

MECHANICAL ENGINEERING (MECH)

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.

MECH 100 Graphics I 1 Unit

Corequisites: MECH 100L.

Typically Offered: Fall and spring

Introduction to engineering graphics. Orthographic projection, auxiliary views, isometric views, dimensioning, tolerancing, drawing standards, working drawings, free-hand sketching, solid modeling. 1 hour discussion. (015811)

Grade Basis: Graded

Repeatability: You may take this course for a maximum of 1 unit

Course Attributes: Lower Division

MECH 100L Graphics I Laboratory 1 Unit

Corequisites: MECH 100.

Typically Offered: Fall and spring

Introduction to solid modeling using a parametric, feature-based application software, SolidWorks. Solid modeling of parts and assemblies, detail and assembly drawings. 3 hours laboratory. (020257)

Grade Basis: Graded

Repeatability: You may take this course for a maximum of 1 unit

Course Attributes: Lower Division

MECH 140 Introduction to Design and Automation 2 Units

Prerequisite: MATH 119 or GE Mathematical Concepts/Quantitative Reasoning (2) Ready, first-year freshmen who successfully completed trigonometry and precalculus in high school can meet this prerequisite by achieving a score that meets department guidelines on the calculus readiness exam.

Typically Offered: Fall and spring

Introduces the design process and fundamentals of automation. Hands-on use of sensors, pneumatics, stepper motors, bearings, couplings, gears, belts, pulleys, and framing materials. Topics include AC and DC motor control, simple electrical circuits, machine controllers, PLC programming, testing and analysis of results, budgeting, and bills of materials. Teams design and build a proof-of-concept system to verify their design. 1 hour discussion, 3 hours laboratory. (005401)

Cross listing(s): MECA 140

Grade Basis: Graded

Repeatability: You may take this course for a maximum of 2 units

Course Attributes: Lower Division

MECH 198 Special Topic 1-3 Units

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. 3 hours lecture. (005406)

Grade Basis: Graded

Repeatability: You may take this course more than once

Course Attributes: Lower Division

MECH 200 Graphics II 2 Units

Prerequisite: MECH 100 and MECH 100L.

Typically Offered: Fall and spring

A study of advanced topics in Engineering Graphics. Concepts include drawing standards, geometric dimensioning and tolerancing, working drawings, model based definition, intermediate to advanced solid modeling, advanced assemblies, renderings, animations, equations, and design considerations. Preparation for advanced certifications in Engineering Graphics. 3 hours laboratory, 1 hour lecture. (015854)

Grade Basis: Graded

Repeatability: You may take this course for a maximum of 2 units

Course Attributes: Lower Division

MECH 208 Introduction to Technical Computing 2 Units

Prerequisite: MATH 121. Recommended: PHYS 204A.

Typically Offered: Fall and spring

A foundation course in technical computing for engineering. Introduces commercial software commonly used in the solution of engineering problems. Application areas include kinematics and kinetics, fluid flow, thermal systems, and machine design. 3 hours laboratory, 1 hour lecture. (021113)

Grade Basis: Graded

Repeatability: You may take this course for a maximum of 2 units

Course Attributes: Lower Division

MECH 210 Materials Science and Engineering 3 Units

Prerequisite: CHEM 107 or CHEM 111, PHYS 202A or PHYS 204A.

Corequisites: MECH 210L for MECA, MECH, and AMAR majors only.

Typically Offered: Fall and spring

Processing, structure, properties, and performance of engineering materials. Applied knowledge of material properties as engineering design parameters. Advanced manufacturing processes, including microfabrication are discussed. 3 hours discussion. (005402)

Grade Basis: Graded

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

Course Attributes: Lower Division

MECH 210L Materials Science and Engineering Laboratory 1 Unit

Corequisites: MECH 210 for AMAR, MECA, and MECH majors only.

