

ADVANCED MANUFACTURING AND APPLIED ROBOTICS (AMAR)

See Course Description Symbols and Terms (<https://catalog.csuchico.edu/academic-standards-policies/course-description-symbols-terms/>) for an explanation of course description terminology and symbols, the course numbering system, and course credit units.

AMAR 160 Manufacturing Processes 3 Units

Typically Offered: Fall and spring

A modern introduction to fundamental manufacturing practices as well as cutting-edge industrial manufacturing process advancements. Hands-on practice in traditional and advanced manufacturing methods. Integration of Life Cycle Assessment and Reduce, Reuse, Recycle principles. 2 hours discussion, 3 hours laboratory. (005149)

Grade Basis: Graded

Repeatability: You may take this course for a maximum of 3 units

Course Attributes: Lower Division

AMAR 198 Special Topic 1-3 Units

Prerequisite: To be established when course is formulated.

Typically Offered: Inquire at department

Special topic generally offered one time only. Different sections may have different topics. See the Class Schedule for specific topic being offered.

This course may be repeated for a maximum of 21 units to be counted toward the major. 1 hour activity. (015894)

Grade Basis: Graded

Repeatability: You may take this course more than once

Course Attributes: Lower Division

AMAR 260 Applied Advanced Manufacturing 4 Units

Prerequisite: AMAR 160 (with a grade of C- or higher), MATH 119 or MATH 120, MECH 100, PHYS 202A or PHYS 204A. Recommended: MATH 105.

Typically Offered: Spring only

Industrial applications of subtractive and additive manufacturing. Traditional and advanced material removal techniques including the physics of metal-cutting, cutting-tool materials and geometry, conventional and semi-automatic machine tools, and electrical discharge machining (EDM). Additive manufacturing topics include 3D printing, rapid prototyping, and emerging additive manufacturing, processes and technologies. Also includes cost estimating and power management as applied to industrial scale manufacturing. 3 hours laboratory, 3 hours lecture. (005212)

Grade Basis: Graded

Repeatability: You may take this course for a maximum of 4 units

Course Attributes: Lower Division

AMAR 298 Special Topic 1 Unit

Prerequisite: To be established when course is formulated.

Typically Offered: Inquire at department

Special topic generally offered one time only. Different sections may have different topics. See the Class Schedule for specific topic being offered.

This course may be repeated for a maximum of 21 units to be counted toward the major. 1 hour discussion. (015850)

Grade Basis: Graded

Repeatability: You may take this course more than once

Course Attributes: Lower Division

AMAR 300 Applied Mathematics and Programming for Advanced Manufacturing 3 Units

Prerequisite: MATH 105 and MATH 119 or MATH 120, MECH 140 (may be taken concurrently).

Typically Offered: Fall only

An introduction to programming and mathematical concepts encountered in advanced manufacturing. Mathematical concepts are presented in the context of their application to industrial automation and robotics. Students will learn modern programming tools and constructs common to the industry. Mathematical and programming concepts are applied in weekly laboratory exercises. 2 hours laboratory, 2 hours lecture. (022127)

Grade Basis: Graded

Repeatability: You may take this course for a maximum of 3 units

Course Attributes: Upper Division

AMAR 316 Introduction to Plastics 3 Units

Prerequisite: CHEM 107 or CHEM 111, MECH 210 (may be taken concurrently).

Typically Offered: Fall only

Survey of polymer chemistry, mechanical properties, and industrial processing of thermoplastics with emphasis on waste reduction and recycling. 3 hours laboratory, 2 hours lecture. (022071)

Grade Basis: Graded

Repeatability: You may take this course for a maximum of 3 units

Course Attributes: Upper Division

AMAR 318 Advanced Plastics & Composites 3 Units

Prerequisite: AMAR 316.

Typically Offered: Spring only

An introduction to composite materials and processing. Topics include thermoplastic and thermoset composites, glass and carbon fiber reinforcements, biobased polymers and natural fibers, core materials, tooling, and thermoset processing equipment. 3 hours laboratory, 2 hours lecture. (022070)

Grade Basis: Graded

Repeatability: You may take this course for a maximum of 3 units

Course Attributes: Upper Division

AMAR 347 Sustainable Polymer Composites 3 Units

Prerequisite: MECH 210.

