MECHATRONIC ENGINEERING BS

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.

The Mechatronic Engineering program is accredited by the Engineering Accreditation Commission (EAC) of ABET, http://www.abet.org.

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 harrassment.

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:

- CSCI 111 Programming and Algorithms I
- EECE 144 Logic Design Fundamentals
- EECE 237 Embedded Systems Development
- EECE 315 Electronics I
- EECE 344 Embedded 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.

Advising Requirement

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

E-advising Tools

Use the interactive e-advising tools designed to help students graduate within four years. These tools can be accessed through the Student Center in the Portal (https://portal.csuchico.edu).

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.

Course	Title	Units
Lower Division		
AMAR 160	Manufacturing Processes	3
CHEM 111	General Chemistry I	4
CIVL 211	Statics	3
CSCI 111	Programming and Algorithms I	4
EECE 144	Logic Design Fundamentals	4
EECE 211	Linear Circuits I	3
EECE 211L	Linear Circuits I Activity	1
EECE 237	Embedded Systems Development	3
MATH 120	Analytic Geometry and Calculus	4
MATH 121	Analytic Geometry and Calculus	4
MATH 260	Elementary Differential Equations	4
MECA/MECH 140	Introduction to Design and Automation	2
MECH 100	Graphics I	1
MECH 100L	Graphics I Laboratory	1
MECH 200	Graphics II	2
MECH 210	Materials Science and Engineering	3
MECH 210L	Materials Science and Engineering Laboratory	1
PHYS 204A	Physics for Students of Science and Engineering: Mechanics	4
PHYS 204B	Physics for Students of Science and Engineering: Electricity and Magnetism	4
PHYS 204C	Physics for Students of Science and Engineering: Heat, Wave Motion, Sound, Light, and Modern Topics	4
Upper Division		
CIVL 311	Strength of Materials	4
EECE 311	Linear Circuits II	4
EECE 315	Electronics I	4
EECE 344	Embedded Systems Design	4
MECA 380	Measurements and Instrumentation	3
MECA 440AW	Capstone Design I (W)	3
MECA 440B	Capstone Design II	3
MECA 482	Control System Design	3
MECA 486	Motion and Machine Automation	4
MECH 320	Dynamics	3
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 365	Signals, Systems, and Transforms	
EECE 375	Fields and Waves	
EECE 437	Real-Time Embedded Systems	
EECE 443	Computer Architecture Performance and Implementation	
EECE/PHYS 450	Optics	
EECE/PHYS 451	Lasers and Their Applications	
EECE 481	Electromechanical Conversion	
EECE 483	Solar Energy Devices and Systems	
EECE 484	Power System Distribution and Analysis	
EECE 565	Bioimaging Systems	
EECE 566	Applied Digital Image Processing	
EECE 682	Digital Control System Design Using Artificial Intelligence	
MECA 389	Industrial Internship	
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	
Total Units		**101**

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.
- Yourcumulative#GPA should be at least 3.5 or within the top 5% of majors in your department.
- Your GPAin 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.

Honors in the Major is not 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: 43 units

See General Education (https://catalog.csuchico.edu/colleges-departments/undergraduate-education-academic-success/general-education/#gerequirementstext) 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 (1B) is waived.
- Take only one course in either Arts (3A) or Humanities (3B). The other is waived.
- MECH 340W is an approved major course substitution for Social and Behavioral Sciences (4).
- EECE 311 fulfills Upper-Division Mathematical Concepts and Quantitative Reasoning (UD-2).

American Institutions Course Requirements: 6 units

The American Institutions graduation requirement, as mandated in Title 5, Section 40404 (https://govt.westlaw.com/calregs/Document/I56C041434C6911EC93A8000D3A7C4BC3/?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPage requires that students satisfactorily complete courses in United States history, the US Constitution, and government and American ideals (including California state and local government). At Chico State, HIST 130 meets the US history requirement (US-1), and POLS 155 meets the US Constitution and government requirement (US-2) and the California state and local government requirement (US-3). POLS 155 also fulfills three units of GE Area 4, Social and Behavioral Sciences. See Bachelor's Degree Requirements (https://catalog.csuchico.edu/undergraduate-requirements/bachelors-degree-requirements/#amin) for more information.

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. Many courses taken to satisfy these requirements may also apply to General Education (https://catalog.csuchico.edu/colleges-departments/undergraduate-education-academic-success/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 (https://www.csuchico.edu/pres/em/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 Writing and Math Requirements (https://catalog.csuchico.edu/undergraduate-requirements/writing-math-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 English Composition (1A) (https://catalog.csuchico.edu/colleges-departments/undergraduate-education-academic-success/general-education/#1A) requirement must be completed before a student is permitted to register for a GW course.