Typically Offered: Fall and spring

Standards and procedures for materials testing. Hands-on experience with commonly used equipment for materials testing. Test data acquisition and integration for material properties. Presentation of test data and findings in technical reports. 3 hours laboratory. (021645)

Grade Basis: Graded

Repeatability: You may take this course for a maximum of 1 unit

Course Attributes: Lower Division

MECH 298 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. 3 hours lecture. (015855)

Grade Basis: Graded

Repeatability: You may take this course more than once

Course Attributes: Lower Division

<p>MECH 306 Equation Solving Techniques 3 Units Prerequisite: MATH 260, MECH 208. Recommended: PHYS 204A. Typically Offered: Fall and spring Numerical analysis, analytical methods, and equation solving techniques for mechanical engineering design. Structured problem formulation, parametric studies, introduction to programming concepts, and optimization for design. 2 hours activity, 2 hours lecture. (005413) Grade Basis: Graded Repeatability: You may take this course for a maximum of 3 units Course Attributes: Upper Division</p>	<p>MECH 308 Finite Element Analysis 3 Units Prerequisite: CIVL 311 with a grade of C- or higher, MECH 306. Typically Offered: Fall and spring Development of finite element formulation from fundamental governing engineering equations. Coverage includes areas ranging from elasticity, vibration, and heat transfer to acoustics and composites. 3 hours lecture. (005439) Grade Basis: Graded Repeatability: You may take this course for a maximum of 3 units Course Attributes: Upper Division</p>	<p>MECH 320 Dynamics 3 Units Prerequisite: CIVL 211 with a grade of C- or higher, MATH 260. Typically Offered: Fall and spring Kinematics and dynamics of mechanical systems composed of rigid bodies. Moments and products of inertia, forces of interaction, inertia forces and torques. Equations of motion of non-planar systems. 3 hours discussion. (005409) Grade Basis: Graded Repeatability: You may take this course for a maximum of 3 units Course Attributes: Upper Division</p>	<p>MECH 332 Thermodynamics 3 Units Prerequisite: PHYS 204A. Typically Offered: Fall and spring Properties of substances, ideal gas equation of state, heat and work, first and second laws of thermodynamics, steady-state analysis of closed and open systems, entropy, gas and vapor power cycles, introduction to renewable energy sources. 3 hours discussion. (005414) Grade Basis: Graded Repeatability: You may take this course for a maximum of 3 units Course Attributes: Upper Division</p>	<p>MECH 338 Heat Transfer 4 Units Prerequisite: CIVL 321, MATH 260, MECH 332. Recommended: MECH 306. Typically Offered: Fall and spring Conduction, convection, and radiation heat transfer; steady-state and transient analysis methods; numerical methods applied to conduction heat transfer; design of finned arrays, systems for electronics cooling, heat exchangers, and solar collectors. 2 hours activity, 3 hours discussion. (005448) Grade Basis: Graded Repeatability: You may take this course for a maximum of 4 units Course Attributes: Upper Division</p>	<p>MECH 340W Mechanical Engineering Design (W) 4 Units W Prerequisite: GE English Composition (1A), AMAR 160, CIVL 311 with a grade of C- or higher, MECH 140, MECH 200, MECH 210. Recommended: MECH 320. Typically Offered: Fall and spring Design and performance of machine components and systems subjected to both steady and variable loading conditions. Failure theories, reliability, use of codes and standards, and standard design practices are introduced. Also discussed are realistic constraints for design in economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability contexts. The course includes a sequence of writing assignments formatted to industry standards that teach written and graphical communication appropriate to the discipline. A grade of C- or higher is required to pass this course. 2 hours activity, 3 hours lecture. (005411) Grade Basis: Graded Repeatability: You may take this course for a maximum of 4 units Course Attributes: Upper Division; Laptop required, see department for details.; Writing Course</p>
					<p>MECH 389 Industrial Internship 1-3 Units Prerequisite: Approval of faculty internship coordinator prior to off-campus assignment. Typically Offered: Fall and spring Engineering experience in an industrial setting. Minimum duration of 400 hours of work under the direct supervision of an on-site engineering supervisor. On completion of the internship, a written report prepared under the direction of a faculty member is required. This course is an elective for the BS in Mechanical Engineering, a total of 3 units must be completed to receive elective credit. 9 hours supervision. (005454) Grade Basis: Credit/No Credit Repeatability: You may take this course for a maximum of 3 units Course Attributes: Upper Division</p>
					<p>MECH 398 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. 3 hours lecture. (005424) Grade Basis: Graded Repeatability: You may take this course more than once Course Attributes: Upper Division</p>
					<p>MECH 399 Special Problems 1-3 Units Prerequisite: Approval of supervising faculty member. Typically Offered: Inquire at department This course is an independent study of special problems offered for 1.0-3.0 units. See the department office for information on registering. 9 hours supervision. (005426) Grade Basis: Credit/No Credit Repeatability: You may take this course for a maximum of 6 units Course Attributes: Upper Division</p>
					<p>MECH 408 Modeling and Simulation 3 Units Prerequisite: MECH 200, MECH 308, MECH 338, MECH 340W. Typically Offered: Inquire at department Computer modeling, simulation, and solution of engineering problems. Applications in mechanical, thermal, and fluid flow analysis. Emphasis on proper use of current commercial software and solution verification through traditional engineering analysis. 3 hours lecture. (021223) Grade Basis: Graded Repeatability: You may take this course for a maximum of 3 units Course Attributes: Upper Division</p>

