Program
BS in Civil Engineering
BS in Computer Engineering
BS in Electrical/Electronic Engineering
BS in Mechanical Engineering
BS in Mechatronic Engineering
Minor in Computer Engineering
MS in Electrical Engineering
Option in Electronic Engineering
Option in Computer Engineering

Engineering offers programs of study leading to the bache-
lor’s degree in civil, computer, electrical/electronic, me-
chanical, and mechatronic engineering. The programs are
accredited by the Engineering Accreditation Commission of
ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, telephone: (410) 347-7700,
which accredits U.S. engineering programs. The
engineering curricula are based on a thorough foundation
in communication skills, humanities, mathematics, and
natural and engineering sciences. The Minor in Computer
Engineering does not require an extensive mathematics
background and is open to majors ranging from commu-
nications to the sciences to liberal arts. It gives students the
opportunity to apply computing hardware and software
technology in their own discipline.

High School Preparation
For an Engineering Degree
In addition to the mathematics, English, and science
courses required for admission to the university, high
school students should consider taking introductory
courses in computing and pre-calculus. If these high
school courses are not completed, additional time may be
required to complete an engineering degree.

FE (EIT) Examination
Senior engineering students are encouraged to take the
Fundamentals of Engineering (Engineer-In-Training)
exam which is the first of two exams required to become
a licensed professional engineer by the California State
Board of Registration.

Student Organizations
Several professional societies have student chapters on cam-
pus that help students by offering tutoring and peer advising,
Student organizations conduct meetings with professional
engineers, sponsor social events, and organize teams to com-
pete at regional competitions with other universities. The
American Society of Civil Engineers, the Structural Engineers
Association of California, the Institute of Transportation En-
gineers, the Society of Plastics Engineers, the Association for
Computing Engineers, the Institute of Electrical and Elec-
tronics Engineers, the American Society of Mechanical En-
gineers, the Society of Manufacturing Engineers, the National
Society of Black Engineers, and the Society of Women Engi-
ners have active chapters. The national honor societies
Tau Beta Pi and Eta Kappa Nu are also available to qualified
students. As no national society exists for mechatronic engi-
ners, Chico has formed a local club, the American Institute
of Mechatronic Engineers.

MESA Engineering Programs (MEP)
The Mathematics • Engineering • Science Achievement
(MESA) Engineering Programs, known collectively as
MEP, are a comprehensive recruitment, retention, and
graduation effort which assists underrepresented and dis-
advantaged students pursuing degrees in engineering and
computer science. The program offers tutoring, advising,
and counseling, and includes a study center and an MEP
Theme House on campus. Please visit or call us.

Career Outlook
Opportunities for civil engineers will expand due to the
need to maintain and enhance the nation’s infrastruc-
ture of transportation, water resources, structural, and
environmental systems.

Computer engineers are some of the most recruited grad-
uates on the campus. Recent surveys indicate that the de-
mand for engineers with hardware and software design
experience will continue to increase in both private and
government sectors.

Electrical/electronics engineers are in demand by indus-
try and government. This demand is predicted to con-
tinue as electronic equipment and embedded systems
become more vital to business, industry, and the home.

Mechanical engineers are employed throughout industry,
in government laboratories, and in private practice. Oppor-
tunities exist in “smart” product design, energy conversion,
transportation and manufacturing systems, to name a few.

Mechatronic engineers are expected to be in high de-
mand as the number of “intelligent” products on the
market increases. The need for graduates who can design
products with “embedded” intelligence and control is
growing rapidly as microprocessors are integral to many
new consumer products.

College of Engineering, Computer Science,
and Construction Management
Dean: Kenneth N. Derucher
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530-898-5342
530-898-4576 (fax)
e-mail: mep@csuchico.edu
http://www.csuchico.edu/mep/
Chair: Gregory Kallio

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and Computer Engineering
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e-mail: elce@csuchico.edu
http://www.csuchico.edu/elce/
Chair: Larry L. Wear

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and Manufacturing Technology
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Chair: Gregory Kallio

MESA Engineering Programs
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http://www.csuchico.edu/mep/
Director: Paul Villegas

Highlighted text indicates a change from the original publication.
High School Preparation For an Engineering Degree
High school graduates planning to study Engineering should complete three years of high school mathematics, including geometry, algebra, and trigonometry. In addition, courses in biology, English, computers, physics, chemistry, and mechanical drawing should be taken to assist the student in moving smoothly into an Engineering program. If these high school courses are not completed, additional time may be required to complete the requirements for an Engineering degree.

CIVIL ENGINEERING
Civil engineering graduates qualify for graduate school or professional work in a broad range of engineering activities. They are well balanced, stressing environmental engineering; engineering mechanics; soil mechanics and foundations; structural analysis and design; surveying and mapping; transportation and traffic engineering; water resources and hydraulics; and construction engineering and management, city planning, and administration.

Civil Engineering Program Mission
The civil engineering program has two comprehensive objectives: to prepare graduates for immediate entry into a variety of professional careers and to provide a solid undergraduate foundation in general principles enabling continued education at advanced levels.

Civil Engineering Educational Objectives
The CSU, Chico Civil Engineering program educational objectives are best framed in terms of the following goals for its graduates:

• Civil Engineering graduates will be prepared to be effective engineers and problem solvers.
• They will be well educated in engineering sciences and proficient in at least four recognized civil engineering areas.
• They will be able to effectively use engineering technology that will enhance their productivity.
• They will be familiar with applicable regulatory and professional issues.
• They will be effective written, technical, and oral communicators, and be able to function effectively as members of multi-disciplinary teams.
• They will have an appreciation for the individual, society, good citizenship, community service, ethical conduct, and human heritage, and they will be aware of the impact of their designs on mankind and the environment.

Civil Engineering Design Experience
The civil engineering program provides an essential balance of engineering science and design. Design content permeates the curriculum, beginning at a fundamental level in the lower division followed by a natural progression to comprehensive design in upper-division courses. Fundamental design problems typically have a unique solution and may involve only a few, simple constraints. Comprehensive design incorporates a multitude of realistic constraints with a variety of possible outcomes—commonly referred to as “open-ended” design.

Required courses in the program provide proficiencies in civil engineering design, beginning in the first year (CIVL 131 Introduction to Civil Engineering) and culminating with comprehensive design in the third and fourth years (CIVL 431 Environmental Engineering, CIVL 415 Reinforced Concrete Design, and CIVL 441 Transportation Engineering). This ensures a breadth of design experience that is then enhanced and focused in elective courses.

THE BACHELOR OF SCIENCE IN CIVIL ENGINEERING

Total Course Requirements for the Bachelor’s Degree: 132 units
See “Requirements for the Bachelor’s Degree” in The University Catalog for complete details on general degree requirements. A minimum of 40 units, including those required for the major, must be upper division.

A suggested Major Academic Plan (MAP) has been prepared to help students meet all graduation requirements within four years. Please request a plan from your major advisor or view it and other current advising information on the CSU, Chico Web.

General Education Requirements: 48 units

Civil engineering major requirements have modifications to the university's General Education Requirements. The following courses, together with the approved General Education courses required for the civil engineering major, fulfill the General Education Requirement.

1. Select one course from each of the following Breadth areas: A1, A2, C (either C1 or C2 or C3), and D (either D1, or D2, or D3).
2. Select two courses from the same Upper-Division Theme. Consult with an adviser to determine which two courses in the selected theme meet the Upper-Division Theme Requirement for civil engineering majors.

Accreditation Requirement
Courses must be selected in such a manner as to satisfy the humanities, social science, mathematics, base science, and engineering topics requirements of the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, telephone: (410) 347-7700.

Cultural Diversity Course Requirements: 6 units

See “Cultural Diversity” in The University Catalog. Most courses taken to satisfy these requirements may also apply to General Education.

American Institutions Requirement: 6 units

See the “American Institutions Requirement” under “Bachelor’s Degree Requirements.” For this major, this requirement is normally fulfilled by completing HIST 130 and POLS 155. For this major, HIST 130 may also be applied to General Education Breadth Area C1, C2, or C3, and POLS 155 may also be applied to General Education Breadth Area D1, D2, or D3.

Literacy Requirement:

See “Mathematics and Writing Requirements” in The University Catalog. Writing proficiency in the major is a graduation requirement and may be demonstrated through satisfactory completion of a course in your major which has been designated as the Writing Proficiency (WP) course for the semester in which you take the course. Students who earn a C or better are required to repeat the course and earn a C or better to receive WP credit. See The Class Schedule for the designated WP courses for each semester. You must pass ENGL 130 (or its equivalent) with a C or better before you may register for a WP course.

Course Requirements for the Major: 107-109 units

The following courses, or their approved transfer equivalents, are required of all candidates for this degree.

Lower-Division Requirements: 53-55 units

14 courses required:
CIVL 130 Surveying 3.0 FA
Prerequisites: MATH 120 (may be taken concurrently).
CIVL 131 Intro to Civil Engr Design 3.0 SP
Prerequisites: CIVL 130.
CIVL 205 Computer Applications in Engr 2.0 FS
Prerequisites: PHYS 204A (may be taken concurrently).
CIVL 211 Statics 3.0 FS
Prerequisites: MATH 121; MECH 100 or MECH 102 (may be taken concurrently);
PHYS 204A.
CHEM 111 General Chemistry 4.0 FS
Prerequisites: Second-year high school algebra; one year high school chemistry.
(One year of high school physics and one year of high school mathematics past Algebra II are recommended.)
ECEC 211 Linear Circuits I 3.0 FS
ECEC 211L Linear Circuits I Activity 1.0 FS
Corequisites: ECEC 211.
MATH 121 Analytic Geometry and Calculus 4.0 FS
Prerequisites: Completion of ELM requirement; both MATH 118 and MATH 119 (or high school equivalent); a score that meets department guidelines on a department administered calculus readiness exam.
MATH 121 Analytic Geometry and Calculus 4.0 FS
Prerequisites: Completion of ELM requirement; both MATH 118 and MATH 119 (or high school equivalent); a score that meets department guidelines on a department administered calculus readiness exam.
MATH 260 Elem Differential Equations 4.0 FS
Prerequisites: Completion of ELM requirement; MATH 121 with a grade of C- or better.
MECH 102 Graphics for Civil Engineers 2.0 FS
MECH 210 Materials Science/Engineering 3.0 FS
Prerequisites: PHYS 204A; CHEM 111 (may be taken concurrently);
PHYS 204A Mechanics 4.0 FS
Prerequisites: High school physics or faculty permission. Concurrent enrollment in or prior completion of MATH 121 (second semester of calculus) or equivalent.
PHYS 204B Electricity and Magnetism 4.0 FS
Prerequisites: MATH 121, PHYS 204A with a grade of C- or higher.
Civil Engineering majors must also attain a minimum 2.0 GPA in:

- all college courses attempted and for all courses attempted at Chico.

All students must attain a minimum 2.0 Grade Point Average (GPA) in:

- for a letter grade except those courses specified by the department as

Grading Requirement:

- Those students who have passed GEOS 101. No college credit for

Upper-Division Requirements: 54 units

13 courses required:

- CIVL 302 Engineering Econ & Statistics
- CIVL 311 Strength of Materials
- CIVL 312 Structural Testing Laboratory
- CIVL 313 Structural Mechanics
- CIVL 321 Fluid Mechanics
- CIVL 402 Contracts/Specs/Tech Reports
- CIVL 411 Soil Mechanics and Foundations
- CIVL 415 Reinforced Concrete Design
- CIVL 441 Transportation Engineering
- CIVL 495 Lifelong Development Engineers
- CIVL 496 Economics
- CIVL 512 Thermodynamics
- PHYS 240C Heat/Wave Motion/Sound/Light

3 units selected from:

- CHEM 111 General Chemistry
- GEOS 102 Physical Geology
- PHYS 204A with a grade of C- or higher.

Upper-Division Requirements: 54 units

13 courses required:

- MATH 220 Analytic Geometry and Calculus
- MATH 335 Elementary Linear Algebra
- BIOL 101 Concepts of Biology
- MATH 350 Intro to Probability/Stat
- CIVL 211 General Microbiology
- MATH 350 Intro to Probability/Stat
- CIVL 211 General Microbiology
- CHEM 111 General Chemistry
- GEOS 102 Physical Geology
- PHYS 204A Heat/Wave Motion/Sound/Light

3 units selected from:

- CIVL 302 Engineering Econ & Statistics
- CIVL 311 Strength of Materials
- CIVL 312 Structural Testing Laboratory
- CIVL 313 Structural Mechanics
- CIVL 321 Fluid Mechanics
- CIVL 402 Contracts/Specs/Tech Reports
- CIVL 411 Soil Mechanics and Foundations
- CIVL 415 Reinforced Concrete Design
- CIVL 441 Transportation Engineering
- CIVL 495 Lifelong Development Engineers
- CIVL 496 Economics
- CIVL 512 Thermodynamics
- PHYS 240C Heat/Wave Motion/Sound/Light

Honors in the Major

Honors in the Major is a program of independent work in your major. It involves 6 units of honors course work over two semesters.

1. Your cumulative GPA should be at least 3.5 or within the top 5 percent of majors in your department.
2. Your GPA in your major should be at least 3.5 or within the top 5 percent of majors in your department.
3. Your Honors work culminates with a public presentation of your Honors project.
4. 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 6 units of course work over the two semesters of their senior year.
5. Your honors work culminates with a public presentation of your Honors project.

