BACHELOR OF SCIENCE IN ENGINEERING MANAGEMENT

http://www.pacific.edu/Academics/Schools-and-Colleges/School-of-Engineering-and-Computer-Science/Academics-/Majors/Engineering-Management-.html
Phone: (209) 946-2575
Location: Baun Hall

Programs Offered

Bachelor of Science in Engineering Management

The Bachelor of Science in Engineering Management provides academic preparation for individuals who plan a systems engineering, project management or management career in a technically related field. Pacific graduates from this program have done well in fields such as manufacturing plant engineering, applications engineering, technical sales, construction management, project engineering and cost engineering.

The Engineering Management core consists of courses that cover key topics within engineering management and business administration. In addition, the curriculum includes a large number of engineering electives that provide students with the flexibility to custom design a curriculum to fit their career objectives.

Engineering Management Program Educational Objectives

Within a few years of graduation, graduates of the Engineering Management program are expected to:

1. Enter professional practice or pursue graduate level studies;
2. Use engineering knowledge as a base for solving problems requiring business and analytical skills;
3. Work in a wide array of different industries, positions and projects; and,
4. Seek continual professional development and lifelong learning.

Students graduating with a BS in Engineering Management will have:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. An ability to communicate effectively with a range of audiences
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Bachelor of Science in Engineering Management

Students must complete a minimum of 120 units of academic work and a minimum of 32 units of Cooperative Education in order to earn the bachelor of science in engineering management.

I. General Education Requirements

For more details, see General Education (https://catalog.pacific.edu/uop/generalinformation/generaleducation/)

Minimum 28 units and 9 courses that include:

A. CORE Seminars (2 courses)

CORE 001	Problem Solving & Oral Comm	3
CORE 002	Writing and Critical Thinking	4

> ***Note: 1)*** CORE Seminars cannot be taken for Pass/No Credit. ***2)*** Transfer students with 28 or more transfer credits taken after high school are exempt from both CORE seminars.

B. Breadth Requirement (7 courses, at least 3 units each)

At least one course from each of the following areas:

Artistic Process & Creation
Civic & Global Responsibility
Language & Narratives
Quantitative Reasoning
Scientific Inquiry
Social Inquiry
World Perspectives & Ethics

> ***Note: 1)*** No more than 2 courses from a single discipline can be used to meet the Breadth Requirement.

C. Diversity and Inclusion Requirement

All students must complete Diversity and Inclusion coursework (at least 3 units)

> ***Note: 1)*** Diversity and Inclusion courses can also be used to meet the breadth category requirements, or major or minor requirements.

D. Fundamental Skills

Students must demonstrate competence in:

Writing
Quantitative Analysis (Math)

> ***Note: 1)*** Failure to satisfy the fundamental skills requirements by the end of four semesters of full-time study at the University is grounds for academic disqualification.

II. Major Requirements

Mathematics and Science (30 units minimum)

MATH 039	Probability with Applications to Statistics	4
MATH 051	Calculus I	4
MATH 053	Calculus II	4
MATH 055	Calculus III	4
PHYS 053	Principles of Physics I	5
Three math/science electives		10-12

Engineering (45 units minimum)		
Engineering Science Courses		
IDEA 010	Interdisciplinary Design and Success	2
IDEA 020	Interdisciplinary Design and Innovation	2
ENGR 019	Computer Applications in Engineering	3
ENGR 020	Engineering Mechanics I (Statics)	3
ENGR 030	Engineering and Computing Ethics in Society	3
Engineering Science elective		3-4
Engineering Management Core Courses		
EMGT 142	Design and Innovation	3
EMGT 142L	Design and Innovation Lab	1
EMGT 155	Computer Simulation	4
or COMP 155	Computer Simulation	
EMGT 170	Project Decision Making	4
EMGT 174	Engineering Project Management	3
EMGT 176	Systems Engineering Management	4
Two BUSI/EMGT electives		6-8
ENGR 025	Professional Practice Seminar	1
Engineering Discipline Electives		
EMGT 195	Engineering Management Synthesis	4
Engineering Discipline Electives (sufficient to meet minimum 45 units engineering) *		
Cooperative Education (minimum 32 units)		
ENGR 181	Professional Practice	1-16
ENGR 182	Professional Practice	1-16
ENGR 183	Professional Practice	1-16

* Students who transfer in with 28 or more units are exempt from taking IDEA 010 and IDEA 020.

** Each student works with their advisor to develop a customized set of Engineering Discipline electives to meet student specific goals and objectives. The Engineering Management website describes potential sets of electives for different career paths.

Master of Science in Engineering Curriculum

All students who receive an MSE complete a set of core courses that cover the broader subjects of research and analysis. Students choose from one of four concentrations: Civil Engineering, Mechanical Engineering, Engineering Management, or Computer Engineering/ Electrical Engineering. Students must complete a minimum of 30 units with a Pacific cumulative grade point average of 3.0 in order to earn the Master of Science in Engineering.

