MECHATRONIC ENGINEERING BS

More Information

Advising Requirement
Advising is mandatory for this program. Consult your department advisor or program coordinator for information.

E-advising Tools
Students are encouraged to use the interactive e-advising tools that have been designed to help them graduate within four years. These tools can be accessed through the Student Center.

Mechatronic engineering is a fast-growing interdisciplinary field of study merging mechanical engineering, electrical engineering, computer sciences, and controls theory. Graduates of the Bachelor of Science in Mechatronic Engineering program are prepared to design autonomous systems such as self-driving cars, industrial automation systems, and next-generation robots.


Mechatronic Engineering Program Mission
The mechatronic engineering program has the primary mission of providing students a high-quality undergraduate engineering education with

• A curriculum that is firmly grounded in engineering fundamentals.
• A faculty that provides superior teaching and mentoring both in and out of the classroom.
• A faculty whose focus is undergraduate education.
• Class sizes that encourage student participation.
• Project experiences that build on fundamentals and develop team skills.
• Facilities and equipment that are readily accessible.
• An environment that is conducive to learning and free of bias, discrimination, and harassment.

The faculty is committed to offering a broad undergraduate experience that will promote professional growth and prepare students for a variety of engineering careers, graduate studies, and continuing education

Mechatronic Engineering Program Educational Objectives
The Mechatronic Engineering Program’s Educational Objectives are goals for its graduates to achieve a few years after graduation. Mechatronic engineering graduates will be prepared to

• Practice in engineering-related fields chosen from a broad range of industries.
• Recognize the need and have the ability to engage in continued learning to adapt to evolving professions and to advance professionally.

• Become contributing members of society with an understanding of the inherent and unavoidable impact of the practice of engineering.

Mechatronic Engineering Student Outcomes
Student outcomes are narrower statements that describe what students are expected to know and be able to do by the time of graduation. Mechatronic Engineering Program graduates must demonstrate the following:

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.

Mechatronic Engineering Design Experience
The design experience for mechatronic engineers is integrated throughout the curriculum. The courses that include design experiences are:

• MECA 140 Introduction to Design and Automation
• MECA 240W Capstone Design I (W)
• MECA 340W Mechanical Engineering Design (W)
• EECE 144 Logic Design Fundamentals
• EECE 237 Embedded Systems Development
• EECE 315 Electronics I
• EECE 344 Digital Systems Design
• MECA 140 Introduction to Design and Automation
• MECA 440AW Capstone Design I (W)
• MECA 440B Capstone Design II
• MECH 340W Mechanical Engineering Design (W)

At the freshman level, students learn about the design process and are introduced to designing automated systems in MECA 140 and logic networks are designed in EECE 144. At the sophomore level, software design experience teaches students to think logically in developing efficient, structured computer programs in CSCI 111. At the junior level, there is an opportunity to learn about safety, failure, reliability, codes and standards, and economic considerations, while carrying out detailed design of mechanical components in MECH 340W, and electrical circuits and systems in EECE 237, EECE 315, and EECE 344. In the final capstone experience (MECA 440AW and MECA 440B), students exercise what they learned throughout the preceding design courses in a capstone project that includes design, fabrication, and testing, as well as the more global aspects of design including product realization, economic factors,
environmental issues, and societal impact. Together, these experiences prepare graduates to be successful practitioners with an awareness of the multitude of issues involved.

**Grading Requirement**

All courses taken to fulfill program course requirements must be taken for a letter grade except those courses specified by the department as credit/no credit grading only.

Enrollment in any mathematics course requires a grade of C- or higher in all prerequisite courses or their transfer equivalents.