Typically Offered: Inquire at department

This course provides students an introduction to composite materials and processing by investigating thermoplastic and thermoset composites, glass and carbon fiber reinforcements, biobased polymers and natural fibers, core materials, tooling, and thermoset processing equipment. 3 hours laboratory, 2 hours lecture. (021724)

Grade Basis: Graded

Repeatability: You may take this course for a maximum of 3 units

Course Attributes: Upper Division

- AMAR 352W Industrial Management (W)** **3 Units W, GW**
Prerequisite: GE Written Communication (A2) requirement, junior standing.
Typically Offered: Fall only
 A study of effective industrial safety and supervisory management practices used in the manufacturing industry. Supervisory and managerial procedures used in industry by supervisors, managers, field and sales representatives, and inspectors. Instruction in communication, training, organization, ethics, conflict management, safety practices, and OSHA standards. Instruction in effective technical safety documentation - gathering, organizing, and reporting industrial safety data. 3 hours discussion. (005670)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division; Writing Course; Graduation Writing Assessment
- AMAR 360 Computer Integrated Manufacturing** **4 Units**
Prerequisite: AMAR 260, MECH 200.
Typically Offered: Fall only
 A study of computer numerical control (CNC) machine tools used in the manufacture of engineered products. Integration of computer aided design and computer aided manufacturing (CAD/CAM) software. Course activities utilize industrial scale CNC machining centers and lathes. Advanced manufacturing topics such as toolpath optimization and factory floor integration are introduced. 3 hours laboratory, 3 hours lecture. (005278)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Upper Division
- AMAR 389 Directed Manufacturing Experience** **1-3 Units**
Prerequisite: Approval of faculty internship coordinator prior to off-campus assignment.
Typically Offered: Fall and spring
 Manufacturing experience in an industrial setting which provides an opportunity to apply academic learning to professional practice. Minimum duration of 400 hours of work under the direct supervision of an on-site manufacturing supervisor. On completion of the internship, a report prepared under the direction of a faculty member is required. This course is an elective for the BS in Advanced Manufacturing and Applied Robotics; a total of 3 units must be completed to receive elective credit. 3 hours supervision. (005294)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division
- AMAR 395 Manufacturing Laboratory Practice** **1 Unit**
Prerequisite: AMAR 160.
Typically Offered: Fall and spring
 Provides additional time in the manufacturing laboratories for completion of manufacturing and engineering course-related projects and assignments. 2 hours activity. (020682)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 7 units
Course Attributes: Upper Division
- AMAR 398 Special Topic** **3 Units**
Prerequisite: To be established when course is formulated.
Typically Offered: Inquire at department
 Special topic generally offered one time only. Different sections may have different topics. See the Class Schedule for the specific topic being offered. Normally taught by professionals from the field. This course may be repeated for a maximum of 21 units to be counted toward the major. 1 hour discussion. (005250)
Grade Basis: Graded
Repeatability: You may take this course more than once
Course Attributes: Upper Division
- AMAR 399 Special Problems** **1-3 Units**
Prerequisite: Approval of supervising faculty member.
Typically Offered: Inquire at department
 Independent study of a special problem. See department office for registration procedure. 3 hours supervision. (005251)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Upper Division
- AMAR 420 Robotics for Advanced Manufacturing** **4 Units**
Prerequisite: EECE 344 or MECA 380.
Typically Offered: Fall only
 An overview of robotics and its application to advanced manufacturing. Topics include vision, motion planning, mobile mechanisms, kinematics, dynamics, and sensors. Course activities will utilize industrial scale robots and associated hardware as well as modern simulation tools. This course will also introduce contemporary topics in robotics research and its application. 3 hours laboratory, 3 hours lecture. (022128)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Upper Division
- AMAR 440AW Capstone Design I** **3 Units W, GW**
Prerequisite: GE Oral Communication (A1) requirement; GE Written Communication (A2) requirement; AMAR 360; AMAR 458 (may be taken concurrently). Recommended: MECA 380.
Typically Offered: Fall and spring
 Design methods applied to manufacturing systems in group design projects. Project definition, planning, and management. Design for manufacture, cost considerations, budgets, and teamwork. Oral and written presentation of design results. Initial stage of the capstone design project to be continued in AMAR 440B. 2 hours lecture, 3 hours supervision. (022124)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division; Writing Course; Graduation Writing Assessment
- AMAR 440B Capstone Design II** **3 Units**
Prerequisite: AMAR 440AW.
Typically Offered: Fall and spring
 Implementation of the capstone design project from AMAR 440AW including fabrication, testing, and evaluation of a working prototype. Impact of engineering solutions in global, economic, environmental, and societal context. Ethical and professional responsibilities in engineering including continuing self-education and career development. Must be taken the semester immediately following AMAR 440AW. 2 hours lecture, 2 hours supervision. (022125)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