The Faculty

Civil Engineering

Joel F. Arthur, 1986, Professor, PE, PhD, UC Davis.
Kenneth N. Derucher, 1994, Dean, Administrator, PE, PhD, VA Tech.
Tanya Emerson, 2001, Assistant Professor, PE, PhD, UC Davis.
Thomas C. Ferrara, 1971, Professor Emeritus, PE, PhD, UC Davis.
A. Reed Gibby, 1984, Professor Emeritus, PE, PhD, UC Davis.
Kenneth V.R. Henkel, 1979, Professor Emeritus, PE, PhD, U WI.
Elliott B. Johnson, 1956, Professor Emeritus, MSCE, Iowa St U.
Russell S. Mills, 1978, Chair, Professor, PE, PhD, Stanford U.
Maurice Mow, 1978, Professor Emeritus, PE, PhD, Rensselaer.
Engineering

Charles C. Mueller, 1973; Professor Emeritus, PE, PhD, Mich St U.
Stewart M. Oakley, 1986; Professor, PhD, Oregon State U.
James S. Scolaro, 2000; Research Assistant Professor, BS, CSU Chico.
John D. Teasdale, 1966; Professor Emeritus, PE, MSc, U Iowa.
Gary Z. Watters, 1980; Professor Emeritus, PE, PhD, Stanford U.
PE designates Registered Professional Engineer

Civil Engineering Course Offerings

Please see the section on “Course Description Symbols and Terms” in The University Catalog for an explanation of course description terminology and symbols, the course numbering system, and course credit units. All courses are lecture and discussion and employ letter grading unless otherwise stated. Some prerequisites may be waived with faculty permission. Many syllabi are available on the Chico Web.

CIVL 120 Surveying for Non-Engineers 3.0 Fa/Spr
Prerequisites: PHYS 204A (may be taken concurrently).
Theory and practice in the use of surveying equipment, with particular emphasis on mapping as applied to such disciplines as construction, geology, architecture, agriculture, and anthropology. 2.0 hours discussion, 3.0 hours laboratory. Formerly ENGR 011.

CIVL 130 Surveying 3.0 Fall
Prerequisites: MATH 120 (may be taken concurrently).
Theory and practice in measurement and computation of distances, angles, and areas on the earth’s surface. Difference of combined measurements analysis. Use of scientific calculator required. 2.0 hours discussion, 3.0 hours laboratory. Formerly C E 010.

CIVL 131 Introduction to Civil Engineering Design 3.0 Spring
Prerequisites: CIVL 130.
Provides an introduction to civil engineering facilities and systems (environmental, structural, transportation and water resources), environmental impacts of these systems, historical development of design, introduction to design concepts and procedures, examples of the design of civil engineering systems, creativity in design, and applications in civil engineering design. Horizontal curves, vertical curves, earthwork, state plane coordinates, geographic information systems and global positioning systems. 2.0 hours discussion, 3.0 hours laboratory. Formerly C E 011.

CIVL 205 Computer Applications in Engineering 2.0 Fa/Spr
Prerequisites: PHYS 204A (may be taken concurrently).
Use of the computer in a variety of applications from the fields of engineering. Topics include computer hardware, operating systems, the Internet, technical word processing, electronic spreadsheets, computer charting and drawing, computer programming, and ethics. 4.0 hours activity. Formerly C E 020.

CIVL 211 Statics 3.0 Fa/Spr
Prerequisites: MATH 121; MECH 100 or MECH 102 (may be taken concurrently); PHYS 204A.
Force systems, moments, equilibrium, centroids, and moments of inertia. 2.0 hours discussion, 2.0 hours activity. Formerly C E 035; CAN ENGR 8.

CIVL 302 Engineering Economy and Statistics 3.0 Fa/Spr
Prerequisites: MATH 121; junior standing.
Analysis of alternatives by basic engineering economic methods and applications of statistics including probability, sampling theory and data analysis, and tests of hypotheses. Formerly C E 121.

CIVL 311 Strength of Materials 4.0 Fa/Spr
Prerequisites: CIVL 211; MECH 100 or MECH 102; MATH 260 and MATH 210 (may be taken concurrently).
Strength and elastic properties of materials of construction; tension, compression, shear, and torsion stresses; deflection and deformation; stress analysis of beams and columns. Formerly C E 101.

CIVL 312 Structural Testing Laboratory 1.0 Fa/Spr
Prerequisites: CIVL 205, CIVL 111.
Methods and instruments used in the determination of the strength and elastic properties of materials of engineering. Experiments verifying the theoretical principles of CIVL 311. 3.0 hours laboratory. Formerly C E 102.

CIVL 313 Structural Mechanics 4.0 Fa/Spr
Prerequisites: CIVL 205 (may be taken concurrently), CIVL 311.
Fundamentals of structural analysis for beams, trusses, and frames. Topics include loading (including seismic), influence lines, approximate analysis methods, deflection analysis, and statically indeterminate structures. Methods applicable to computer analysis are introduced. Formerly C E 153.

CIVL 321 Fluid Mechanics 4.0 Fa/Spr
Prerequisites: CIVL 211. Recommended: MATH 260, MECH 320 (may be taken concurrently).
Hydrostatics, principles of continuity, work-energy and momentum, viscous effects, dimensional analysis and similarity. Flow in closed conduits, drag on objects. 3.0 hours discussion, 3.0 hours laboratory. Formerly C E 150.

CIVL 342 Planning of Public Works Projects 3.0 Inquire
Prerequisites: Junior standing.
Not intended for engineering majors. A non-mathematical approach to the decisions made in the planning of public works projects, with particular emphasis on public participation. Current projects being planned on the local, state, and national level will be studied. Formerly ENGR 120.

CIVL 350 Ethics, Technology, and Society 3.0 Fa/Spr
Prerequisites: PHIL 321 and General Education Areas B1 and D3.
A scholarly treatment of the technological impacts on developed and less developed societies in an ethical context. Assessment techniques will be introduced and applied. Historical, current, emerging, and future technologies (communication, transportation, agriculture, cloning, robotics, etc.) will be assessed. (This course cannot be taken as an engineering elective.) This is an approved General Education course. Formerly C E 178.

CIVL 398 Special Topics 1.0-3.0 Fa/Spr
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. Credit/no credit grading only. Formerly C E 198.

CIVL 399 Special Problems 1.0-3.0 Fa/Spr
Prerequisites: Faculty permission.
This course is an independent study of special problems offered for 1.0-3.0 units. You must register directly with a supervising faculty member. You may take this course more than once for a maximum of 6.0 units. Credit/no credit grading only. Formerly C E 199.

CIVL 402 Contracts, Specifications, and Technical Reports 4.0 Fa/Spr
Prerequisites: ENGL 130 or equivalent with a grade of C- or higher, junior standing. Introduction to law as it relates to the practice of civil engineering. Operation of a successful civil engineering business. Writing various technical reports and specifications. This is a writing proficiency, WP, course; a grade of credit-no credit grading only. Formerly C E 119.

CIVL 411 Soil Mechanics and Foundations 4.0 Spring
Prerequisites: CIVL 312 and CIVL 321 (may be taken concurrently); ENGL 130 or equivalent.
Soil properties, tests, and classification. Analysis of soil stresses, consolidation, shear strength, lateral pressures, and ground water movement. Related design consideration involving spread footings, piles, retaining walls, and slopes. Use of programmable scientific calculator required. 3.0 hours discussion, 3.0 hours laboratory. Formerly C E 250.

CIVL 415 Reinforced Concrete Design 4.0 Fall
Prerequisites: CIVL 312, CIVL 313. Recommended: CIVL 411.
The analysis and design of reinforced concrete structures and elements by the strength design method. Laboratory includes experiments on concrete, concrete structural elements, and a design project. 3.0 hours discussion, 3.0 hours laboratory. Formerly C E 255.

CIVL 431 Environmental Engineering 4.0 Spring
Prerequisites: CHEM 111, CIVL 321, BIOS 101 or BIOS 108.
Introduction to water quality, water supply, distribution, and drinking water treatment; wastewater collection, treatment, and disposal. Disease transmission; water quality parameters; physical, chemical, and biological processes in the treatment of water, wastewater, and biosolids. 3.0 hours discussion, 3.0 hours laboratory. Formerly C E 288.

CIVL 441 Transportation Engineering 4.0 Fall
Prerequisites: CIVL 131, CIVL 302 (may be taken concurrently); CIVL 312, CIVL 411.
Transportation systems and facility planning, design, construction, operations, and maintenance. Pavement design and traffic engineering fundamentals. Laboratory includes field studies, design exercises, and modeling/forecasting tasks. 3.0 hours discussion, 3.0 hours laboratory. Formerly C E 270.

CIVL 495 Lifelong Development for Engineers 3.0 Fa/Spr
Prerequisites: ENGL 130 or equivalent; senior standing.
Professional practices in engineering; ethics; opportunities for continuing development, design practices, proper use of computer software, professional relationships. A substantial written project will be required. 2.0 hours discussion, 2.0 hours activity. Formerly ENGR 195.

CIVL 498 Advanced Topics 1.0-3.0 Fa/Spr
Prerequisites: To be established when courses are formulated.
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. Formerly C E 298.
CIVL 499H Honors Project 3.0 Inquire
Prerequisites: Completion of 12 units of upper-division C E courses, faculty permission. This course may be taken twice for a maximum of 6 units. Prerequisite to the second semester is a B or higher in the first semester. Open by invitation to C E majors who have a GPA among the top 5% of C E 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 499H certifies the designation of “Honors in the Major” to be printed on the transcript and the diploma. Each 3-credit course will require both formal written and oral presentations. You may take this course more than once for a maximum of 6.0 units. Formerly C E 299H.

CIVL 550 Advanced Surveying 3.0 Inquire
Prerequisites: CIVL 131 or faculty permission. Laws, practices, and historical background on land surveying. Includes property surveys and legal descriptions. Use of personal computers required. 2.0 hours discussion, 3.0 hours laboratory. Formerly C E 220.

CIVL 551 Foundations Engineering 3.0 Inquire
Prerequisites: CIVL 411. Recommended: CIVL 415. The application of soil mechanics principles to the design of foundations for buildings and earth structures. Integration of structural design and soil response. Formerly C E 251.

CIVL 553 Advanced Structural Analysis 3.0 Inquire
Prerequisites: CIVL 313. Analysis of statically determinate and indeterminate structures under the action of external effects, including gravity and lateral loading. Emphasis on computer analysis of trusses, continuous beams, and rigid frames, using both flexibility and stiffness approaches. Introduction to the finite element method for structural mechanics applications. Formerly C E 290.

CIVL 554 Steel Design 3.0 Inquire
Prerequisites: CIVL 313. Theory, analysis, and design of steel structural elements and systems using the Load and Resistance Factor Design (LRFD) method. Formerly C E 254.

CIVL 556 Timber Design 3.0 Inquire
Prerequisites: CIVL 313. Theory and design procedures for timber structures and their connections to resist gravity and lateral loads. Basic element design by the Allowable Stress Design (ASD) and/or Load and Resistance Factor Design (LRFD) methods are detailed. Also covered is design of floor and roof systems and shear walls. One or two 3-hour field trips required. Formerly C E 256.

CIVL 557 Prestressed Concrete and Reinforced Masonry Design 3.0 Inquire
Prerequisites: CIVL 313. Recommended: CIVL 415. Theory, analysis, design, and construction of prestressed concrete, precast concrete, and masonry structural elements and systems using working stress and/or ultimate strength design methods. Formerly C E 257.

CIVL 558 Earthquake and Wind Engineering 3.0 Inquire
Prerequisites: CIVL 313, MATH 260. Recommended: Concurrent enrollment in or prior completion of CIVL 415, CIVL 554, CIVL 556, or CIVL 557. Earthquake and wind hazard related to the structural design of buildings. Topics include engineering seismology, wind environment and climatology, structural dynamics, structural loading, and design methodologies. Use of computer software for the static and dynamic analysis of three-dimensional building systems. 2.0 hours discussion, 2.0 hours activity. Formerly C E 258.

CIVL 561 Open Channel Hydraulics 3.0 Inquire
Prerequisites: CIVL 321 or faculty permission. Principles and applications of steady, gradually varying, and unsteady open channel hydraulics. Formerly C E 286.

CIVL 562 Engineering Hydrology 3.0 Inquire
Prerequisites: CIVL 321 or faculty permission. A concise treatment of modern hydrology, emphasizing a quantitative approach to surface-water runoff, ground-water runoff, precipitation, evapotranspiration, climate, infiltration, drainage-basin characteristics. Formerly C E 252.

CIVL 567 Pipeline Hydraulics and Design 3.0 Inquire
Prerequisites: CIVL 302, CIVL 321, CIVL 411 (may be taken concurrently). Design of pumped pipelines, analysis of transients in pipe systems caused by valve movement, pump power failure, etc. Design of transient controls through operational procedures and devices such as surge relief valves, air chambers, and surge tanks. Formerly C E 287.

CIVL 571 Natural Systems for Wastewater Treatment 3.0 Inquire
Prerequisites: CIVL 413 or faculty permission. Natural systems for the treatment of wastewater; transmission of excreta-related infections; treatment systems for removal of pathogens; wastewater and biosolids reuse in agriculture and aquaculture. Special emphasis on the problems of developing countries. Formerly C E 291.

CIVL 573 Water Quality Engineering 3.0 Inquire
Prerequisites: CIVL 411 or faculty permission. Waste quality criteria and standards; engineering design; management and monitoring of water quality. Formerly C E 293.

CIVL 575 Solid and Hazardous Waste Management 3.0 Inquire
Prerequisites: CIVL 411 or faculty permission. An introduction to the handling and management of solid and hazardous wastes. Emphasis on state-of-the-art engineering techniques and contemporary management issues based on social, economic, and legal considerations; risk assessment; case studies. Special emphasis on problems of developing countries. Formerly C E 295.

CIVL 581 Transportation Pavements 3.0 Inquire
Prerequisites: CIVL 441 or faculty permission. Characteristics and manufacture of bituminous materials; engineering properties, design, and production of bituminous mixtures; analysis, design, and construction of flexible and rigid pavement cross-sections; stabilization of sub-grades; analysis of pavement distress; development and operation of pavement management systems; and application of computer software. 2.0 hours discussion, 2.0 hours activity. Formerly C E 271.