**Course Requirements for the Major: 101 units**

Completion of the following courses, or their approved transfer equivalents, is required of all candidates for this degree. Courses in this program may complete more than one graduation requirement.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lower Division</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMAR 160</td>
<td>Manufacturing Processes</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 111</td>
<td>General Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>CIVL 211</td>
<td>Statics</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 111</td>
<td>Programming and Algorithms I</td>
<td>4</td>
</tr>
<tr>
<td>EECE 144</td>
<td>Logic Design Fundamentals</td>
<td>4</td>
</tr>
<tr>
<td>EECE 211</td>
<td>Linear Circuits I</td>
<td>3</td>
</tr>
<tr>
<td>EECE 211L</td>
<td>Linear Circuits I Activity</td>
<td>1</td>
</tr>
<tr>
<td>EECE 237</td>
<td>Embedded Systems Development</td>
<td>3</td>
</tr>
<tr>
<td>MATH 120</td>
<td>Analytic Geometry and Calculus</td>
<td>4</td>
</tr>
<tr>
<td>MATH 121</td>
<td>Analytic Geometry and Calculus</td>
<td>4</td>
</tr>
<tr>
<td>MATH 260</td>
<td>Elementary Differential Equations</td>
<td>4</td>
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<td>MECA/MECH 140</td>
<td>Introduction to Design and Automation</td>
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<tr>
<td>MECH 100</td>
<td>Graphics I</td>
<td>1</td>
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<tr>
<td>MECH 100L</td>
<td>Graphics I Laboratory</td>
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<tr>
<td>MECH 200</td>
<td>Graphics II</td>
<td>2</td>
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<tr>
<td>MECH 210</td>
<td>Materials Science and Engineering</td>
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<tr>
<td>MECH 210L</td>
<td>Materials Science and Engineering Laboratory</td>
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<td>PHYS 204A</td>
<td>Physics for Students of Science and Engineering: Mechanics</td>
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<tr>
<td>PHYS 204B</td>
<td>Physics for Students of Science and Engineering: Electricity and Magnetism</td>
<td>4</td>
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<tr>
<td>PHYS 204C</td>
<td>Physics for Students of Science and Engineering: Heat, Wave Motion, Sound, Light, and Modern Topics</td>
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<tr>
<td><strong>Upper Division</strong></td>
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<tr>
<td>CIVL 311</td>
<td>Strength of Materials</td>
<td>4</td>
</tr>
<tr>
<td>EECE 311</td>
<td>Linear Circuits II</td>
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<tr>
<td>EECE 315</td>
<td>Electronics I</td>
<td>4</td>
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<tr>
<td>EECE 344</td>
<td>Digital Systems Design</td>
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<tr>
<td>MECA 380</td>
<td>Measurements and Instrumentation</td>
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<tr>
<td>MECA 440AW</td>
<td>Capstone Design I (W)</td>
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<tr>
<td>MECA 440B</td>
<td>Capstone Design II</td>
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<td>MECA 482</td>
<td>Control System Design</td>
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<td>MECA 486</td>
<td>Motion and Machine Automation</td>
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<tr>
<td>MECH 320</td>
<td>Dynamics</td>
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<td><strong>Total Units</strong></td>
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<td>101</td>
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**MECH 340W** Mechanical Engineering Design (W) 4
Select three units from the following: 3
- AMAR 347 Sustainable Polymer Composites
- AMAR 420 Robotics for Advanced Manufacturing
- AMAR/OSCM 451 Quality Management
- AMAR 458 Project Management
- AMAR 460 Robotic Manufacturing Systems
- AMAR 477 Nanoscale Device Manufacturing
- CIVL 302W Engineering Sustainability and Economic Analysis (W)
- CIVL 313 Structural Mechanics
- CIVL 321 Fluid Mechanics
- CIVL 431 Water and Wastewater Engineering
- EECE 314 Bioinstrumentation
- EECE 316 Electronics II
- EECE 320 System Architecture and Performance
- EECE 343 Computer Architecture Performance and Implementation
- EECE 365 Signals, Systems, and Transforms
- EECE 375 Fields and Waves
- EECE 437 Real-Time Embedded Systems
- EECE/PHYS 450 Optics
- EECE/PHYS 451 Lasers and Their Applications
- EECE 481 Electromechanical Conversion
- EECE 483 Power Systems Operation
- EECE 484 Power System Distribution and Analysis
- EECE 544 Embedded Systems Design
- EECE 565 Bioimaging Systems
- EECE 566 Applied Systems Design
- EECE 682 Computer Control of Dynamic Systems
- MECA 398 Special Topic
- MECA 399 Special Problems
- MECA 470 Introduction to Robotics Engineering
- MECA 498 Special Topic
- MECA 499 Special Problems
- MECH 332 Thermodynamics
- MECH 389 Industrial Internship
- MECH 398 Special Topic
- MECH 399 Special Problems
- MECH 410 Advanced Materials Science and Engineering
- MECH 424 Mechanical Vibrations
- MECH 430 Nanoscale Science and Engineering
- MECH 498 Special Topic
- MECH 499 Special Problems