MECH 410 Advanced Materials Science and Engineering 3 Units**Prerequisite:** MATH 260, MECH 210. Recommended: CIVL 311.**Typically Offered:** Inquire at department

Design, manufacture, and practical applications of advanced engineering materials. Failure analysis and prevention of material failure in mechanical design. Microfabrication of micromechanical devices. 3 hours discussion. (005428)

Grade Basis: Graded**Repeatability:** You may take this course for a maximum of 3 units**Course Attributes:** Upper Division**MECH 424 Mechanical Vibrations 3 Units****Prerequisite:** MECH 320.**Typically Offered:** Inquire at department

Free and forced vibrations of lumped parameter systems, transient vibrations, systems with several degrees-of-freedom. 3 hours discussion. (005437)

Grade Basis: Graded**Repeatability:** You may take this course for a maximum of 3 units**Course Attributes:** Upper Division**MECH 430 Nanoscale Science and Engineering 3 Units****Prerequisite:** CHEM 111, MECH 210, and PHYS 204B, or consent of the instructor.**Typically Offered:** Inquire at department

This course introduces students to the interdisciplinary field of nanoscale science and engineering including the areas of engineering, materials science, chemistry, and physics. The topics covered include advanced materials, synthesis and modification of nanomaterials, properties of nanomaterials, materials characterization, nanofabrication methods, and applications. It has three modules which are formal lectures, guest speakers, and projects. For the projects student learn to conduct a literature search on a given topic and are asked to present their project. They further have a chance to propose their own ideas for potential applications and are asked to give detailed methodology to execute the project. 3 hours discussion. (021952)

Grade Basis: Graded**Repeatability:** You may take this course for a maximum of 9 units**Course Attributes:** Upper Division**MECH 432 Energy Systems 4 Units****Prerequisite:** MECH 338.**Typically Offered:** Fall and spring

Thermodynamics of power cycles, refrigeration, air-conditioning, and combustion processes; analysis, design, and testing of systems involving both conventional and renewable energy sources for power generation, heating, and cooling applications. 3 hours discussion, 3 hours laboratory. (005442)

Grade Basis: Graded**Repeatability:** You may take this course for a maximum of 4 units**Course Attributes:** Upper Division; Sustainable Course**MECH 433 Solar Energy Engineering 3 Units****Prerequisite:** CIVL 321; EECE 211 or EECE 215; MECH 338 (may be taken concurrently).**Typically Offered:** Inquire at department

This introductory course covers the design and operation of solar photovoltaic (PV) and solar thermal systems. Foundational topics include solar radiation characteristics, solar materials, and heat transfer. Solar PV systems include cell operations, I-V characteristics, module design, maximum power-point tracking, charge controllers, batteries, inverters, design of grid-tied and off-grid systems, and system performance evaluation. Solar thermal systems include flat-plate collectors, concentrating collectors, passive and active solar water heating, solar space heating and cooling, and solar thermal power systems. 2 hours activity, 2 hours lecture. (021438)