CIVL 583 Urban Transportation Systems Planning 3.0 Inquire
Prerequisites: CIVL 441 or faculty permission. Introduction to systems approach, urban transportation technology, urban problems and transportation, forecasting methods, urban transportation models and calibration, traffic impact studies and USDOT planning requirements. Formerly C E 273.

CIVL 585 Traffic Engineering 3.0 Inquire
Prerequisites: CIVL 441 or faculty permission. Traffic engineering fundamentals, traffic control signs, markings, and signals. Intersection and highway capacity. Highway safety and accident investigations. Design of streets and parking facilities. Assessment of the environmental impact of traffic. Formerly C E 272.

CIVL 591 Construction Management I 3.0 Inquire
Prerequisites: CIVL 205, junior standing. Recommended: CIVL 302. Introduction to construction engineering and management. Cost estimation for contract construction and engineering, including labor, material, equipment, and overhead costs. Planning, scheduling, and progress control of construction operations. One or two 3-hour field trips required. Formerly C E 231.

CIVL 592 Construction Management II 3.0 Inquire
Prerequisites: CIVL 205; CIVL 321 (may be taken concurrently). Recommended: CIVL 302. Construction procedures, equipment and methods; efficient use of excavation and hauling equipment operations. Application of crew balance, process chart and operations research techniques to construction operations. Quality control and inspection technique for construction safety. One or two 3-hour field trips required. Formerly C E 232.

CIVL 656 Advanced Timber Design Activity 1.0 Inquire
Prerequisites: CIVL 556 or faculty permission. Advanced timber design activities including design projects for lateral loads (seismic or wind) in horizontal diaphragms and shear walls, seismic connections, flexible diaphragm deflections, and development of computational aids for the design of timber systems. 2.0 hours activity. Formerly C E 356A.

CIVL 658 Advanced Earthquake and Wind Engineering Activity 1.0 Inquire
Prerequisites: CIVL 556 or faculty permission. Recommended: Completion of or concurrent enrollment in an advanced structural design course or equivalent. Investigations of current topics in earthquake and wind hazard related to the structural design of buildings. 2.0 hours activity. Formerly C E 358A.

CIVL 661 Advanced Open Channel Hydraulics Design Activity 1.0 Inquire
Prerequisites: CIVL 561 or faculty permission. Procedures for the design of open channels. Applications in steady, gradually-varying, and unsteady open channel hydraulics. 2.0 hours activity. Formerly C E 386A.

CIVL 681 Advanced Transportation Pavements Discussion 1.0 Inquire
Prerequisites: CIVL 441 and CIVL 581 or faculty permission. A comparative and critical analysis of the various pavement design techniques and the application and evaluation of pavement design software. 2.0 hours activity. Formerly C E 371A.

CIVL 697 Independent Study 1.0-3.0 Fa/Sp
Prerequisites: Faculty permission. This course is a graduate-level independent study offered for 1.0-3.0 units. You must register directly with a supervising faculty member. You may take this course more than once for a maximum of 6.0 units. Formerly C E 390.
Engineering Course Offerings

Please see the section on "Course Description Symbols and Terms" in The University Catalog for an explanation of course description terminology and symbols, the course numbering system, and course credit units. All courses are lecture and discussion and employ letter grading unless otherwise stated. Some prerequisites may be waived with faculty permission. Many syllabi are available on the Chico Web.

ENGR 101 MESA Orientation Class 2.0 Fall
Prerequisites: MESA eligibility.
A comprehensive introduction that provides incoming Math, Engineering, Science Achievement (MESA) students with an overview of the fields of engineering and computer science, along with information on degree requirements, technical skills needed, working in industry, professional organizations, and professional development. In addition, there is an introduction to campus resources and university life for first-year MESA students. ABC/no credit grading only. Formerly ENGR 007.

COMPUTER ENGINEERING

The computer engineering program at CSU, Chico bridges the curriculum gap between electrical/electronic engineering and computer science. The program is designed to provide a broad background in both the theory and practice of computer hardware and software design and to prepare them for entrance into usable computer systems. The curriculum includes courses in logic design, microprocessor system design, computer interfacing, programming and data structures, computer architecture and assembly language programming, embedded system design, and system requirements and design. The program is accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, telephone: (410) 347-7170.

Computer Engineering Program Mission:
The Electrical and Computer Engineering Department educates each student to be a responsible and productive computer engineer who can effectively respond to future challenges.

Computer Engineering Program Objective
The objective of the Computer Engineering Program is to produce graduates able to:

- Apply knowledge of mathematics, science, and engineering to identify, formulate, and solve computer engineering problems.
- Use industry standard tools to analyze, design, develop, and test computer-based systems containing both hardware and software components.
- Achieve success in graduate programs in computer engineering, electrical engineering, or computer science.
- Continue to develop their knowledge and skills after graduation in order to succeed personally and contribute to employer success.
- Work effectively as a member of a multi-disciplinary development team and undertake leadership roles when appropriate.
- Communicate their thoughts, in both written and oral forms, so that others can comprehend and build on their work.
- Appreciate the importance of ethics in the profession and the need to act in society’s best interest.

Computer Engineering Design Experience
Design is a fundamental aspect of the computer engineering curriculum and is integrated into the curriculum beginning in the freshman year where students are introduced to both hardware and software design. As students expand their knowledge and analysis skills through the sophomore and junior years, the design problems they are assigned increase in complexity. Design problems are assigned in electronics, digital and microprocessor systems, embedded systems, and software systems. The design experience culminates in the senior year when all students are required to design a project, create testable requirements for the project, design the project, and construct the project to prove the design works. Projects chosen by students often include elements of both hardware and software design. In the past, students have designed computer-controlled robots, security systems, sophisticated Web applications, and peripheral interfaces.

THE BACHELOR OF SCIENCE IN COMPUTER ENGINEERING

Total Course Requirements for the Bachelor’s Degree: 132 units
See “Requirements for the Bachelor’s Degree” in The University Catalog for complete details on general degree requirements. A minimum of 40 units, including those required for the major, must be upper division.

A suggested Major Academic Plan (MAP) has been prepared to help students meet all graduation requirements within four years. Please request a plan from your major adviser or view it and other current advising information on the CSU, Chico Web.

General Education Requirements

Computer Engineering is a major with modifications to the university’s General Education Requirements. The following requirements, together with the approved General Education courses required for the Computer Engineering major (marked with an * below), fulfill the General Education Requirement.

1. Select two courses, one from each of the Core Areas A1 and A2.
2. Select one course from Breadth Area C1 or C2 or C3. A course that also fulfills the Ethnic or Non-Western requirement is recommended.
3. Select one course from Breadth Area D1 or D2 or D3. A course that also fulfills the Ethnic or Non-Western requirement is recommended.
4. Select two courses from the same Upper-Division Theme.

Consult with an advisor or The Class Schedule to determine which two courses in the theme you select meet the Upper-Division Theme Requirement for Computer Engineering majors.

Cultural Diversity Course Requirements: 6 units
See “Cultural Diversity” in The University Catalog. Courses used to satisfy these requirements may also apply to General Education Areas C and D.

American Institutions Requirement: 6 units

This requirement is normally fulfilled by completing HIST 130 and POLS 155. For other alternatives, see the “Bachelor’s Degree Requirements” section.

Literacy Requirement:
See “Mathematics and Writing Requirements” in The University Catalog. Writing proficiency in the major is a graduation requirement and may be demonstrated through satisfactory completion of a course in your major which has been designated as the Writing Proficiency (WP) course for the semester in which you take the course. Students who earn below a C- are required to repeat the course and earn a C- or better to receive WP credit. See The Class Schedule for the designated WP courses for each semester. You must pass ENGL 130 (or its equivalent) with a C- or better before you may register for a WP course.

Course Requirements for the Major: 108 units

The following courses, or their approved transfer equivalents, are required of all candidates for this degree.

Lower-Division Requirements: 51 units

15 courses required:

- CHEM 111 General Chemistry 4.0 FS *
  Prerequisites: Second-year high school algebra; one year high school chemistry. (One year of high school physics and one year of high school mathematics past Algebra II are recommended.)
- CSCI 112 Programming and Algorithm II 3.0 FS
  Prerequisites: Grade of C- or better in CSCI 111 (or EECE 135 for engineering majors).
- EECE 101 Intro Elec/Computer Engr 2.0 FS
- EECE 135 Algorithms & Progs for Engrs 3.0 FS
- Prerequisites: MATH 120 is recommended.
- EECE 144 Logic Design Fundamentals 4.0 FS
  Prerequisites: Recommended: EECE 101, MECH 100, or MECH 102.
- EECE 211 Linear Circuits I 3.0 FS
  Corequisites: EECE 211.
- EECE 221 Processor Arch/Assembly Lang 3.0 FS
  Prerequisites: Either CSCI 111 or EECE 135.
- MATH 120 Analytic Geometry and Calculus 4.0 FS *
  Prerequisites: Completion of ELM requirement; both MATH 118 and MATH 119 (or high school equivalent); a score that meets department guidelines on a department administered calculus readiness exam.
- MATH 121 Analytic Geometry and Calculus 4.0 FS
  Prerequisites: Completion of ELM requirement; MATH 120 with a grade of C- or higher.
- MATH 220 Analytic Geometry and Calculus 4.0 FS
  Prerequisites: Completion of ELM requirement; MATH 121 with a grade of C- or higher.

Highlighted text indicates a change from the original publication.
culminates in a public presentation of your work. Students sometimes collaboration allows you to work in your field at a professional level and interest on an original performance or research project. This year-long gram allows you to work closely with a faculty mentor in your area of ment chair. Most importantly, however, the Honors in the Major pro -

Your Honors work will be recognized at your graduation, on your per -

Honors in the Major is a program of independent work in your major. 

The Faculty

Electrical and Computer Engineering

Richard A. Bednar, 1979, Professor Emeritus, PE, PhD, Mich St U. 
Roy E. Crosbie, 1983, Director of Academic Develop., Professor Emeritus, PhD, CBRI, Univ of Liverpool.
Ralph J. Gagnon, 1981, Professor Emeritus, PhD, U of WA.
Arthur Gee, 1977, Professor Emeritus, PE, MSEE, Poly U NY.
Louis R. Harrold, 1984, Professor Emeritus, MSEE, UC Davis.
Phil Hoff, 1970, Professor Emeritus, PhD, UC Berkeley.
William G. Lane, 1960, Professor Emeritus, PE, PhD, UC Davis.
Hede Ma, 2000, Professor, PhD, SUNY Binghamton.
Lyle McBride, 1985, Professor Emeritus, PhD, Harvard U.
Harald E. Petersen, 1984, Professor Emeritus, PhD, Stanford U.
Albert O. Richardson, 1989, Professor, PhD, Penn St U.
Ben-Dau Tseng, 1982, Professor, PhD, U Windsor.
Larry L. Wear, 1972, Chair, Professor Emeritus, PhD, Santa Clara Univ.
Dale Word, 2002, Assist Professor, MS, CSU Chico.
John J. Zenor, 1982, Professor Emeritus, PhD, U Missouri. 

PE designates Registered Professional Engineer
Electrical and Computer Engineering

Course Offerings

Please see the section on “Course Description Symbols and Terms” in The University Catalog for an explanation of course description terminology and symbols, the course numbering system, and course credit units. All courses are lecture and discussion and employ letter grading unless otherwise stated. Some prerequisites may be waived with faculty permission. Many syllabi are available on the Chico Web.

**EECE 101** Introduction to Electrical and Computer Engineering

Survey of topics from the fields of electrical and computer engineering. Applications of critical thinking to the solution of engineering problems. Using the computer and sensors to control mechanical devices. Formerly ECE 084.

**EECE 110** Basic Electricity and Instruments

3.0 Fa/Spr

Prerequisites: None. This course is not intended for engineering majors. An introduction to electrical and electronic technology: DC circuitry analysis, AC circuitry analysis, basic electronic components and logic circuits. Instruments used in the study of basic electronics are discussed, demonstrated, and used; emphasis on interpretation of schematic diagrams, breadboarding, familiarization with electronic components. 2.0 hours discussion, 2.0 hours activity. Formerly ECE 030.

**EECE 135** Algorithms and Programs for Engineers

3.0 Fa/Spr

Prerequisites: MAT120 is recommended. Introduces students to the software development life cycle and the elements of a computer system. Teaches the syntax common to both C and C++. Shows how to split large program into segments and explains the role of algorithms in programming. Programming assignments are taken from simple engineering and mathematics problems. 2.0 hours discussion, 2.0 hours activity. Formerly ECE 090.

**EECE 135X** Programming Problem Session

1.0 Fa/Spr

Prerequisites: Concurrent enrollment in EECE 135. Designed to supplement EECE 135 with additional applications and extended explanations of concepts encountered in programming. Provides the student with the opportunity for additional assistance in basic programming skills. 2.0 hours activity. Credit/no credit grading only. Formerly ECE 090X.

**EECE 144** Logic Design Fundamentals

4.0 Fa/Spr

Prerequisites: Recommended: EECE 101, MECH 100, or MECH 102. Introduces and explores switching algebra. Minimization of algebraic function. Use of Karnaugh maps for simplification. Design of combinational logic networks. Design of sequential logic devices including flip-flops, registers, and counters. Analysis and applications of digital devices. Analysis and design of synchronous and asynchronous sequential state machines, state table derivation and reduction. Use of such CAD tools for schematic capture and logic device simulations. 3.0 hours lecture, 2.0 hours activity. Formerly ECE 108X.

**EECE 144X** Logic Design Session

1.0 Fa/Spr

Corequisites: EECE 144. Designed to supplement EECE 144 with additional applications and extended explanations of concepts encountered in the first logic design course. Provides the student with the opportunity for additional assistance in logic design techniques and tools. 2.0 hours activity. Credit/no credit grading only. Formerly ECE 085X.

**EECE 198** Special Topics

1.0-3.0 Inquire

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. Formerly ECE 098.

