MS IN MECHANICAL ENGINEERING

Total units required for MS: 30

Program Description

The Master of Science program in Mechanical Engineering prepares students for leadership in the practice of Mechanical Engineering. The program includes the study of scientific and technical principles underlying modern engineering practice and advanced mathematical techniques needed for their application in research and design.

Specializations

Four areas are offered as specializations: Design and Dynamic Systems; Manufacturing and Material Engineering; Thermal and Fluids Systems; and Aerospace Systems. In each area there are specific course requirements to be met; all four specializations encompass Engineering Design.

Elective courses allow for the development of each student's particular interests. An individual's applied research or design study, presented in a Master's thesis or project, complements the formal class work and completes the program.

Admission Requirements

Admission as a classified graduate student in Mechanical Engineering requires:

- a Bachelor of Science degree in Mechanical Engineering, or equivalent;
- a minimum GPA of 3.0 in the last 60 semester or 90 quarter units of BS Degree; and
- English Language Requirement (for foreign students or domestic students with foreign documents).

Applicants who do not meet the three admission requirements listed above because they have a Baccalaureate degree in a field other than Mechanical Engineering, or equivalent, and/or because their GPA is below 3.0 but above 2.5 in the last 60 semester or 90 quarter units of BS Degree, may be admitted with conditionally classified status. Any deficiencies will be noted in a written response to the applicant.

If a student lacks some of the undergraduate courses needed for successful completion of the graduate program, such prerequisite courses must be taken before the student can be fully accepted to the program.

Admission Procedures

Applications are accepted as long as space for new students exists. All prospective graduate students, including Sacramento State graduates, must file the following with the Office of Graduate Studies, River Front Center 215, (916) 278-6470:

- Online application for admission (CalStateApply or equivalent);
- one set of official transcripts from all colleges and universities attended *other than Sacramento State*; and
- English Language Requirement (for foreign students or domestic students with foreign documents).

For more admissions information and application deadlines, please visit the Office of Graduate Studies website (http://csus.edu/gradstudies/).

Approximately six weeks after receipt of all items listed above, a decision regarding admission will be mailed.

Minimum Units and Grade Requirement for the Degree

Units Required for the MS: 30

Minimum Cumulative GPA: 3.0. Up to six units of grade "C" or better may be credited toward fulfillment of the requirements for the master's degree. All other graded units must be completed with a grade of "B" or better. Grades of "C-", "D", "F", "WU", "I", "W" and "NC" may not be used to fulfill any MS degree requirements.

Advancement to Candidacy

Each student must file an application for Advancement to Candidacy, indicating a proposed program of graduate study. This procedure should begin as soon as the classified graduate student has:

- removed any deficiencies in admission requirements;
- completed at least 12 units in the graduate program with a minimum 3.0 GPA, including ME 209 (2 units) and at least 7 other units at the 200 level. Note: For our program completion of ME 209 with a grade of "B" or above satisfies the Graduate Writing Assessment Requirement (GWAR); and
- obtained approval of a thesis/project topic using the Department of Mechanical Engineering Master's Thesis/Project Approval Form.

Advancement to Candidacy forms are available on the Office of Graduate Studies website. The student fills out the form after planning a degree program in consultation with a faculty advisor. After approval by the Mechanical Engineering Graduate Coordinator, the form is then returned to the Office of Graduate Studies for approval.

Notes:

- The student cannot register for the culminating experience (ME 500), until he/she has been advanced to candidacy. One full semester prior to registering for (ME 500), the student must submit a proposed topic from to the Department office.
- The Thesis Committee consists of the student's Thesis Advisor, who is the Chairperson of the Thesis Committee, and another faculty member who serves as the second advisor.
- Advising: The Department of Mechanical Engineering has a Graduate Coordinator who is the liaison between each graduate student and the Office of Graduate Studies. After Advancing to Candidacy (see above), the student proceeds with research for the thesis. Guidance of this phase of study is done by a faculty member with expertise in the particular thesis topic.

Program Requirements

Code	Title	Units
Required Core Courses (8 Units)		**8**
ENGR 201	Engineering Analysis I	3
ENGR 202	Engineering Analysis II	3
or ME 206	Stochastic Modeling for Engineers	
ME 209	Research Methodology ✎	2
Additional Requirements for Suggested Specializations (9 Units)		

Select at least three courses with advisor approval to develop a focus area of study	9
Aerospace Systems	
Design and Dynamic Systems	
Manufacturing and Materials Engineering	
Thermal and Fluid Systems	
Electives (7-9 Units)	
Select 7-9 units [1]	7 - 9
Culminating Requirement (4-6 Units)	
Select 4-6 units [2]	4 - 6
Total Units	**30-32**

[1] Selected in consultation with advisor. May include two undergraduate courses.

