including data analysis, results and recommendations for action.

**Registration Restrictions:** Graduate standing or instructor permission

**ESM A699 ESM Thesis 3-9 Credits**

Individual research on an existing engineering or science management problem, resulting in a thesis including data analysis, research results, and recommendations for action.

**Special Note:** May be repeated for a maximum of 9 credits.

**Registration Restrictions:** Graduate standing or instructor permission