

# MS IN MECHANICAL ENGINEERING

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## In Workflow

1. ME Committee Chair (akuma@csus.edu)
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3. ECS College Committee Chair (troy.topping@csus.edu)
4. ECS Dean (kevan@csus.edu)
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6. Senate Curriculum Subcommittee Chair (curriculum@csus.edu)
7. Dean of Undergraduate (james.german@csus.edu;%20celena.showers@csus.edu)
8. Dean of Graduate (cnewsome@skymail.csus.edu)
9. Catalog Editor (212408496@csus.edu;%20torsetj@csus.edu;%20cnewsome@skymail.csus.edu)
10. Graduate Studies (jdsmall@csus.edu)

## Approval Path

1. Wed, 03 Apr 2019 20:29:18 GMT  
Akihiko Kumagai (akuma): Rollback to Initiator
2. Wed, 17 Apr 2019 19:59:00 GMT  
Akihiko Kumagai (akuma): Rollback to Initiator
3. Wed, 25 Sep 2019 17:50:59 GMT  
Akihiko Kumagai (akuma): Approved for ME Committee Chair
4. Wed, 25 Sep 2019 17:52:18 GMT  
Akihiko Kumagai (akuma): Approved for ME Chair
5. Fri, 27 Sep 2019 18:10:30 GMT  
Troy Topping (troy.topping): Approved for ECS College Committee Chair
6. Fri, 27 Sep 2019 19:25:04 GMT  
Kevan Shafizadeh (kevan): Approved for ECS Dean

## History

1. May 2, 2018 by clmig-jwehrheim

Date Submitted: Wed, 25 Sep 2019 17:16:06 GMT

## Viewing: MS in Mechanical Engineering

**Last approved: Wed, 02 May 2018 13:46:13 GMT**

**Last edit: Fri, 27 Sep 2019 18:10:22 GMT**

Changes proposed by: Troy Topping (102067379)

### Academic Group: (College)

Engineering & Computer Science

### Academic Organization: (Department)

Mechanical Engineering

### Catalog Year Effective:

2020-2021 Catalog

### Individual(s) primarily responsible for drafting the proposed degree major program:

Name (First Last)	Email	Phone 999-999-9999
Troy Topping	troy.topping@csus.edu	916-206-0255

### Type of Program Proposal:

Major

### Program Change Type:

Non-Substantive

### Title of the Program:

MS in Mechanical Engineering

**Designation: (degree terminology)**

Master of Science

**Briefly describe the program proposal (new or change) and provide a justification:**

We have updated Admission Procedures to reflect current practice in accordance with the CSU, Graduate Studies and CSUS IPGE. We have updated the Admission requirements to define the 3.0 GPA based on the last 60 semester units or 90 quarter units, instead of upper division engineering courses, to better serve the capabilities of Graduate Studies in calculating this requirement. We have added courses in the specializations to better reflect the available course work. Some courses are cross listed across specializations because they fit in more than one area.

**Objectives of the degree program:**

1. Will enter professional employment at an advanced level and/or Ph.D. programs in the following areas of mechanical engineering practice: aerospace systems, design and dynamic systems, manufacturing, materials science engineering, and thermal and fluids systems.
2. Will use knowledge of the principles of science, mathematics, and engineering, to identify, formulate, and solve problems in mechanical engineering.
3. Will apply creativity in the design of systems, components, or processes to meet desired needs.
4. Will communicate effectively through speaking, writing, and graphics.

**University Learning Goals**

**Graduate (Masters) Learning Goals:**

- Critical thinking/analysis
- Communication
- Information literacy
- Disciplinary knowledge
- Intercultural/Global perspectives
- Professionalism
- Research (optional)

**Will this program be required as part of a teaching credential program, a single subject, or multiple subject waiver program (e.g., Liberal Studies, Biology) or other school personnel preparation program (e.g., School of Nursing)?**

No

**Catalog Description:**

**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: Course prerequisites and other criteria for admission of students to the degree major program, and for their continuation in it.**

**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.

As defined by policy <http://www.csus.edu/umannual/acadaff/fsm00010.htm>, a change in units constitutes a substantive change to the program. If your changes constitute a substantive change, please refer back to the "Program Change Type" field above to ensure that "Substantive" is selected.

**Program Requirements: (If new courses are being created as part of a new program, it will be useful to propose courses first.)**

## Program Requirements

Code	Title	Units
<b>Required Core Courses (8 Units)</b>		<b>8</b>
ENGR 201	Engineering Analysis I	3
ENGR 202 or ME 206	Engineering Analysis II Stochastic Modeling for Engineers	3
ME 209	Research Methodology	2
<b>Additional Requirements for Suggested Specializations (9 Units)</b>		
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		
<b>Electives (7-9 Units)</b>		
Select 7-9 units <sup>1</sup>		7 - 9
<b>Culminating Requirement (4-6 Units)</b>		

Select 4-6 units <sup>2</sup>	4 - 6
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Total Units	30-32
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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.

### For graduate programs, the number of declared undergraduate major and the degree production over the preceding years of the corresponding baccalaureate program:

This is an existing graduate program. In 2016, ME had 962 declared undergraduate majors, comprising 25% of the college. From 2012-17, the five year mean was 142 degrees conferred per year.

### Fiscal Impact to Change an Existing Program

Indicate programmatic or fiscal impact which this change will have on other academic units' programs, and describe the consultation that has occurred with affected units:

This is not a substantive change. No impact.

Attach a copy of correspondence with these units:

Gmail - Fwd\_ E01071 & MS programs in ECS.pdf

Provide a fiscal analysis of the proposed changes:

NA

How will the above changes be accommodated within the department/College existing fiscal resources?

NA

Will the proposed changes require additional resources?

No

What additional space, equipment, operating expenses, library, computer, or media resources, clerical/technical support, or other resources will be needed?

None

Estimate the cost and indicate how these resource needs will be accommodated:

NA

Reviewer Comments:

Akihiko Kumagai (akuma) (Wed, 03 Apr 2019 20:29:18 GMT):Rollback: Revising

Akihiko Kumagai (akuma) (Wed, 17 Apr 2019 19:59:00 GMT):Rollback: updates

Key: 171