**EECE 211** Linear Circuits I

3.0 Fa/Spr

Prerequisites: MAT121, PHYS 204B. DC and sinusoidal circuit analysis, including resistive, capacitive, and inductive circuit elements and independent sources. Ideal transformer, Thevenin and Norton circuit theorems and superposition. Phasors, impedance, resonance, and AC power. Three-phase AC Circuit analysis. Formerly ECE 091. CAN ENGR12.

**EECE 211L** Linear Circuits I Activity

1.0 Fa/Spr

Corequisites: EECE 211. Experiments to reinforce the principles taught in EECE 211. The combination of EECE 211 and EECE 211L is equivalent to CAN ENGR 6. 2.0 hours activity. Formerly ECE 091L.

**EECE 211X** Circuits Problem Session

1.0 Fa/Spr

Prerequisites: Concurrent enrollment in EECE 211. Designed to supplement EECE 211 with additional applications and extended explanations of concepts encountered in the first circuits course. Provides the student with the opportunity for additional assistance in analyzing and designing circuits. 2.0 hours activity. Credit/no credit grading only. Formerly ECE 095X.

**EECE 221** Processor Architecture and Assembly Language Programming

3.0 Fa/Spr

Prerequisites: Either CSCI 111 or EECE 125. An introduction to the components that make up a processor and the organization of those components. The representation of numbers, data, and instructions within a processor along with the ways they are addressed. Assembly language programming using arithmetic, logical, conditional, test, and input/output instructions. 2.0 hours lecture, 2.0 hours activity. Formerly ECE 086.

**EECE 311** Linear Circuits II

4.0 Fa/Spr

Prerequisites: EECE 211; MATH 260 (may be taken concurrently). Circuit analysis techniques for networks with both independent and dependent sources. Network topology, Natural and forced responses for RLC circuits. Complex frequency, poles, and zeros. Magnetically coupled circuits and two-port networks. Introduction to linear algebra, circuit simulation using PSPICE, and mathematical analysis using MATLAB. Formerly ECE 140.

**EECE 315** Electronics I

4.0 Fa/Spr


**EECE 316** Electronics II

4.0 Fa/Spr

Prerequisites: EECE 315. Op-amp circuits, waveform generation and shaping, sinusoidal oscillators, high frequency amplifiers, active filters, power supply regulators, power electronics, advanced linear ICs. 3.0 hours discussion, 2.0 hours activity. Formerly ECE 146.

**EECE 320** System Architecture and Performance

3.0 Fall

Prerequisites: Either CSCI 320 or EECE 344 (may be taken concurrently). Study of computing architecture and how the structure of various hardware and software modules affects the ultimate performance of the total system. Topics include qualitative and quantitative analysis of bandwidths, response times, error detection and recovery, interrupts, and system throughputs. Distributed systems and coprocessors; vector and parallel architectures. Formerly ECE 187.

**EECE 335** Project Requirements, Design, and Testing

3.0 Fa/Spr

Prerequisites: ENGR 130; either CSCI 112 or EECE 221. Students are introduced to methodologies used to specify system description. Hardware and software documentation standards are described. Methodologies for modeling development and presentation materials are discussed, and students are required to make both written and oral presentations. 2.0 hours discussion, 2.0 hours activity. Formerly ECE 180. This course is also offered as CSCI 305.

**EECE 343** Computer Interface Circuits

4.0 Fa/Spr

Prerequisites: EECE 144, EECE 315. The use of computer simulation in circuit analysis and design is emphasized; CAD tools as PSPICE and Altera MAX+PLUS II are used. Pulse and digital wave shaping circuits for integrated circuit families (TTL, CMOS, ECL) are covered. Power supplies as applied to both large- and small-scale systems; power and ground bus structures. Line drivers and receivers; single-ended versus differentially driven lines. Advanced state machine design methodologies and procedures for computer interface circuit designs are discussed. Formerly ECE 188.

**EECE 344** Digital Systems Design

4.0 Fa/Spr

Prerequisites: EECE 144, EECE 315. Extends the study of digital circuits to LSI and VLSI devices. Use of computer simulation in system analysis and design verification. 8-bit and 16-bit microprocessors, architecture, bus organization and address decoding. Design concepts for microprocessor systems, including system integration with programmable logic devices. Interfacing to A/D and P/A Converters. Design of input and output ports and interface to programmable ports. Serial communications; interrupt processing. Use of codes for storage and transmission of information; parity, ASCII, Hamming and other error detecting and correcting codes, 2.0 hours activity. Special fee required; see The Class Schedule. Formerly ECE 186.

**EECE 365** Continuous-Time Signals and Transforms

4.0 Fa/Spr

Prerequisites: EECE 311, MATH 260. Theory and application of Fourier series, Fourier transforms, and Laplace transforms. Parseval’s Theorem, convolution and transfer functions. System modeling and simulation, topics from linear algebra, and introduction to partial differential equations. Formerly ECE 141.
Engineering

EECE 375 Fields and Waves 3.0 Spring
Prerequisites: EECE 211, EECE 211L, MATH 260.

EECE 381 Micromouse Design and Construction 1.0 Fa/Spr
Prerequisites: EECE 144, EECE 211, EECE 211L, EECE 221.
This class covers the design and construction of a self-contained robot that will meet the requirements for the IEEE Micromouse competition. Constraints placed on the robot are discussed. 2.0 hours activity. You may take this course more than once for a maximum of 2.0 units. Formerly ECE 189.

EECE 389 Internship in Electrical and Computer Engineering 1.0-3.0 Inquire
This internship is offered for 1.0-3.0 units. Students must register directly with a supervising faculty member. You may take this course more than once for a maximum of 15.0 units. Formerly ECE 189.

EECE 398 Special Topics 1.0-3.0 Fa/Spr
This course is for special topics offered for 1.0-3.0 units. Typically the topic is offered once per 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. Formerly ECE 198.

EECE 399 Special Problems 1.0-3.0 Fa/Spr
This course is an independent study of special problems offered for 1.0-3.0 units. You must register directly with a supervising faculty member. You may take this course more than once for a maximum of 6.0 units. Credit/no credit grading only. Formerly ECE 199.

EECE 411 Consumer Electronics 4.0 Inquire
Prerequisites: EECE 311.
Engineering analysis of consumer electronic equipment: radio receivers, audio and video tape recorders, and television. Other topics will be covered as time permits and student interest directs. Formerly ECE 244.

EECE 417 Radio Frequency Circuits 4.0 Fall
Prerequisites: EECE 315.
Characteristics of passive and active components at high frequencies, reflections and standing waves, matching networks, scattering parameters, high-frequency measurement equipment and techniques, sample high-frequency design and construction projects, Smith charts. 3.0 hours lecture, 3.0 hours laboratory. Formerly ECE 247.

EECE 425 Advanced Computer Architecture 4.0 Spring
Prerequisites: Either CSCI 320 or EECE 320.
The application, design, and performance aspects of parallel processor structures, arithmetic pipelining and vector processing units; architectural classification; memory structures, multiprocessor systems; interconnection networks, multiprocessing control and scheduling; parallel algorithms. Formerly ECE 235.

EECE 427 Topics in Systems and Architecture 4.0 Inquire
Prerequisites: Either CSCI 311 or EECE 344.
Study of selected topics in the area of computer systems and computer architecture. Fault-tolerant systems, system reliability, and redundancy in hardware and software are usually included. Formerly ECE 234.

EECE 431 Software Engineering—Requirements and Design 3.0 Fall
Prerequisites: CSCI 112.
This course examines the requirements and design processes. Requirements topics include gathering, analysis, verification, and management. Design topics include static, functional, and dynamic views of software design, mapping designs to requirements, design patterns, and methodologies. The course also compares software design methodologies including data flow, data structure, and object-oriented analysis and design. Formerly ECE 210.

EECE 437 Real-Time Embedded Systems 4.0 Spring
Prerequisites: CSCI 112, either CIVL 302 or MECH 350, either CSCI 320 or EECE 320.
This course presents the concepts and techniques associated with designing, developing, and testing real-time and embedded systems. Topics include the nature and uses of real-time systems, architecture and design of real-time systems, embedded development and debugging environments, embedded programming techniques, real-time operating systems and real-time scheduling and algorithms. Special attention is given to the study of real-time process scheduling and performance, including mathematical analysis of scheduling algorithms. Formerly ECE 252.

EECE 444 Microprocessor Systems Design 4.0 Spring
Prerequisites: EECE 344.
Advanced microprocessor design concepts and techniques. Timing considerations and calculations for reliable high-speed processor operating frequencies. Interrupts for real-time processing; interfacing microprocessors to Dynamic Random Access Memories. Designing DRAM controllers using state machine design procedures, Direct Memory Access Controllers (DMAs) and multi-master systems. Programmable Parallel Ports and Timers. Special purpose processors for digital signal processing, communications and multimedia applications. 3.0 hours discussion, 2.0 hours activity. Special fee required; see The Class Schedule. Formerly ECE 285.

EECE 447 Introduction to VLSI Systems 4.0 Inquire
Prerequisites: EECE 144, EECE 315.
Design of VLSI circuits. Emphasis is on design methodologies, including the use of CAE tools for schematic capture, chip layout, circuit simulation, and fault/delay analysis. Formerly ECE 237.

EECE 450 Lasers and Their Applications 3.0 Spring
Prerequisites: PHYS 204B, PHYS 204C.
Geometrical and physical optics, interference, diffraction, reflection, dispersion, resolution, polarization, fiber optics, laser optics, and holography. 2.0 hours discussion, 3.0 hours laboratory. Formerly ECE 230. This course is also offered as PHYS 450.

EECE 451 Lasers and Their Applications 3.0 Fall
Prerequisites: PHYS 204C. Recommended: EECE 450.
The theory and mechanism of laser action, various types of lasers and their applications and future use. Laboratory involves measurements with lasers, fiber optics, data transmission, and holography. 2.0 hours discussion, 3.0 hours laboratory. Formerly ECE 231. This course is also offered as PHYS 451.

EECE 453 Communication Systems Design 4.0 Spring
Prerequisites: EECE 365; CIVL 302 or MATH 320.

EECE 455 Introduction to Network Engineering 4.0 Fall
Prerequisites: Either CSCI 320 or EECE 344.
Computer network architecture is reviewed. Network components such as hubs, routers, and bridges are discussed. Transmission media and protocols are discussed. Concepts of data communications are reviewed. Formerly ECE 255.

EECE 465 Digital Signal Processing 4.0 Spring
Prerequisites: EECE 365 (may be taken concurrently).
Properties of continuous and discrete signals. Z-transform and Fast-Fourier Transform. Digital filtering techniques. Finite word length effects on digital signal processing elements. 3.0 hours discussion, 2.0 hours activity. Formerly ECE 297.

EECE 479 Topics in Robotics and Control Systems 4.0 Inquire
Prerequisites: EECE 365.
Study of selected topics in the area of robotics and control systems such as system simulation and modeling, and discrete-time control systems. Formerly ECE 265.

EECE 482 Control System Design 4.0 Fall
Prerequisites: EECE 211, MATH 260. Recommended: MECA 380, MECH 320; either EECE 135 or MECH 306.
Modeling and simulation of dynamic system performance. Control system design for continuous systems using both analog and digital control techniques. 3.0 hours lecture, 2.0 hours activity. Formerly ECE 265. This course is also offered as MECA 482.

EECE 490A Senior Project Planning 3.0 Fa/Spr
Prerequisites: ENGR 301 (or its equivalent) with a grade of C- or higher, faculty permission; EECE 316 or EECE 444 may be taken concurrently.
Students prepare plans for their senior project. Plan must include the project concept with ethical, environmental, and social impact; project requirements; preliminary design; work schedule. Requirements and design shall address human factors, safety, reliability, maintainability, and customer cost. Oral and written reports are required. 3.0 hour lecture, 4.0 hours activity. This is a writing proficiency, WP, course; a grade of C- or better certifies writing proficiency for majors. Formerly ECE 290A.

EECE 490B Senior Project 2.0 Fa/Spr
Prerequisites: EECE 490A.
In a continuation of EECE 490A, students complete detailed designs, construct, test, and demonstrate their senior project design. Design documentation must address sustainability, manufacturability and, if appropriate, health and safety issues. Formal oral and written reports documenting the project are required. 4.0 hours activity. Formerly ECE 290B.
Electrical/electronic engineering graduates are qualified for professional practice or graduate work in several areas of specialization, including systems, electronics, and digital design. In addition to fundamentals of science and mathematics, the program provides a solid background in circuits, analog and digital electronics, microprocessors, and electromagnetics. The senior-level classes offered for electrical/electronic engineers include control systems, communication systems, digital signal processing, electronics, and digital design. The program is accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, telephone: (410) 347-7700.

Electrical/Electronic Engineering Program Mission
The Electrical and Computer Engineering Department educates each student to be a responsible and productive electrical/electronic engineer who can effectively respond to future challenges.

Electrical/Electronic Engineering Program Objective
The objective of the Electrical/Electronic Engineering Program is to produce graduates able to:

- Apply knowledge of mathematics, science, and engineering to identify, formulate, and solve electrical/electronic engineering problems.
- Use industry standard tools to analyze, design, and test computer-based systems containing both hardware and software components.
- Achieve success in graduate programs in electrical engineering or a related field.
- Continue to develop their knowledge and skills after graduation in order to succeed personally and contribute to employer success.
- Work effectively as a member of a multi-disciplinary development team and undertake leadership roles when appropriate.
- Communicate their thoughts, in both written and oral forms, so that others can comprehend and build on their work.
- Appreciate the importance of ethics in the profession and the need to act in society’s best interest.
Electrical/Electronic Engineering Design Experience

Design is a fundamental aspect of the electrical/electronic engineering curriculum, and it is integrated into the curriculum in the freshman year where students are introduced to both hardware and software design. As students expand their knowledge and analysis skills through the sophomore and junior years, the design problems they are assigned increase in complexity. Design problems are assigned in analog electronics, digital systems, control systems, and digital signal processing.