<p>AMAR 451 Quality Management 3 Units Prerequisite: OSCM 306 or faculty permission; MATH 105 or MATH 108 for Business majors only. Typically Offered: Fall and spring The study and application of the quality management process in both the manufacturing and service sectors of the economy. Topics include process analysis and improvement, statistical process control, cost of quality, quality measurement, and quality in the global marketplace. 3 hours lecture. (005784) Cross listing(s): OSCM 451 Grade Basis: Graded Repeatability: You may take this course for a maximum of 3 units Course Attributes: Upper Division</p>	<p>AMAR 464 Fluid Metallurgy 3 Units Prerequisite: AMAR 160. Typically Offered: Inquire at department The course provides students a comprehensive overview of the study of metal casting technology. Students learn about the properties of casting allows, casting processes, pattern design, pattern making, mold making, core design, core making, heat treating, finishing of castings, and sand testing. 3 hours laboratory, 2 hours lecture. (005209) Grade Basis: Graded Repeatability: You may take this course for a maximum of 3 units Course Attributes: Upper Division</p>
<p>AMAR 454 Advanced Laboratory Practices 2 Units Prerequisite: Faculty permission. Typically Offered: Fall and spring Provides qualified students an opportunity to do individual special interest study and practice toward gaining proficiencies in the student's area of specialization. 6 hours independent study. (005279) Grade Basis: Graded Repeatability: You may take this course for a maximum of 6 units Course Attributes: Upper Division</p>	<p>AMAR 477 Nanoscale Device Manufacturing 3 Units Prerequisite: EECE 315 or MECH 210. Typically Offered: Spring only This course introduces the manufacturing processes for various classes of nanoscale devices from logic/memory semiconductors to nano-electro-mechanical systems (NEMS). Study of processes including photoresist lithography, ingot growth, ion implantation, chemical vapor deposition, atomic layer deposition, and molecular beam epitaxy. Course covers the fundamental performance barriers for each material/device type and perform defect analyses to assess how defects either improve or degrade these materials. Also covered are financial aspects of nanoscale manufacturing including capital equipment costs, the financial history of these industries, return on investment, amortization, and case studies of both industry failures and successes. 3 hours lecture. (021768) Grade Basis: Graded Repeatability: You may take this course for a maximum of 3 units Course Attributes: Upper Division</p>
<p>AMAR 458 Project Management 3 Units Prerequisite: Senior standing. Typically Offered: Fall only This course familiarizes students with techniques for managing technical projects while they design, plan, and implement a manufacturing project through the mock-up stage. Students work in groups on projects of mutual interest to gain experience in planning and updating schedules. Students learn to define requirements, estimate and manage resources, and structure decisions and trade-offs. Discussion includes global project management and supply chain responsibility. Emphasis is placed on group dynamics in communication and problem solving. 3 hours lecture. (005291) Grade Basis: Graded Repeatability: You may take this course for a maximum of 3 units Course Attributes: Upper Division</p>	<p>AMAR 498 Advanced Topic 1-3 Units Prerequisite: To be established when course is formulated. Typically Offered: Inquire at department Special topic generally offered one time only. Different sections may have different topics. See the Class Schedule for the specific topic being offered. This course is normally taught by professionals from the field. This course may be repeated for a maximum of 21 units to be counted toward the major. 1 hour discussion. (005308) Grade Basis: Graded Repeatability: You may take this course more than once Course Attributes: Upper Division</p>
<p>AMAR 460 Robotic Manufacturing Systems 4 Units Prerequisite: AMAR 420. Typically Offered: Spring only A continuation of robotics and its application to advanced manufacturing. Implementation of smart manufacturing systems on the factory floor. Practical automation workflows based on parametric modeling, scripting, simulation, and optimization. Course activities will utilize industrial scale robots and associated hardware. This course will also introduce contemporary topics in robotics research applied to machine learning and artificial intelligence. 3 hours laboratory, 3 hours lecture. (022129) Grade Basis: Graded Repeatability: You may take this course for a maximum of 4 units Course Attributes: Upper Division</p>	<p>AMAR 499 Special Problems 1-3 Units Prerequisite: Approval of supervising faculty member. Typically Offered: Inquire at department Independent study of a special problem. See department office for registration procedure. 9 hours supervision. (015852) Grade Basis: Credit/No Credit Repeatability: You may take this course for a maximum of 6 units Course Attributes: Upper Division</p>