[2] Master's Thesis (4-6 units) program consists of the following minimum requirements:
Core courses (8 units)
Specialty Area (9 units)
Electives (7-9 units)
ME 500 (4-6 units)

Thesis Defense/Presentation: The Thesis must be orally presented and defended, approved by the student's Thesis Committee and approved by the ME Graduate Coordinator or the Department Chair prior to submittal of the thesis to the Office of Graduate Studies.

Additional Requirements for Suggested Specializations

Note: With advisor approval select at least **three** courses to develop a focus area of study.

Specialization - Aerospace Systems

This area focuses on the design of aerospace systems. Classical and computer-aided techniques are studied to provide a strong background in mechanical design theory and practice. Industrial software tools are used to perform finite-element modeling, dynamic system analysis, and optimum design.

Code	Title	Units
ME 241	Optimum Mechanical Design	3
ME 253	Advanced Fluid Mechanics	3
ME 259	Introduction to Computational Fluid Dynamics	3
ME 270	Advanced Computer-Aided Design of Dynamic Systems	3
ME 272	Finite Element Modeling in Computer-Aided Design	3
ME 274	Introduction to Flight Dynamics	3
ME 275	Analysis of Aircraft Structures	3
ME 278	Space Systems Engineering Management	3
ME 285	Materials for Extreme Environments	3

Or other courses selected in consultation with an advisor.

Specialization - Design and Dynamic Systems

This area focuses on the design of products and on the manufacturing systems needed for their production. Classical and computer-aided techniques are studied to provide a strong background in mechanical design theory and practice. Industrial software tools are used to perform finite-element modeling, dynamic system analysis, and optimum design.

Code	Title	Units
ME 240	Mechanical Design & Failure Analysis	3
ME 241	Optimum Mechanical Design	3
ME 243	Accident Biomechanics Reconstruction	3
ME 270	Advanced Computer-Aided Design of Dynamic Systems	3
ME 272	Finite Element Modeling in Computer-Aided Design	3
ME 273	Multibody Dynamics of Rigid and Flexible Systems	3
ME 276	Advanced Vibration Theory	3
ME 278	Space Systems Engineering Management	3

Or other courses selected in consultation with an advisor.

Specialization - Manufacturing and Materials Engineering

This area includes the use of mathematical methods as well as current computer techniques to solve problems encountered in planning, designing, and/or controlling manufacturing systems. Study of the techniques for product design and Manufacturing, Neural Networks, Artificial Intelligence, and Industrial Management is conducted. This area also focuses on the design of products and on the manufacturing systems needed for their production. Classical and computer-aided techniques are studied to provide a strong background in mechanical design theory and practice. Industrial software tools are used to perform finite-element modeling, dynamic system analysis, and optimum design.

Code	Title	Units
ME 233	Intelligent Product Design and Manufacturing	3
ME 236	Computer Controlled Manufacturing Processes	3
ME 237	Digital Control of Manufacturing Processes	3
ME 238	Automated Inspection	3
ME 240	Mechanical Design & Failure Analysis	3
ME 280	Advanced Mechanical Properties of Materials	3
ME 285	Materials for Extreme Environments	3

Or other courses selected in consultation with an advisor.

Specialization - Thermal and Fluid Systems

This area concentrates on the principles of thermodynamics, heat transfer, and fluid mechanics as applied to such products as heat exchangers, internal combustion engines, gas turbines, and solar energy systems. Courses make use of computational fluid dynamics (CFD) and finite element analysis (FEA) software tools to explore the behavior of a variety of thermal energy conversion systems and components. In this area of interest, innovative system design is becoming more important as progress is made toward increasing the efficiency of thermal systems while reducing the adverse effects on the environment.

Code	Title	Units
ME 253	Advanced Fluid Mechanics	3
ME 255	Advanced Heat Transfer	3
ME 256	Mechanics and Thermodynamics of Compressible Flow	3
ME 258	Advanced Thermodynamics	3
ME 259	Introduction to Computational Fluid Dynamics	3

Or other courses selected in consultation with an advisor.