The design experience culminates in the senior year when all students are required to identify a design project, create testable requirements to the project, design the project, and construct the project to prove the design works. In the past, students have designed computer-controlled robots, digital signal processing systems, communication systems, remote video control and display systems, and audio systems.

THE BACHELOR OF SCIENCE IN ELECTRICAL/ELECTRONIC ENGINEERING

Total Course Requirements for the Bachelor's Degree: 132 units

See “Requirements for the Bachelor's Degree” in The University Catalog for complete details on general degree requirements. A minimum of 40 units, including those required for the major, must be upper division.

A suggested Major Academic Plan (MAP) has been prepared to help students meet all graduation requirements within four years. Please request a plan from your major adviser or view it and other current advising information on the CSU, Chico Web.

General Education Requirements

Electrical/Electronic Engineering is a major with modifications to the university’s General Education Requirements. The following requirements, together with the approved General Education courses required for the Electrical/Electronic Engineering major (marked with an * below), fulfill the General Education Requirement.

1. Select two courses, one from each of the Core Areas A1 and A2.
2. Select one course from Breadth Area B2.
3. Select one course from Breadth Area C1 or C2 or C3. A course that also fulfills the Ethnic or Non-Western requirement is recommended.
4. Select one course from Breadth Area D1 or D2 or D3. A course that also fulfills the Ethnic or Non-Western requirement is recommended.
5. Select two courses from the same Upper-Division Theme. (Consult with an advisor or The Class Schedule to determine which two courses in the theme you select meet the Upper-Division Theme Requirement for Electrical/Electronic Engineering majors.)

Cultural Diversity Course Requirements: 6 units

See “Cultural Diversity” in The University Catalog. Most courses used to satisfy these requirements may also apply to General Education Areas C and D.

American Institutions Requirement: 6 units

This requirement is normally fulfilled by completing HIST 130 and POLS 155. For other alternatives, see the “Bachelor's Degree Requirements section.

Literacy Requirement:

See “Mathematics and Writing Requirements” in The University Catalog. Writing proficiency in the major is a graduation requirement and may be demonstrated through satisfactory completion of a course in your major which has been designated as the Writing Proficiency (WP) course for the semester in which you take the course. Students who earn below a C- are required to repeat the course and earn a C- or better to receive WP credit. See The Class Schedule for the designated WP courses for each semester. You must pass ENGL 130 (or its equivalent) with a C- or better before you may register for a WP course.

Course Requirements for the Major: 105 units

The following courses, or their approved transfer equivalents, are required of all candidates for this degree.

Lower-Division Requirements: 48 units

14 courses required:

CHEM 111 General Chemistry 4.0 FS *
Prerequisites: Second-year high school algebra, one year high school chemistry, (one year of high school physics and one year of high school mathematics past Algebra II are recommended.)
ECEE 101 Intro Elec/Computer Engr 2.0 FS

Upper-Division Requirements: 57 units

15 courses required:

CIVL 302 Engineering Econ & Statistics 3.0 FS
Prerequisites: MATH 121, junior standing.

ECEE 144 Logic Design Fundamentals 4.0 FS
Prerequisites: Recommended: EEE 101, MECH 100, or MECH 102.

MATH 120 Analytic Geometry and Calculus 4.0 FS *
Prerequisites: Completion of ELM requirement; both MATH 118 and MATH 119 (or high school equivalent); a score that meets department guidelines on a department administered calculus readiness exam.

MATH 121 Analytic Geometry and Calculus 4.0 FS
Prerequisites: Completion of ELM requirement; MATH 120 with a grade of C- or higher.

MATH 220 Analytic Geometry and Calculus 4.0 FS
Prerequisites: Completion of ELM requirement; MATH 121 with a grade of C- or higher.

MATH 260 Elem Differential Equations 4.0 FS
Prerequisites: Completion of ELM requirement, MATH 121 with a grade of C- or better.

PHYS 204A Mechanics 4.0 FS *
Prerequisites: High school physics or faculty permission. Concurrent enrollment in or prior completion of MATH 121 (second semester of calculus) or equivalent.

PHYS 204B Electricity and Magnetism 4.0 FS
Prerequisites: MATH 121, PHYS 204A with a grade of C- or higher.

PHYS 204C Heat/Wave Motion/Sound/Light 4.0 FS
Prerequisites: MATH 121, PHYS 204A with a grade of C- or higher.

Electrical/Electronic Engineering major (marked with an * below), fulfills the American Institutions Requirement, and it is integrated into the curriculum in the freshman year where students are introduced to both hardware and software design. As students expand their knowledge and analysis skills through the sophomore and junior years, the design problems they are assigned increase in complexity. Design problems are assigned in analog electronics, digital systems, control systems, and digital signal processing.

The design experience culminates in the senior year when all students are required to identify a design project, create testable requirements to the project, design the project, and construct the project to prove the design works. In the past, students have designed computer-controlled robots, digital signal processing systems, communication systems, remote video control and display systems, and audio systems.

THE BACHELOR OF SCIENCE IN ELECTRICAL/ELECTRONIC ENGINEERING

Total Course Requirements for the Bachelor's Degree: 132 units

See “Requirements for the Bachelor's Degree” in The University Catalog for complete details on general degree requirements. A minimum of 40 units, including those required for the major, must be upper division.

A suggested Major Academic Plan (MAP) has been prepared to help students meet all graduation requirements within four years. Please request a plan from your major adviser or view it and other current advising information on the CSU, Chico Web.

General Education Requirements

Electrical/Electronic Engineering is a major with modifications to the university's General Education Requirements. The following requirements, together with the approved General Education courses required for the Electrical/Electronic Engineering major (marked with an * below), fulfill the General Education Requirement.

1. Select two courses, one from each of the Core Areas A1 and A2.
2. Select one course from Breadth Area B2.
3. Select one course from Breadth Area C1 or C2 or C3. A course that also fulfills the Ethnic or Non-Western requirement is recommended.
4. Select one course from Breadth Area D1 or D2 or D3. A course that also fulfills the Ethnic or Non-Western requirement is recommended.
5. Select two courses from the same Upper-Division Theme. (Consult with an advisor or The Class Schedule to determine which two courses in the theme you select meet the Upper-Division Theme Requirement for Electrical/Electronic Engineering majors.)

Cultural Diversity Course Requirements: 6 units

See “Cultural Diversity” in The University Catalog. Most courses used to satisfy these requirements may also apply to General Education Areas C and D.

American Institutions Requirement: 6 units

This requirement is normally fulfilled by completing HIST 130 and POLS 155. For other alternatives, see the “Bachelor's Degree Requirements section.

Literacy Requirement:

See “Mathematics and Writing Requirements” in The University Catalog. Writing proficiency in the major is a graduation requirement and may be demonstrated through satisfactory completion of a course in your major which has been designated as the Writing Proficiency (WP) course for the semester in which you take the course. Students who earn below a C- are required to repeat the course and earn a C- or better to receive WP credit. See The Class Schedule for the designated WP courses for each semester. You must pass ENGL 130 (or its equivalent) with a C- or better before you may register for a WP course.

Course Requirements for the Major: 105 units

The following courses, or their approved transfer equivalents, are required of all candidates for this degree.

Lower-Division Requirements: 48 units

14 courses required:

CHEM 111 General Chemistry 4.0 FS *
Prerequisites: Second-year high school algebra, one year high school chemistry, (one year of high school physics and one year of high school mathematics past Algebra II are recommended.)
ECEE 101 Intro Elec/Computer Engr 2.0 FS
Advising Requirement:
Advising is mandatory for all majors in this degree program. Consult your undergraduate adviser for specific information.
A sample program for students who wish to complete their major in four years is available upon written request to the Department of Electrical and Computer Engineering, CSU, Chico, CA 95929-0888.
Please see Honors in the Major under Computer Engineering.

THE MASTER OF SCIENCE IN ELECTRICAL ENGINEERING

The MS in Electrical Engineering is designed to serve those students who wish to obtain advanced knowledge in the design of high-speed electronic systems or computer-based systems. This knowledge prepares students for a doctoral program or an intermediate level position in industry.

Course Requirements for the Master's Degree: 30 units
Continuous enrollment is required. A maximum of 9 semester units of transfer credit may be applied toward the degree.

Graduate Time Limit: All requirements for the degree are to be completed within five years of the end of the semester of enrollment in the oldest course applied toward the degree. See “Graduate Education” in The University Catalog for complete details on general degree requirements.

Program Selection
Students will choose either the Option in Computer Engineering or the Option in Electronic Engineering.

MS in Electrical Engineering with an Option in Computer Engineering:
This option is designed primarily for students who wish to apply electrical and software engineering principles to the design and development of computers and computer-based systems.

MS in Electrical Engineering with an Option in Electronic Engineering:
This option is designed primarily for students who wish to expand their study of principles and applications of electrical engineering to high-speed circuits, components, and systems.

Prerequisites for Admission to Conditionally Classified Status:
1. Satisfactory grade point average as specified in “Admission to Master’s Degree Programs” in The University Catalog.
2. Approval by the department and the Office of Graduate Programs.
3. A professionally accredited baccalaureate in electrical or computer engineering, or an equivalent approved by the Office of Graduate Studies.
4. Successful completion of the Graduate Record Examination if required by the Graduate Coordinator.

Prerequisites for Admission to Classified Status:
In addition to any requirements listed above:
1. Successful completion of the Graduate Writing Examination.
2. Completion of background preparation equivalent to the following undergraduate courses: EECE 135, EECE 221, EECE 315, EECE 343, and EECE 344, EECE 365.

All required undergraduate electrical and computer engineering (ECE) courses must be taken for a letter grade, and a grade of C or better must be earned in each course. Students are required to complete the background courses immediately as a matter of reasonable progress toward the master’s degree.

Advancement to Candidacy:
In addition to any requirements listed above:
1. Formation of the graduate advisory committee in consultation with the Graduate Coordinator.
2. Development of an approved program, including a thesis or project proposal if the thesis or project plan is chosen, in consultation with the Graduate Coordinator.
3. Classified graduate standing and completion at the university of at least 9 units of the proposed program with a minimum 3.00 grade point average.

Requirements for the MS Degree in Electrical Engineering
Completion of all requirements as established by the department graduate committee, the graduate advisory committee, and the Office of Graduate Studies, to include:

1. Completion of an approved program consisting of 30 units of 400/500/600-level courses as follows:
   (a) Completion of the 12-unit core:
      EECE 455 Intro to Network Engineering 4.0 FA
      EECE 615 High Frequency Design Techs 4.0 FA
      Prerequisites: EECE 315, PHYS 204C.
      EECE 643 Computer-Aided Circuit Engr 4.0 SP
      Prerequisites: EECE 615.
   (b) At least 18 units, including a thesis or project if chosen, must be in electrical and computer engineering (ECE); remaining units may be selected from electrical or computer engineering or in related areas with the approval of the Graduate Coordinator.
   (c) At least 18 of the units required for the degree must be 600-level courses.
   (d) Not more than 9 semester units of transfer and/or extension credit (correspondence courses and U.C. extension course work are not acceptable); Open University course work is included in this 9 unit total.
2. Completion and final approval of one of the following three plans as specified by the graduate advisory committee:
   (a) Thesis Plan. This plan includes 24 units of course work and 6 units of thesis research (EECE 699T). Research may be theoretical or applied, but must reflect an individual in-depth study into an approved topic. This plan requires a formal research thesis which must be submitted to the Office of Graduate Studies for approval and accession to the library.
   (b) Project Plan. Requirements for this plan consist of 27 units of course work and 3 units of project preparation (EECE 699P). The project must show how analysis and design have been applied to a particular area of electronic or computer engineering. A written project description must be submitted to the Office of Graduate Studies for approval and accession to the library.
   (c) Examination Plan. Requirements for this plan consist of 30 units of course work and a comprehensive oral examination prepared by the faculty. The two-hour examination will cover areas covered in four courses from the candidate's course of study.
3. Approval by the Graduate Coordinator and the Graduate Coordinators Committee on behalf of the faculty of the university.

OPTION IN COMPUTER ENGINEERING: 18 units
Undergraduate background:
Programming in C++ and assembly language
Data structures
Operating systems
Signals and transforms
Analog electronics
Digital systems and state machine design
Computer interface circuits
Microprocessor system design

8 units selected from:

- EECE 425 Advanced Computer Architecture 4.0 SP
- Prerequisites: Either CSCI 320 or EECE 320.
- EECE 631 Processes Improvement 4.0 SP
- Prerequisites: CSCI 330 or EECE 431.
- EECE 655 Topics Computer Networking 4.0 SP
- Prerequisites: EECE 344, EECE 455.

10 units selected from:

- Any approved senior or graduate-level courses not otherwise required for the degree.

OPTION IN ELECTRONIC ENGINEERING: 18 units
Undergraduate background:
Programming in C++ and assembly language
Signals and transforms
Advanced analog electronics
Digital systems design
Computer interface circuits
Control systems
Digital Signal Processing
Communication Systems

8 units selected from:

- EECE 417 Radio Frequency Circuits 4.0 FA
- Prerequisites: EECE 315.
- EECE 617 High-Frequency Analog Design 4.0 SP
- Prerequisites: EECE 417, EECE 615.
- EECE 675 Electromagnetic Compatibility 4.0 SP
- Prerequisites: EECE 615.

10 units selected from:

- Any approved senior or graduate-level courses not otherwise required for the degree.
Graduate Literacy Requirement:
Writing proficiency is a graduation requirement.
Electrical Engineering students will demonstrate their writing competence through successfully completing a departmentally administered examination. Consult the Graduate Coordinator for specific information.

