

# ADVANCED MANUFACTURING AND APPLIED ROBOTICS BS

The Bachelor of Science in Advanced Manufacturing and Applied Robotics prepares graduates for a variety of careers in today's modern manufacturing workplace. The faculty provide students with a broad undergraduate experience in math, science, business, and the humanities, as well as laboratory courses with a practical, applications orientation. The knowledge and skills gained will enable students to become Certified Manufacturing Technologists (CMfgT), after passing a comprehensive examination administered by the Society of Manufacturing Engineers (SME).

## Advanced Manufacturing and Applied Robotics Program Objectives

The program's objectives are best defined in terms of the following attributes of its graduates.

1. First and foremost, graduates from California State University, Chico's Advanced Manufacturing and Applied Robotics program understand how products are designed, produced, and tested, while meeting the business, environmental, and social responsibilities associated with the production and development of goods.
2. They have expertise in today's modern manufacturing tools including automation, sensing, programming, and robotics.
3. They understand the fundamental behavior of materials and the testing techniques used to determine material properties.
4. They have a solid foundation of materials processing technologies including additive, subtractive, and nano-scale manufacturing techniques for metals, polymers, and composites.
5. They are able to integrate project management, quality assurance methods, supply chain management, and the economic, technical, environmental, and societal issues involved in manufacturing.
6. They are effective at communicating their ideas in oral, written, and graphical form.
7. They function effectively as members of interdisciplinary teams.

## 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.

## Course Requirements for the Major: 90 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 |
|------------------------------|--|-------|
| <b>Lower Division</b>        |  |       |
| AMAR 160                     | Manufacturing Processes  | 3     |
| AMAR 260                     | Applied Advanced Manufacturing                                 | 4     |
| CHEM 107                     | General Chemistry for Applied Sciences                         | 4     |
| ECON 103                     | Principles of Microeconomic Analysis                           | 3     |
| EECE 215                     | Practical Circuits and Electronics                             | 4     |
| MATH 105                     | Introduction to Statistics                                     | 3     |
| MATH 119                     | Precalculus Mathematics  | 4     |
| MECH 100                     | Graphics I   | 1     |
| MECH 100L                    | Graphics I Laboratory  | 1     |
| MECH/MECA 140                | Introduction to Design and Automation                          | 2     |
| MECH 200                     | Graphics II  | 2     |
| MECH 210                     | Materials Science and Engineering                              | 3     |
| MECH 210L                    | Materials Science and Engineering Laboratory                   | 1     |
| PHYS 202A                    | General Physics I  | 4     |
| <b>Upper Division</b>        |  |       |
| AMAR 300                     | Applied Mathematics and Programming for Advanced Manufacturing | 3     |
| AMAR 316                     | Introduction to Plastics                                       | 3     |
| AMAR 318                     | Advanced Plastics & Composites                                 | 3     |
| AMAR 352W                    | Industrial Management (W)                                      | 3     |
| AMAR 360                     | Computer Integrated Manufacturing                              | 4     |
| AMAR 420                     | Robotics for Advanced Manufacturing                            | 4     |
| AMAR 440AW                   | Capstone Design I  | 3     |
| AMAR 440B                    | Capstone Design II   | 3     |
| AMAR/OSCM 451                | Quality Management   | 3     |
| AMAR 458                     | Project Management   | 3     |
| AMAR 460                     | Robotic Manufacturing Systems                                  | 4     |
| AMAR 477                     | Nanoscale Device Manufacturing                                 | 3     |
| CIVL 302W                    | Engineering Sustainability and Economic Analysis (W)           | 3     |
| MECA 380                     | Measurements and Instrumentation                               | 3     |
| OSCM 306                     | Operations Management  | 3     |
| <b>Technical Elective</b>    |  |       |
| Select one of the following: |  | 3     |
| AMAR 347                     | Sustainable Polymer Composites                                 |       |
| AMAR 389                     | Directed Manufacturing Experience                              |       |
| BLAW 413                     | Employment Law   |       |
| BSIS 308                     | Decision Analysis for Business                                 |       |
| ECON 355                     | The Economics of Government Regulations                        |       |
| MECA 470                     | Introduction to Robotics Engineering                           |       |
| MGMT 303                     | Survey of Management   |       |
| MINS 301                     | Corporate Technology Integration                               |       |
| OSCM 440                     | Supply Chain Management  |       |
| OSCM 441                     | Purchasing and Global Sourcing                                 |       |

|                    |   |
|--------------------|---|
| OSCM 442           | Production Planning and Inventory Control |
| <b>Total Units</b> | <b>90</b>                                 |

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).

- Take one course in either Arts (3A) or Humanities (3B). The other is waived.
- AMAR 360 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=CategoryPageItem&contextData=\(sc.Default\)](https://govt.westlaw.com/calregs/Document/I56C041434C6911EC93A8000D3A7C4BC3/?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default))), 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 120 units to fulfill all requirements for the Advanced Manufacturing and Applied Robotics degree. It is suggested that USD and GC requirements be completed within the lower division Area 3 selection and the upper division Area 3 and 4 selections.

## 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.

- AMAR 352W Industrial Management (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.