A. Thesis Option

1. Students must complete a minimum of 30 units.
2. All students must perform independent research that must culminate in the completion of a thesis based on the findings of the research. For successful completion of the thesis course, students must submit a research proposal, conduct the research, write the thesis, and successfully complete a final oral defense.
3. All students complete six units of ENGR 299, Thesis Research.
4. The Concentration Requirements specified must be satisfied.

B. Non-thesis Option

1. Students must complete a minimum of 30 units.
2. For the Non-thesis Option, students may choose to do a project or they may satisfy all the unit requirements through coursework.
   a. For the *project* option, students complete up to 6 units of research under the supervision of an SOECS faculty member. Upon completion of the project, the student submits a comprehensive report.
   b. Students may elect to satisfy the entire degree through *coursework*.
   c. Both project and coursework options must satisfy the Concentration Requirements specified.

Master of Science in Engineering with a concentration in Engineering Management

Students must complete a minimum of 30 units with a Pacific cumulative grade point average of 3.0 in order to earn the Master of Science in Engineering degree. A single course cannot fulfill requirements in both the MSE and BS degree.

EMGT 262	Applied Analytics for Decision Making	3
ENGR 201	Techniques in Research	3
ENGR 212	Technology Venturing	3
ENGR 250	Probability and Statistics for Engineering and Computer Science	3
ENGR 290	Engineering Project Management and Leadership	3
ENGR 292	Managing Science Technology and Innovation	3
Four Electives Approved by Advisor as Coherent Plan		12

Engineering Management Courses

EMGT 115. Building Information Modeling. 4 Units.
This course provides the basics of design, modeling, scheduling, resource allocation, time/cost tradeoffs, task coordination, team-building, progress monitoring, and post project assessment while using the latest BIM technologies. Students study the lean construction and how to integrate BIM into the project delivery processes. Prerequisite: Completion of all fundamental skills.

EMGT 142. Design and Innovation. 3 Units.
This course brings buyers, sellers and end-users of design, prototyping and testing together in an educational and real problem environment. Students will learn how to identify innovation, and develop, design and market new product or service. Students will also learn the nature and importance of technological innovation in commercial organizations with particular reference to bringing a new product or service off the drawing board, through virtual development, and into a modern pre-sales promotional environment in weekly project deliverables. Prerequisite: Upper division standing in engineering.

EMGT 142L. Design and Innovation Lab. 1 Unit.
The laboratory component of EMGT 142, course provides the basics of Industrial Design techniques including drawing, graphical, presentation and design communication skills. Students learn how to design functional objects, sculpture and use a variety of 2D and 3D applications to produce those models as physical objects. A variety of rapid prototyping methods include: 3D Printing, Vacuum Forming, and Laser Cutting is used in weekly project deliverables. Prerequisite: Upper division. Corequisite: EMGT 142.

EMGT 145. Product Design & Additive Manufacturing. 3 Units.
In this course students learn the scientific principles of additive manufacturing (AM). The course covers, how to design and prototype to meet a specific need. Next, explore how AM can apply to the identified opportunity, from product planning and modeling to development and evolution. Prerequisites: Junior Standing, MECH 015 or CIVL 015.

EMGT 155. Computer Simulation. 4 Units.
This course explores digital simulation in which a model of a system is implemented and executed on a computer. The course focuses on modeling methodologies, mathematical techniques for implementing models, and statistical tecniques for analyzing the results of simulations. Students develop simulations that use both simulation development toolkits and general-purpose programming languages. Also listed as COMP 155. Prerequisites: Completion of all Fundamental Skills; MATH 037 or MATH 039; MATH 045 or MATH 051, COMP 051 or COMP 061 or ENGR 019 with a "C-" or better.

EMGT 162. Introduction to Data Analytics for Engineers and Computer Scientists. 3 Units.
This course introduces students to state-of-the-art topics involving large collection of data. Particular emphasis is made on data collection, data storage and processing, extracting structured data from unstructured data, analytics, visualization, and a number of specific applications. Students explore large amounts of complex, digital data and learn about the tools and skills they need to solve knowledge from voluminous data sets. Prerequisites: ENGR 019 or COMP 051; upper division standing.

EMGT 170. Project Decision Making. 4 Units.
Project decision-making based upon engineering economy studies. This area covers techniques for economic evaluation of alternatives including time value of money, risk costs, effects of inflation, compound interest calculation, minimum attractive rate of return, capital budgeting, break-even analysis, sensitivity analysis, and risk analysis. A second facet of the course covers the fundamental aspects of project management within an engineering context. This area covers the project procurement process, project management and project scheduling. (Summer, Fall).