Graduate Grading Requirements:
All courses in the major (with the exceptions of Independent Study - 597/697, Comprehensive Examination - 696, Master's Project - 699P, and Master’s Thesis - 699T) must be taken for a letter grade, except those courses specified by the department as ABC/No Credit (400/500-level courses), AB/No Credit (600-level courses), or Credit/No Credit grading only. A maximum of 10 units combined of ABC/No Credit, AB/No Credit, and Credit/No Credit grades may be used on the approved program (including 597/697, 696, 699P, 699T and courses outside the major). While grading standards are determined by individual programs and instructors, it is also the policy of the university that unsatisfactory grades may be given when work fails to reflect achievement of the high standards, including high writing standards, expected of students pursuing graduate study. Students must maintain a minimum 3.0 grade point average in each of the following three categories: all course work taken at any accredited institution subsequent to admission to the master’s program; all course work taken at CSU, Chico subsequent to admission to the program; and all courses on the approved master’s degree program.
In addition, students may not count more than two courses in which they received a grade of C toward the approved program.

The Faculty
Please see Computer Engineering for faculty listing.

Course Offerings
Please see Computer Engineering for course offerings.

MECHANICAL ENGINEERING
Mechanical engineering includes aspects of mechanical design, thermal-fluid systems, applied mechanics, and automation. The mechanical engineering student is prepared in all of these areas in order to analyze and design complex mechanical systems. Graduates can specialize in areas such as energy conversion systems, mechanisms and machines, manufacturing, materials, and automation through electives.

Mechanical Engineering Program Mission
The mechanical engineering program has the primary mission of providing a high-quality undergraduate engineering education by providing students 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 encourages students from different gender and backgrounds.
We are committed to offer a broad undergraduate experience that will promote professional growth and prepare students for a variety of engineering careers, graduate studies, and continuing education.

Mechanical Engineering Program Educational Objectives
The program's educational objectives are best framed in terms of goals for its graduates. Mechanical engineering graduates will:
- Be effective engineers and problem solvers.
- Be well educated in the mechanical engineering sciences.
- Be able to use engineering tools that will enhance their productivity.
- Be familiar with current technology and how it can be incorporated into their design, analysis, and testing activities including an understanding of manufacturing methods and the use of computers, sensors, and actuators to automate machines and processes.
- Be effective oral, written, and graphical communicators.
- Be able to function effectively as members of multi-disciplinary teams.
- Have an appreciation for the individual, society, and human heritage, and be aware of the impact of their designs on human-kind and the environment.
- Be prepared for a variety of engineering careers, graduate studies, and continuing education.

Mechanical Engineering Design Experience
The mechanical engineering program at CSU, Chico is a traditional balance of engineering science and design. The design sequence for mechanical engineers is a progressive one. The courses which are primarily devoted to design are:
- MECH 140 - Introduction to Engineering Design
- MECH 340 - Mechanical Engineering Design
- MECH 440A - Mechanical Engineering Design Project I
- MECH 440B - Mechanical Engineering Design Project II

The freshman experience (MECH 140) focuses on the creative aspects of design and gives students an opportunity to practice the engineering design process with little or no emphasis on engineering science. At the junior level (MECH 340), 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 the senior project (MECH 440A and MECH 440B), students are expected to exercise what they learned throughout the preceding design courses in a final project that includes manufacturing and testing, as well as the more global aspects of design including product realization, economic factors, environmental issues, and social impact. Together, these experiences prepare graduates to be successful practitioners with an awareness of the multitude of issues involved.

THE BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

Total Course Requirements for the Bachelor’s Degree: 132 units
See “Requirements for the Bachelor’s Degree” in The University Catalog for complete details on general degree requirements. A minimum of 40 units, including those required for the major, must be upper division.
A suggested Major Academic Plan (MAP) has been prepared to help students meet all graduation requirements within four years. Please request a plan from your major adviser or view it and other current advising information on the CSU, Chico Web.

General Education Requirement
Mechanical Engineering is a major with modifications to the university’s General Education Requirements. The following requirements, together with the approved General Education courses required for the Mechanical Engineering major (marked with an * below), fulfill the General Education Requirement.
1. Select two courses, one from each of the Core Areas A1 and A2.
2. Select one course from Breadth Area B2.
3. Select one course from Breadth Area C1 or C2 or C3.
4. Select one course from Breadth Area D1 or D2 or D3.
5. Select two courses from the same Upper-Division Theme.
(Consult with an adviser or The Class Schedule to determine which two courses in the theme you select meet the Upper-Division Theme Requirement for Mechanical Engineering majors.)

Cultural Diversity Requirement: 6 units
Complete two Cultural Diversity courses, one Ethnic and one Non-Western. (See the “Bachelor’s Degree Requirements” section.) Both courses must also satisfy one of the General Education requirements in order for 132 units to fulfill all requirements for the Mechanical Engineering degree.

American Institutions Requirement: 6 units
This requirement is normally fulfilled by completing HIST 130 and POLS 155. For other alternatives, see the “Bachelor’s Degree Requirements” section.

Literacy Requirement:
See “Mathematics and Writing Requirements” in The University Catalog. Writing proficiency in the major is a graduation requirement and may be demonstrated through satisfactory completion of a course in your major which has been designated as the Writing Proficiency (WP) course for the semester in which you take the course. Students who earn below a
Engineering

C- are required to repeat the course and earn a C- or better to receive WP credit. See The Class Schedule for the designated WP courses for each semester. You must pass ENGL 130 (or its equivalent) with a C- or better before you may register for a WP course.

Course Requirements for the Major: 105 units

The following courses, or their approved transfer equivalents, are required of all candidates for this degree.

Lower-Division Requirements: 52 units

16 courses required:

CIVL 211 Statics 3.0 FS
Prerequisites: MATH 121; MATH 100 or MATH 102 may be taken concurrently;
PHYS 204A.
CHEM 111 General Chemistry 4.0 FS *
Prerequisites: Second-year high school algebra; one year high school chemistry.
(One year of high school physics and one year of high school mathematics past Algebra II are recommended.)
EECE 211 Linear Circuits I 3.0 FS
Prerequisites: MATH 121, PHYS 204B.
EECE 2111 Linear Circuits I Activity 1.0 FS
Corequisites: EECE 211.
MATH 120 Analytic Geometry and Calculus 4.0 FS *
Prerequisites: Completion of ELM requirement; both MATH 118 and MATH 119 (or high school equivalent); a score that meets department guidelines on a department administered calculus readiness exam.
MATH 121 Analytic Geometry and Calculus 4.0 FS
Prerequisites: Completion of ELM requirement; MATH 120 with a grade of C- or higher.
MATH 220 Analytic Geometry and Calculus 4.0 FS
Prerequisites: Completion of ELM requirement; MATH 121 with a grade of C- or higher.
MATH 260 Elem Differential Equations 4.0 FS
Prerequisites: Completion of ELM requirement, MATH 121 with a grade of C- or better.
MECH 100 Graphics I 2.0 FS
MECH 140 Intro to Engineering Design 3.0 FS
MECH 200 Graphics II 2.0 FS
Prerequisites: MECH 100.
MECH 210 Materials Science/Engineering 3.0 FS
Prerequisites: PHYS 204A; CHEM 111 (may be taken concurrently).
MFGT 160 Intro Manufact Engineering 3.0 FS
PHYS 204A Mechanics 4.0 FS *
Prerequisites: High school physics or faculty permission. Concurrent enrollment in or prior completion of MATH 121 (second semester of calculus) or equivalent.
PHYS 204B Electricity and Magnetism 4.0 FS
Prerequisites: MATH 121, PHYS 204A with a grade of C- or higher.
PHYS 204C Heat/Wave Motion/Sound/Light 4.0 FS
Prerequisites: MATH 121, PHYS 204A with a grade of C- or higher.

Upper-Division Requirements: 53 units

15 courses required:

CIVL 302 Engineering Econ & Statistics 3.0 FS
Prerequisites: MATH 121, junior standing.
CIVL 311 Strength of Materials 4.0 FS
Prerequisites: CIVL 211, MATH 100 or MATH 102; MATH 260 and MATH 210 (may be taken concurrently).
CIVL 321 Fluid Mechanics 4.0 FS
Prerequisites: CIVL 211, MATH 260, MATH 320 (may be taken concurrently).
CIVL 495 Lifelong Development Engineers 3.0 FS
Prerequisites: ENGL 130 or equivalent; senior standing.
MECA 380 Measurements & Instrumentation 3.0 SP
Prerequisites: ECE 211, ECE 211L; either ECE 135 or MATH 106. Recommended: CIVL 302.
MECA 482 Control System Design 4.0 FA
Prerequisites: ECE 213, MATH 260. Recommended: MECA 380, MECA 320; either ECE 135 or MATH 106.
This course is also offered as ECE 402.
MECH 306 Solution Solving Techniques 4.0 FA
Prerequisites: MATH 260. Recommended: PHYS 204A.
MECH 308 Finite Element Analysis 3.0 SP
Prerequisites: CIVL 311, MECH 306 (or faculty permission). Recommended: MATH 260, PHYS 204C.
MECH 320 Dynamics 3.0 FS
Prerequisites: CIVL 211; MATH 260 (may be taken concurrently).
MECH 332 Thermodynamics 3.0 FS
Prerequisites: PHYS 204A, Recommended: PHYS 204C.
MECH 338 Heat Transfer 4.0 SP
Prerequisites: CIVL 321, MECH 322. Recommended: ECE 211, MATH 306.
MECH 340 Mechanical Engineer Design 3.0 SP
Prerequisites: CIVL 311, MATH 260. Recommended: MECH 140, MATH 200, MECH 306, MECH 320, MGT 160.
MECH 432 Energy Systems 4.0 FA
Prerequisites: MECH 338.
MECH 440A Mech Engr Design Project I 3.0 FA WP
Prerequisites: ENGL 130 (or its equivalent) with a grade of C. or higher, MECH 140, MATH 200, MECH 340, MECH 160. Recommended: CIVL 302, MEC 380, MECH 308, MECH 338.
MECH 440B Mech Engr Design Project II 2.0 SP
Prerequisites: MECH 440A. Recommended: CIVL 302, MEC 380, MECH 308, MECH 338.

3 units selected from:

A technical elective with adviser’s approval.

Grading Requirement:

All courses taken to fulfill major course requirements must be taken for a letter grade except those courses specified by the department as Credit/No Credit grading only.

Fundamentals of Engineering Examination (EIT)

The Fundamentals of Engineering Examination, also known as the Engineer-in-Training (EIT) Exam, is the first of two exams that the California State Board of Registration requires to be passed to be a licensed professional engineer. Prior to graduation, those majoring in Mechanical Engineering must apply to the California State Board of Registration and take the exam. Passing the exam is not required for graduation.

Advising Requirement:

Advising is strongly recommended for all majors in this degree program.

Honors in the Major

Honors in the Major is a program of independent work in your major. It involves 6 units of honors course work completed over two semesters. 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. Most importantly, however, 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 competition in shows; such experience is valuable for graduate school and later professional life.

Some common features of Honors in the Major program are:
1. You must take 6 units of Honors in the Major course work. At least 3 of these 6 units are independent study (499H) as specified by your department.
2. You must have completed 9 units of upper-division course work or 21 overall units in your major before you can be admitted to Honors in the Major. Check the requirements carefully, as there may be specific courses that must be included in these units.
3. Your cumulative GPA should be at least 3.5 or within the top 5 percent of majors in your department.
4. Your GPA in your major should be at least 3.5 or within the top 5 percent of majors in your department.
5. 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 6 units of course work over the two semesters of their senior year.
6. Your honors work culminates with a public presentation of your Honors project.

While Honors in the Major is part of the Honors Program, each department administers its own program. Please contact your major department or major advisor for further information.

The Faculty

Mechanical Engineering

Joseph Paul Greene, 1998, Professor, PhD, U Michigan.
Chuen H. Hsu, 1982, Professor, PhD, Iowa St U.
Gregory A. Kallio, 1988, Chair, Professor, PhD, WA State U.
Ronald Roth, 1986, Professor, MD; PhD, Stanford U.
Jimmy Tan-atichat, 1987, Professor, PhD, IL Inst of Tech.
Ramesh M. Varahamurti, 1984, Professor, PhD, WA State U.
Michael G. Ward, 1988, Associate Dean, Professor, PE, PhD, Stanford U.
Mechanical Engineering Course Offerings

Please see the section on “Course Description Symbols and Terms” in The University Catalog for an explanation of course description terminology and symbols, the course numbering system, and course credit units. All courses are lecture and discussion and employ letter grading unless otherwise stated. Some prerequisites may be waived with faculty permission. Prerequisites and syllabi are available on the Chico Web.

MECH 100  Graphics I  2.0 Fa/Spr
An introduction to engineering graphical communication using both free-hand sketching and computer-aided solid modeling. 1.0 hour lecture, 3.0 hours laboratory. Formerly ME 100.

MECH 102  Graphics for Civil Engineers  2.0 Fa/Spr
An introduction to engineering graphical communication using both free-hand sketching and computer-aided solid modeling. This course is not intended for Mechanical Engineering, Mechatronic Engineering, or Manufacturing Technology majors, nor for the Minor in Manufacturing. 1.0 hour discussion, 3.0 hours laboratory. Special fee required; see The Class Schedule. Formerly M E 102.

MECH 140  Introduction to Engineering Design  3.0 Fa/Spr
An introduction to the art and science of engineering design. Techniques for encouraging creativity in design. Use of a computer to control design, product data management, intermediate solid modeling, introduction to analysis using solid modeling. 1.0 hour discussion, 3.0 hours laboratory. Special fee required; see The Class Schedule. Formerly M E 025.

MECH 198  Special Topic  1.0-3.0 Inquire
Special topic generally offered one time only. Different sections may have different topics. See The Class Schedule for specific topic being offered. Formerly M E 098.

