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.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>MECH 100</td>
<td>Graphics I</td>
<td>1</td>
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<tr>
<td>Corequisites: MECH 100L.</td>
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<tr>
<td>Typically Offered: Fall and spring</td>
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<tr>
<td>MECH 100L</td>
<td>Graphics I Laboratory</td>
<td>1</td>
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<tr>
<td>Corequisites: MECH 100.</td>
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<tr>
<td>MECH 140</td>
<td>Introduction to Design and Automation</td>
<td>2</td>
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<tr>
<td>Prerequisite: MATH 119 or GE Mathematics/Quantitative Reasoning 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.</td>
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<td>Typically Offered: Fall and spring</td>
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<tr>
<td>MECH 110</td>
<td>Materials Science and Engineering Laboratory</td>
<td>3</td>
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<tr>
<td>Corequisites: CHEM 107 or CHEM 111, PHYS 202A or PHYS 204A.</td>
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<tr>
<td>MECH 208</td>
<td>Introduction to Technical Computing</td>
<td>2</td>
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<tr>
<td>Prerequisite: MATH 121. Recommended: PHYS 204A.</td>
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<tr>
<td>MECH 210</td>
<td>Materials Science and Engineering</td>
<td>3</td>
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<tr>
<td>Corequisites: MECH 210L for MECA, MECH, and AMAR majors only.</td>
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<tr>
<td>MECH 210L</td>
<td>Materials Science and Engineering Laboratory</td>
<td>1</td>
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<tr>
<td>Corequisites: MECH 210 for AMAR, MECA, and MECH majors only.</td>
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<tr>
<td>MECH 298</td>
<td>Special Topic</td>
<td>1-3</td>
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<tr>
<td>Prerequisite: To be established when course is formulated.</td>
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<tr>
<td>Typically Offered: Inquire at department</td>
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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 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

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

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

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

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

MECH 340W  Mechanical Engineering Design (W)  4 Units
Prerequisite: GE Written Communication (A2), 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 context. 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; Writing Course

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 more than once
Course Attributes: Upper Division

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

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

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
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  
Prerequisite: MECH 306. Recommended: CIVL 321; EECE 211 or EECE 215; 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 to be 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  

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 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  

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