EMGT 172. Engineering Economy. 3 Units.
This course examines decision-making based upon engineering economy studies. This course covers techniques for economic evaluation of alternatives that includes time, value of money, risk cost, effects of taxation, monetary inflation, compound interest calculations, minimum attractive rate of return, capitol budgeting, break-even analysis, sensitivity analysis and risk analysis. Prerequisite: Completion of all Fundamental Skills.

EMGT 174. Engineering Project Management. 3 Units.
Students study the fundamentals of project management that are used in estimating, planning, coordinating and controlling engineering projects. Topics include fundamentals of specifications and contracts, and the scheduling of projects. Prerequisites: Completion of all Fundamental Skills.

EMGT 176. Systems Engineering Management. 4 Units.
This course provides an introduction to the concepts and process of systems engineering. It uses interactive lectures, participatory class exercises and case studies to illustrate the framing and solution of problems through a systems engineering approach. The course stresses an understanding of the interdisciplinary aspects of systems development, operations and support. Prerequisites: Completion of all Fundamental Skills; MATH 055 with a “C-“ or better, or permission of instructor.

EMGT 191. Independent Study. 1-4 Units.
Special individual projects are undertaken under the direction of one or more faculty members knowledgeable in the particular field of study. Permission of faculty member involved. The student must be in good academic standing.

EMGT 192. Professional Practice. 8 Units.

EMGT 195. Engineering Management Synthesis. 4 Units.
The capstone course is for Engineering Management majors. Emphasis on integration and application of management concepts. including project proposal and design, with periodic reviews and written and oral reports. Prerequisites: Completion of all Fundamental Skills.

EMGT 197. Undergraduate Research. 1-4 Units.
This course offers applied or basic research in focused topics within Engineering Management under faculty supervision. Permission of faculty supervisor and department chair.

EMGT 215. Advanced Building Information Modeling. 3 Units.
Course provides advanced knowledge of design, modeling, scheduling, resource allocation, time/cost tradeoffs, task coordination, team-building, progress monitoring, and post project assessment while using the latest BIM technologies. Students study lean construction and how to integrate BIM into the project delivery processes. Prerequisite: Graduate or blended students in the School of Engineering and Computer Science.

EMGT 245. Advanced Product Design & Additive Manufacturing. 3 Units.
In this course students learn the scientific principles of additive manufacturing (AM). The course covers, how to design and prototype to meet a specific need. Next, explore how AM can apply to the identified opportunity, from product planning and modeling to development and evolution. Prerequisites: MSES standing or instructor approval.

EMGT 250. Decision Techniques in Engineering. 3 Units.
This course is designed to introduce fundamental and advanced decision techniques applicable to engineering and business processes. The techniques discussed are applicable to complex problems in both professional and personal situations. The tools and techniques address deterministic and stochastic problems, trade-offs, no-linear preferences and group decision making. Class discussions develop a theoretical framework as foundation for practical application within the organization. Prequisites: Graduate or blended students in the School of Engineering and Computer Science and ENGR 250 with a "C" or better.

EMGT 262. Applied Analytics for Decision Making. 3 Units.
This course examines concepts and methods central to analytics and decision making systems. The focus is on the application of management science and artificial intelligence techniques for prescriptive and predictive analytics. Case studies of existing systems are used to reinforce concepts discussed in class. A major component of the course is a project entailing the design, implementation, and evaluation of prototype systems for real world applications. Prerequisite: Graduate or blended students in the School of Engineering and Computer Science.

EMGT 276. Advanced Systems Engineering Management. 3 Units.
This course deepens understanding of the concepts and processes of system engineering. The course focuses on the interdisciplinary aspects of systems development, operations, and support. A systems engineering problem solving process is progressively developed starting with system requirements analysis and goal development, through the development of criteria for system evaluation, the system design requirements, the design review and evaluation, and the system engineering program planning. The course contents are structured into four principal areas: 1) system engineering fundamentals; 2) system analysis characteristics of design; 3) system engineering processes; 4) system planning, organizing, and managing. Prerequisites: Graduate standing.

EMGT 291. Graduate Independent Study. 1-4 Units.
Special individual projects are undertaken under the direction of one or more faculty. Prerequisite: Graduate or blended students in the School of Engineering and Computer Science or permission of instructor.

EMGT 293. Special Topics. 4 Units.
Special courses are organized and offered from time to time to meet the needs or interests of a group of students. Prerequisite: Graduate or blended students in the School of Engineering and Computer Science or permission of the instructor.

EMGT 297. Graduate Research. 1-4 Units.
Approval by the faculty supervisor and the department chairperson is required. Prerequisite: Graduate or blended students in the School of Engineering and Computer Science and permission of instructor.

EMGT 299. Thesis. 1-6 Units.
Minimum of six units is required for Thesis Option students. Prerequisites: Graduate or blended students in the School of Engineering and Computer Science and permission of the research advisor.