**Honors in the Major**

Honors in the Major is a program of independent work in your major. It requires six units of honors coursework completed over two semesters.
The Honors in the Major program allows you to work closely with a faculty mentor in your area of interest on an original performance or research project. This year-long collaboration allows you to work in your field at a professional level and culminates in a public presentation of your work. Students sometimes take their projects beyond the University for submission in professional journals, presentation at conferences, or academic competition. Such experience is valuable for graduate school and professional life. Your honors work will be recognized at your graduation, on your permanent transcripts, and on your diploma. It is often accompanied by letters of commendation from your mentor in the department or the department chair.

Some common features of Honors in the Major program are:

- You must take six units of Honors in the Major coursework. All six units are honors courses (marked by a suffix of H), and at least three of these units are independent study (399H, 499H, 599H) as specified by your department. You must complete each course with a minimum grade of B.
- You must have completed 9 units of upper-division coursework or 21 overall units in your major before you can be admitted to Honors in the Major. Check the requirements for your major carefully, as there may be specific courses that must be included in these units.
- Your cumulative GPA should be at least 3.5 or within the top 5% of majors in your department.
- Your GPA in your major should be at least 3.5 or within the top 5% of majors in your department.
- Most students apply for or are invited to participate in Honors in the Major during the second semester of their junior year. Then they complete the six units of coursework over the two semesters of their senior year.
- Your honors work culminates with a public presentation of your honors project.

While Honors in the Major is part of the Honors Program, each department administers its own program. Please contact your major department or major advisor to apply.

See Bachelor’s Degree Requirements (https://catalog.csuchico.edu/undergraduate-requirements/bachelors-degree-requirements/) for complete details on general degree requirements. A minimum of 39 units, including those required for the major, must be upper division.

**General Education Requirements: 48 units**

See General Education (https://catalog.csuchico.edu/colleges-departments/undergraduate-education/general-education/) and the Class Schedule (http://www.csuchico.edu/schedule/) for the most current information on General Education Requirements and course offerings.

This major has approved GE modification(s). See below for information on how to apply these modification(s).

- Critical Thinking (A3) is waived. (https://www.calstate.edu/attend/student-services/casper/Pages/high-unit-majors.aspx)
- Take only one course in either Arts (C1) or Humanities (C2). The other is waived.
- MECH 340W is an approved major course substitution for Social Sciences (D).
- MECA 440B is an approved major course substitution for Lifelong Learning and Self-Development (E).

- EECE 311 fulfills Upper-Division Scientific Inquiry and Quantitative Reasoning (UD-B).

**Diversity Course Requirements: 6 units**

You must complete a minimum of two courses that focus primarily on cultural diversity. At least one course must be in US Diversity (USD) and at least one in Global Cultures (GC). See Diversity Requirements (https://catalog.csuchico.edu/undergraduate-requirements/diversity-requirements/) for a full list of courses. Most courses taken to satisfy these requirements may also apply to General Education (https://catalog.csuchico.edu/colleges-departments/undergraduate-education/general-education/).

Both courses must also satisfy one of the General Education Requirements in order for 128 units to fulfill all requirements for the Mechatronic Engineering degree.

**Upper-Division Writing Requirement**

Writing Across the Curriculum (EM 17-009 (http://www.csuchico.edu/prs/EMs/2017/17-009.shtml/)) is a graduation requirement and may be demonstrated through satisfactory completion of four Writing (W) courses, two of which are designated by the major department. See Mathematics/Quantitative Reasoning and Writing Requirements (https://catalog.csuchico.edu/undergraduate-requirements/mathematicsquantitative-reasoning-writing-requirements/) for more details on the four courses. The first of the major designated Writing (W) courses is listed below.

- MECH 340W Mechanical Engineering Design (W)

The second major-designated Writing course is the Graduation Writing Assessment Requirement (GW) (EO 665 (https://calstate.policystat.com/policy/9585618/latest/)). Students must earn a C- or higher to receive GW credit. The GE Written Communication (A2) (https://catalog.csuchico.edu/colleges-departments/undergraduate-education/general-education/#A2) requirement must be completed before a student is permitted to register for a GW course.