MECH 200  Graphics II  2.0 Fa/Spr
Prerequisites: MECH 100.
Drawing standards, geometric dimensioning and tolerancing, working drawings, product data management, intermediate solid modeling, introduction to analysis using solid modeling. 1.0 hour lecture, 3.0 hours laboratory. Formerly M E 200.

MECH 210  Materials Science and Engineering  3.0 Fa/Spr
Prerequisites: PHYS 204A, CHEM 111 (may be taken concurrently).
Processing, structure, properties, and performance of engineering materials. Applied knowledge of material properties as engineering design parameters. Advanced manufacturing processes, including microfabrication. 1.0 hour discussion, 2.0 hours activity. 3.0 hours laboratory. Special fee required; see The Class Schedule. Formerly M E 045. CAN ENGR 4.

MECH 298  Special Topic  1.0-3.0 Inquire
Prerequisites: To be established when course is formulated.
Special topic generally offered one time only. Different sections may have different topics. See The Class Schedule for specific topic being offered. Formerly M E 195.

MECH 306  Equation Solving Techniques  4.0 Fall
Prerequisites: MATH 260, PHYS 204A.
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. 1.0 hour discussion, 2.0 hours activity. Formerly M E 142.

MECH 308  Finite Element Analysis  3.0 Spring
Prerequisites: CIVL 111, MECH 306 (or faculty permission).
Recommended: MECH 210, PHYS 204C.
Development of finite element formulation from fundamental governing engineering equations. Coverage includes areas ranging from elasticity, vibration, and heat transfer to acoustics and composites. 2.0 hours discussion, 2.0 hours activity. Formerly M E 242.

MECH 320  Dynamics  3.0 Fa/Spr
Prerequisites: CIVL 211, MATH 260 (may be taken concurrently).
Kinetomechanics 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. Formerly M E 135.

MECH 332  Thermodynamics  3.0 Fa/Spr
Prerequisites: PHYS 204A, Recommended: PHYS 204C.
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. Formerly M E 152.

MECH 338  Heat Transfer  4.0 Spring
Prerequisites: CIVL 321, MECH 332. Recommended: EECE 211, MECH 306.
Conduction, convection, and radiation heat transfer; steady-state and transient analysis methods; numerical methods applied to conduction heat transfer; design of finned arrays, heat exchangers, and systems for electronics cooling; measurement of temperature and heat rate. 3.0 hours discussion, 2.0 hours activity. Formerly M E 259.

MECH 340  Mechanical Engineering Design  3.0 Spring
Design and performance of machine components and systems subjected to both steady and variable loading conditions. Introduction to failure theories, reliability, use of codes and standards, and standard design practices. 2.0 hours discussion, 2.0 hours activity. Formerly M E 138.

MECH 389  Industrial Internship  1.0-3.0 Fa/Spr
Prerequisites: Approval of faculty internship coordinator prior to off-campus assignment. 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. May be taken only once for credit. You may take this course more than once for a maximum of 15.0 units. Credit/no credit grading only. Formerly M E 289.

MECH 398  Special Topic  1.0-3.0 Inquire
Prerequisites: To be established when course is formulated.
Special topic generally offered one time only. Different sections may have different topics. See The Class Schedule for specific topic being offered. Formerly M E 198.

MECH 399  Special Problems  1.0-3.0 Inquire
Prerequisites: Approval of supervising faculty member.
This course is an independent study of special problems offered for 1.0-3.0 units. See the department office for information on registering. You may take this course more than once for a maximum of 6.0 units. Credit/no credit grading only. Formerly M E 199.

MECH 410  Advanced Materials Science and Engineering  3.0 Inquire
Prerequisites: MATH 260, MECH 210. Recommended: CIVL 311.

MECH 412  Fracture Mechanics  3.0 Inquire
Prerequisites: CIVL 311.
Theories and practical applications of linear elastic fracture mechanics and elastic-plastic fracture mechanics. Design against fatigue, fracture criteria, and fracture control in engineering design. Formerly M E 206.

MECH 414  Material Processing in Manufacturing  3.0 Inquire
Prerequisites: MECH 308, MECH 338, METG 160.
Mechanics and analysis of processing parameters for metal forming, cutting, joining, and casting processes; polymer extrusion, injection, and molding processes; composite pultrusion, filament winding, vacuum bagging, and autoclave processes. Computer simulation for improvement of processes. 2.0 hours discussion, 2.0 hours activity. Formerly M E 209.

MECH 418  Polymer Engineering  3.0 Inquire
Prerequisites: MATH 260, MECH 210.
Major topics include polymer structure and synthesis, polymerization mechanisms, crystallinity, viscoelastic behavior in manufacturing processes and in service, deformation mechanisms, manufacture, and design with polymers. 2.0 hours discussion, 2.0 hours activity. Formerly M E 207.

MECH 422  Dynamics of Machinery  3.0 Inquire
Prerequisites: MECH 320.

MECH 424  Mechanical Vibrations  3.0 Inquire
Prerequisites: MECH 320.
Free and forced vibrations of lumped parameter systems, transient vibrations, systems with several degrees-of-freedom. Formerly M E 240.
MECH 426 Rotor Dynamics 3.0 Inquire
Prerequisites: MECA 380, MECH 320.
Dynamics of distributed masses on a flexible rotor, including modal analysis of free and forced vibration, balancing, support-bearing dynamics, rotor rub and similar phenomena. Diagnosis of rotor malfunctions with vibration measurement and analysis. Formerly M E 241.

MECH 432 Energy Systems 4.0 Fall
Prerequisites: MECH 138.
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. 3.0 hours discussion, 3.0 hours laboratory. Formerly M E 252.

MECH 434 Compressible Flow 3.0 Inquire
Prerequisites: CIVL 122, MATH 260, MECH 312; Recommended: MECH 306.
Compressible fluids in isentropic flow, normal and oblique shock, Prandtl-Meyer expansion, Fanno, and Rayleigh flow. Subsonic and supersonic flow, with applications to rocket and jet propulsion, wind tunnels, shock tubes, airfoils, and combustion chambers. Formerly M E 258.

MECH 435 Low Speed Aerodynamics 3.0 Inquire
Prerequisites: MATH 260, MECH 312. Recommended: MECH 306.
Flow around elementary shapes, concepts of flow circulation, lift and drag, incompressible inviscid flows around thin airfoils and wings of finite span. Formerly M E 254.

MECH 436 Air Pollution Control 3.0 Inquire
Prerequisites: CIVL 121 (or faculty permission). CHEM 111; either CHEM 331 or MECH 332; Recommended: CIVL 302, MECH 308.
Analysis and design of components and systems for gaseous and particulate pollution control; gas separation by absorption, adsorption, condensation, and incineration; particulate separation by gravity settlers, cyclones, electrostatic precipitators, fabric filters, and scrubbers; air pollution legislation and regulation. Formerly M E 253.

MECH 439 Building Energy Analysis and Design 3.0 Inquire
Prerequisites: MECH 302. Recommended: MECH 306.

MECH 440A Mechanical Engineering Design Project I 3.0 Fall
Prerequisites: ENGL 130 (or its equivalent) with a grade of C- or higher, MECH 140, MECH 200, MECH 340, MFTG 160. Recommended: CIVL 302, MECH 308, MECH 308, MECH 318.
System design methods applied to mechanical systems. Design project concepts. Consideration of the manufacturing cost, and environmental and social impact. Oral and written presentation of results. Initial design of the capstone design project to be continued in MECH 440B. 2.0 hours discussion, 3.0 hours laboratory. This is a writing proficiency, WP, course; a grade of C- or better certifies writing proficiency for majors. Formerly M E 238A.

MECH 440B Mechanical Engineering Design Project II 2.0 Spring
Prerequisites: MECH 440A. Recommended: CIVL 302, MECH 380, MECH 308, MECH 338.
Continuation of the capstone design project from MECH 440A. Implementation of the capstone design project, including fabrication, testing, and evaluation of a working prototype. Must be taken the semester immediately following MECH 440A. 4.0 hours activity. Formerly M E 238B.

MECH 440H Mechanical Engineering Design Project I 3.0 Inquire Honors
Prerequisites: ENGL 130 (or its equivalent) with a grade of C- or higher, MECH 140, MECH 340, MFTG 160, acceptance into the Honors in the Major program. Recommended: CIVL 302, MECH 380, MECH 308, MECH 338.
Group design projects. Consideration of the manufacturing cost, and environmental and social impact. Oral and written presentations of results. Initial design of the Honors/capstone design project to be continued in MECH 440B. 2.0 hours discussion, 3.0 hours laboratory. This is a writing proficiency, WP, course; a grade of C- or better certifies writing proficiency for majors. Formerly M E 238H.

MECH 498 Special Topic 1.0-3.0 Inquire
Prerequisites: To be established when course is formulated.
Special topic generally offered one time only. Different sections may have different topics. See The Class Schedule for the specific topic being offered. Formerly M E 298.

MECH 499 Special Problems 1.0-3.0 Fa/Spr
Prerequisites: Approval of supervising faculty member.
This course is an independent study of special problems offered for 1.0-3.0 units. See the department office for information on registration. You may take this course more than once for a maximum of 6.0 units. Credit/no credit grading only. Formerly M E 299.

MECH 499H Honors Project 3.0 Inquire
Prerequisites: Completion of 12 units of upper-division MECH courses, faculty permission.
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 better 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 better in the first semester. Each 3-unit course will require both formal written and oral presentations. You may take this course more than once for a maximum of 6.0 units. Formerly M E 299H.

MECH 506 Computer-Aided Engineering 3.0 Inquire
Prerequisites: MECH 340, MECH 308 may be taken concurrently; faculty permission. Use of a computer workstation and resident software to model, design, and analyze complex engineering systems. Functional characteristics are examined and design performance is evaluated under planned operating conditions. 2.0 hours discussion, 3.0 hours laboratory. Formerly M E 308.

MECH 508 Advanced Finite Element Analysis 3.0 Inquire
Prerequisites: MECH 308.
Finite-element methods in the analysis and optimal design of mechanical structures, machine components, and distributed systems. Formerly M E 372.

MECH 520 Advanced Dynamics 3.0 Inquire
Prerequisites: MECH 320.

MECH 531 Advanced Fluid Dynamics 3.0 Inquire
Prerequisites: CIVL 321, MECH 306, faculty permission. Advanced analysis of fluid flow in engineering processes; application of Navier-Stokes equations to laminar and turbulent flows, with introduction to computational fluid dynamics (CFD); selected design applications, such as piping systems, lubrication, aerodynamics, turbomachinery, multiphase flow, and flow measurement. Formerly M E 354.

MECH 534 Advanced Compressible Flow 3.0 Inquire
Prerequisites: MECH 443, faculty permission. Multidimensional compressible flow; perturbation methods; hodograph plane and method of characteristics; shock wave analysis and design of nozzles and surfaces. Formerly M E 356.

MECH 538 Advanced Heat Transfer 3.0 Inquire
Prerequisites: MECH 338, faculty permission. Application of thermal energy and mass diffusion equations to complex heat and mass transfer processes; variable property conduction, numerical methods, boiling and condensation, spectral analysis of thermal radiation, multi-mode problems, compact heat exchangers, gas absorption and adsorption, thermoelectric and heat pipe applications. Formerly M E 359.

MECH 580 Data Acquisition: Concepts and Applications 3.0 Inquire
Prerequisites: MECA 482, faculty permission.
General considerations in data acquisition systems selection, analog pre-processing, sampling, and quantization (A/D and D/A conversions), the computer as a data acquisition controller, input-output techniques, time-series analyses and signal reconstruction. 2.0 hours discussion, 3.0 hours laboratory. Formerly M E 361.

MECH 582 Advanced Control System Design 3.0 Inquire
Prerequisites: MECA 482, faculty permission. Computer-aided analysis and design of automatic control techniques to mechanical engineering problems. Single and multivariable feedback systems. Controllability, observability, and state estimation. Simulation of control systems. Formerly M E 305.

MECH 679 Independent Study 1.0-3.0 Inquire
Prerequisites: Approval of supervising faculty member.
This course is a graduate-level independent study offered for 1.0-3.0 units. You may take this course more than once for a maximum of 6.0 units. Formerly M E 398.

MECH 698 Advanced Topic 1.0-3.0 Inquire
Prerequisites: To be established when course is formulated.
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. You may take this course more than once for a maximum of 3.0 units. Formerly M E 397.

MECH 699P Master's Project 1.0-6.0 Inquire
Prerequisites: Approval of supervising faculty member. Independent study leading to a Master's Thesis of a special problem approved by student's graduate advisory committee. The department office for registration procedure. You may take this course more than once for a maximum of 6.0 units. Credit/no credit grading only. Formerly M E 399P.

MECH 699R Honors Thesis 3.0 Inquire
Prerequisites: Approval of supervising faculty member.
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 better 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 better in the first semester. Each 3-unit course will require both formal written and oral presentations. You may take this course more than once for a maximum of 6.0 units. Formerly M E 299H.

MECH 699T Master's Thesis 1.0-6.0 Inquire
Prerequisites: Approval of supervising faculty member. Independent study leading to a Master's Thesis of a special problem approved by student's graduate advisory committee. The department office for registration procedure. You may take this course more than once for a maximum of 6.0 units. Credit/no credit grading only. Formerly M E 399P.

MECH 699W Master's Project 1.0-6.0 Inquire
Prerequisites: Approval of supervising faculty member. Independent study leading to a Master's Thesis of a special problem approved by student's graduate advisory committee. The department office for registration procedure. You may take this course more than once for a maximum of 6.0 units. Credit/no credit grading only. Formerly M E 399P.
MECHATRONIC ENGINEERING

Mechatronic Engineering is a new discipline that combines many of the skills of a mechanical engineer with those of a computer engineer and an electrical engineer. The mechatronic engineering graduate is prepared to design "intelligent" products such as "jitter-free" camcorders, active vehicle suspension systems that adjust to road conditions, anti-lock braking systems, and laser printers.