Grade Basis: Graded**Repeatability:** You may take this course for a maximum of 3 units**Course Attributes:** Upper Division; Sustainable Course**MECH 435 Low Speed Aerodynamics 3 Units****Prerequisite:** CIVL 321, MATH 260. Recommended: MECH 306.**Typically Offered:** Inquire at department

Flow around elementary shapes, concepts of flow circulation, lift and drag. Incompressible inviscid flows around thin airfoils and wings of finite span. 3 hours discussion. (005444)

Grade Basis: Graded**Repeatability:** You may take this course for a maximum of 3 units**Course Attributes:** Upper Division**MECH 440AW Capstone Design I (W) 3 Units W, GW****Prerequisite:** GE English Composition (1A); GE Oral Communication (1C); MECH 200; MECH 340W with a grade of C- or higher. Recommended: MECA 380, MECH 308, MECH 338.**Typically Offered:** Fall and spring

Design methods applied to mechanical system 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 is continued in MECH 440B. 2 hours lecture, 3 hours supervision. (005433)

Grade Basis: Graded**Repeatability:** You may take this course for a maximum of 3 units**Course Attributes:** Upper Division; Writing Course; Graduation Writing Assessment Requirement Course**MECH 440B Capstone Design II 3 Units****Prerequisite:** MECH 440AW. Recommended: MECA 380, MECH 308, MECH 338.**Typically Offered:** Fall and spring

Continuation of the capstone design project from MECH 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 MECH 440AW. 2 hours lecture, 3 hours supervision. (005434)

Grade Basis: Graded**Repeatability:** You may take this course for a maximum of 3 units**Course Attributes:** Upper Division

- MECH 498 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 the specific topic being offered. 3 hours lecture. (005456)
Grade Basis: Graded
Repeatability: You may take this course more than once
Course Attributes: Upper Division
- MECH 499 Special Problems** **1-3 Units**
Prerequisite: Approval of supervising faculty member.
Typically Offered: Inquire at department
 This course is an independent study of special problems offered for 1.0-3.0 units. See the department office for information on registering. 3 hours supervision. (005457)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Upper Division
- MECH 499H Honors Project** **3 Units**
Prerequisite: Completion of 12 units of upper-division MECH courses, faculty permission.
Typically Offered: Inquire at department
 Open by invitation to MECH majors who have a GPA among the top 5% of MECH students based upon courses taken at CSU, Chico. This is an "Honors in the Major" course; a grade of B or higher in 6 units of MECH 499H certifies the designation of "Honors in the Major" to be printed on the transcript and the diploma. If taken twice, prerequisite to the second semester is a grade of B or higher in the first semester. Each 3-unit course will require both formal written and oral presentations. 9 hours supervision. (005458)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Upper Division
- MECH 697 Independent Study** **1-3 Units**
Prerequisite: Approval of supervising faculty member.
Typically Offered: Inquire at department
 This course is a graduate-level independent study offered for 1.0-3.0 units. 9 hours supervision. (005476)
Grade Basis: Report in Progress: Graded
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Graduate Division
- MECH 698 Advanced Topic** **1-3 Units**
Prerequisite: To be established when course is formulated.
Typically Offered: Inquire at department
 This course is for special topics offered for 1.0-3.0 units. Typically the topic is offered on a one-time-only basis and may vary from term to term and be different for different sections. See the Class Schedule for the specific topic being offered. 9 hours supervision. (005475)
Grade Basis: Graduate Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Graduate Division
- MECH 699P Master's Project** **1-6 Units**
Prerequisite: Approval of supervising faculty member.
Typically Offered: Inquire at department
 Independent study leading to a Master's Thesis of a special problem approved by student's graduate advisory committee. See the department office for registration procedure. 9 hours supervision. (005485)
Grade Basis: Report in Progress: CR/NC
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Graduate Division
- MECH 699T Master's Thesis** **1-6 Units**
Prerequisite: Approval of supervising faculty member.
Typically Offered: Inquire at department
 Independent study leading to a Master's Thesis of a special problem approved by student's graduate advisory committee. See the department office for registration procedure. 9 hours supervision. (005483)
Grade Basis: Report in Progress: CR/NC
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Graduate Division