Mechatronic Engineering Program Mission
The mechatronic engineering program has the primary mission of providing a high-quality undergraduate engineering education by providing students 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 encourages students from different genders and backgrounds.

We are committed to offering a broad undergraduate experience that will promote professional growth and prepare students for a variety of careers, graduate studies, and continuing education.

Mechatronic Engineering Program Educational Objectives
The program’s educational objectives are best framed in terms of goals for its graduates. Mechatronic engineering graduates will:

- Be effective interdisciplinary engineers and problem solvers.
- Be well educated in the basic engineering sciences and fundamentals of mechanical, electrical, and computer engineering.
- Be able to use engineering tools that will enhance their productivity.
- Be able to design, analyze, and test "intelligent" products and processes that incorporate suitable computers, sensors, and actuators.
- Be effective oral, written, and graphical communicators.
- Be able to function effectively as members of multi-disciplinary teams.
- Have an appreciation for the individual, society, and human heritage, and be aware of the impact of their designs on human-kind and the environment.
- Be prepared for a variety of engineering careers, graduate studies, and continuing education.

Mechatronic Engineering Design Experience
The design experience for mechatronic engineers is integrated throughout the curriculum. The courses which include design experiences are:

- EECE 144 - Logic Design Fundamentals
- EECE 221 - Processor Architecture and Assembly Language Programming
- EECE 315 - Electronics I
- EECE 316 - Electronics II
- EECE 344 - Digital Systems Design
- ECE 343 - Computer Interface Circuits
- MEGA 440A - Mechatronic Engineering Design Project 1
- MEGA 440B - Mechatronic Engineering Design Project 2
- MECH 340 - Mechanical Engineering Design

At the freshman level, logic networks are designed in EECE 144. At the sophomore level, software design experience teaches students to think logistically in developing efficient, structured computer programs in EECE 221. At the junior level, there is an opportunity to learn about safety, failure, reliability, and economic considerations, while carrying out detailed design of mechanical components in MECH 340, and electrical circuits and systems in EECE 315, EECE 316, EECE 343, and EECE 444. In the final senior project (MECA 440A and MECA 440B), students are expected to exercise what they learned throughout the preceding design courses in a final project that includes assembly and testing, as well as the more global aspects of design including product realization, economic factors, environmental issues, and social impact. Together, these experiences prepare graduates to be successful practitioners with an awareness of the multitude of issues involved.

THE BACHELOR OF SCIENCE IN MECHATRONIC ENGINEERING

Total Course Requirements for the Bachelor’s Degree: 132 units
See “Requirements for the Bachelor’s Degree” in The University Catalog for complete details on general degree requirements. A minimum of 40 units, including those required for the major, must be upper division.

A suggested Major Academic Plan (MAP) has been prepared to help students meet all graduation requirements within four years. Please request a plan from your major advisor or view it and other current advising information on the CSU, Chico Web.

General Education Requirement
Mechatronic Engineering is a major with modifications to the university’s General Education Requirements. The following courses, together with the approved General Education courses required for the Mechatronic Engineering major marked with an * below, fulfill the General Education Requirement.

1. Select two courses, one from each of the Core Areas A1 and A2.
2. Select one course from Breadth Area B2.
3. Select one course from Breadth Area C1 or C2 or C3.
4. Select one course from Breadth Area D1 or D2 or D3.
5. Select two courses from the same Upper-Division Theme.

(Consult with an advisor or The Class Schedule to determine which two courses in the theme you select meet the Upper-Division Theme Requirement for Mechatronic Engineering majors.)

American Institutions Requirement: 6 units
This requirement is normally fulfilled by completing HIST 130 and POLS 155. For other alternatives, see the “Bachelor’s Degree Requirements” section.

Course Requirements for the Major: 105 units
The following courses, or their approved transfer equivalents, are required of all candidates for this degree.

Lower-Division Requirements: 53 units
16 courses required:

- CIVL 211 Statics 3.0 FS
- EECE 144 Logic Design Fundamentals 4.0 FS
- ECE 221 Processor Architecture and Assembly Language Programming 3.0 FS
- MATH 120 Analytic Geometry and Calculus 4.0 FS
- MATH 121 Calculus 1 4.0 FS
- MATH 204A Calculus 2 4.0 FS
- MECH 100 Graphics 1 2.0 FS

A suggested Major Academic Plan (MAP) has been prepared to help students meet all graduation requirements within four years. Please request a plan from your major advisor or view it and other current advising information on the CSU, Chico Web.
EEngineering

MFGT 160 Intro Manufact Engineering 3.0 FS
PHYS 204A Mechanics 4.0 FS *
Prerequisites: High school physics or faculty permission. Concurrent enrollment in or prior completion of MATH 121 (second semester of calculus) or equivalent.
PHYS 204B Electricity and Magnetism 4.0 FS
Prerequisites: MATH 121, PHYS 204A with a grade of C- or higher.
PHYS 204C Heat/Wave Motion/Sound/Light 4.0 FS
Prerequisites: MATH 121, PHYS 204A with a grade of C- or higher.

Upper-Division Requirements: 52 units
15 courses required:

CIVL 302 Engineering Econ & Statistics 3.0 FS
CIVL 311 Strength of Materials 4.0 FS
Prerequisites: CIVL 211, MECH 100 or MECH 102; MATH 260 and MECH 210 (may be taken concurrently).
CIVL 495 Lifelong Development Engineers 3.0 FS
Prerequisites: ENGL 130 or equivalent; senior standing.
EECE 311 Linear Circuits II 4.0 FS
Prerequisites: EECE 211; MATH 260 (may be taken concurrently).
EECE 315 Electronics I 4.0 FS
Prerequisites: EECE 211L. Corequisites: EECE 311, MATH 260.
EECE 316 Electronics II 4.0 FS
Prerequisites: EECE 315.
EECE 343 Computer Interface Circuits 4.0 FS
Prerequisites: EECE 144, EECE 315.
EECE 344 Digital Systems Design 4.0 FS
Prerequisites: EECE 144, EECE 221; either EECE 110 or EECE 211 and EECE 211L.
MECA 380 Measurements & Instrumentation 3.0 SP
Prerequisites: EECE 211, EECE 211L; either EECE 135 or MECH 360.
MECA 482 Control System Design 4.0 FS
Prerequisites: EECE 211, MATH 260. Recommended: MECA 380, MECH 320; either EECE 135 or MECH 360.
This course is also offered as EECE 482.
MECA 486 Motion and Machine Automation 4.0 FS
Prerequisites: EECE 211, EECE 211L; either EECE 482 or MECA 482 (may be taken concurrently).
MECA 440A Mechatronic Engr Design Proj I 3.0 FA WP
Prerequisites: ENGL 130 (or its equivalent) with a grade of C- or higher, EECE 344, MECH 140, MFGT 160. Recommended: CIVL 302, MECA 380.
MECA 440B Mechatronic Engr Des Proj II 2.0 SP
Prerequisites: MECA 440A. Recommended: CIVL 302, MECA 380.
MECH 320 Dynamics 3.0 FS
Prerequisites: CIVL 211, MATH 260 (may be taken concurrently).
MECH 340 Mechanical Engineer Design 3.0 SP

Grading Requirement:
All courses taken to fulfill major course requirements must be taken for a letter grade except those courses specified by the department as Credit/No Credit grading only.

Advising Requirement:
Advising is strongly recommended for all majors in this degree program. Consult your undergraduate adviser for specific information.

Honors in the Major
Honors in the Major is a program of independent work in your major. It involves 6 units of honors course work completed over two semesters.

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. Most importantly, however, 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 competition in shows; such experience is valuable for graduate school and later professional life. Some common features of Honors in the Major program are:
1. You must take 6 units of Honors in the Major course work. At least 3 of these 6 units are independent study (499H) as specified by your department. You must complete each class with a minimum grade of B.
2. You must have completed 9 units of upper-division course work or 21 overall units in your major before you can be admitted to Honors in the Major. Check the requirements carefully, as there may be specific courses that must be included in these units.
3. Your cumulative GPA should be at least 3.5 or within the top 5 percent of majors in your department.
4. Your GPA in your major should be at least 3.5 or within the top 5 percent of majors in your department.
5. Most students apply for or are invited to participate in Honors in the Major during the second semester of their senior year. Then they complete the 6 units of course work over the two semesters of their senior year.
6. Your honors work culminates with a public presentation of your Honors project.

While Honors in the Major is part of the Honors Program, each department administers its own program. Please contact your major department or major adviser for further information.

The Faculty
Mechatronic Engineering
Roy E. Croshaw, 1983, Director of Academic Development., Professor Emeritus, PhD, GBR: Univ of Liverpool.
Chuen H. Hsu, 1982, Professor, PhD, Iowa St U.
Gregory A. Kallio, 1988, Chair, Professor, PhD, WA State U.
Hede Ma, 2000, Professor, PhD, SUNY Binghamton.
Albert O. Richardson, 1989, Professor, PhD, Penn St U.
Ronald Roth, 1986, Professor, MD, PhD, Stanford U.
Jimmy Tan-atichat, 1987, Professor, PhD, IL Inst of Tech.
Ben-Dau Tseng, 1982, Professor, PhD, U Windsor.
Ramesh M. Varahamurti, 1984, Professor, PhD, WA State U.
Michael G. Ward, 1988, Associate Dean, Professor, PE, PhD, Stanford U.
Larry L. Wear, 1972, Chair, Professor Emeritus, PhD, Santa Clara Univ.
John J. Zenor, 1982, Professor Emeritus, PhD, U Missouri.

Adjunct Faculty
Nick Repanich, 2001, Lecturer A, BS, Cal Poly.
PE designates Registered Professional Engineer

Mechatronic Engineering Course Offerings
Please see the section on “Course Description Symbols and Terms” in The University Catalog for an explanation of course description terminology and symbols, the course numbering system, and course credit units. All courses are lecture and discussion and employ letter grading unless otherwise stated. Some prerequisites may be waived with faculty permission. Many syllabi are available on the Chico Web.

MECA 198 Special Topic 1.0-3.0 Inquire
Special topic generally offered one time only. Different sections may have different topics. See The Class Schedule for specific topic being offered.
Formerly MECA 098.

MECA 298 Special Topic 1.0-3.0 Inquire
Prerequisites: To be established when course is formulated. Special topic generally offered one time only. Different sections may have different topics. See The Class Schedule for specific topic being offered. Formerly MECA 195.

MECA 380 Measurements and Instrumentation 3.0 Spring
Prerequisites: EECE 211, EECE 211L; either EECE 135 or MECH 360. Recommended: CIVL 302.
Measurement of steady-state and dynamic phenomena using common laboratory instruments. Calibration of instruments, dynamic response of instruments, and statistical treatment of data. 2.0 hours discussion, 3.0 hours laboratory. Special fee required; see The Class Schedule. Formerly MECA 261.

MECA 389 Industrial Internship 1.0-3.0 Fa/Sp
Prerequisites: Approval of faculty internship coordinator prior to off-campus assignment. Engineering experience in an industrial setting. Minimum duration of 400, 700, or 1,000 hours of work (for 1.0, 2.0, or 3.0 units respectively) 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. May be taken only once for credit. You may take this course more than once for a maximum of 15.0 units. Credit/no credit grading only. Formerly MECA 299.

MECA 398 Special Topic 1.0-3.0 Inquire
Prerequisites: To be established when course is formulated. Special topic generally offered one time only. Different sections may have different topics. See The Class Schedule for the specific topic being offered. Formerly MECA 198.
MECA 399  Special Problems  1.0-3.0 Inquire
Prerequisites: Approval of supervising faculty member.
This course is an independent study of special problems offered for 1.0-3.0 units. See the department office for information on registering. You may take this course more than once for a maximum of 6.0 units. Credit/no credit grading only. Formerly MECA 199.

MECA 440A  Mechatronic Engineering Design Project I  3.0 Fall
Prerequisites: ENGL 130 (or its equivalent) with a grade of C- or higher, EECE 344, MECH 340, MGFT 160. Recommended: CIVL 302, MECA 380.
System design methods applied to mechatronic systems. Group design projects. Consideration of the manufacturing cost, and environmental and social impact. Oral and written presentation of results. Initial design of the capstone design project to be continued in MECA 440B. 2.0 hours discussion, 3.0 hours laboratory. This is a writing proficiency, WP, course; a grade of C- or better certifies writing proficiency for majors. Formerly MECA 238A.

MECA 440B  Mechatronic Engineering Design Project II  2.0 Spring
Prerequisites: MECA 440A. Recommended: CIVL 302, MECA 380.
Continuation of the capstone design project from MECA 440A. Implementation of the capstone design project, including fabrication, testing, and evaluation of a working prototype. Must be taken the semester immediately following MECA 440A. 4.0 hours activity. Formerly MECA 238B.

MECA 440H  Mechatronic Engineering Design Project I  3.0 Inquire
- Honors
Prerequisites: ENGL 130 (or its equivalent) with a grade of C- or higher, EECE 344, MECH 340, MGFT 160, acceptance into the Honors in the Major program. Recommended: CIVL 302, MECA 380.
System design methods applied to mechatronic systems. Group design projects. Consideration of the manufacturing cost, and environmental and social impact. Oral and written presentation of results. Initial design of the Honors/capstone design project to be continued in MECA 440B. 2.0 hours discussion, 3.0 hours laboratory. This is a writing proficiency, WP, course; a grade of C- or better certifies writing proficiency for majors. Formerly MECA 238H.

MECA 482  Control System Design  4.0 Fall
Prerequisites: EECE 211, MATH 260. Recommended: MECA 380, MECH 320, either EECE 135 or MECH 306.
Modeling and simulation of dynamic system performance. Control system design for continuous systems using both analog and digital control techniques. 3.0 hours lecture, 2.0 hours activity. Formerly MECA 201. This course is also offered as EECE 482.

MECA 486  Motion and Machine Automation  4.0 Fall
Prerequisites: EECE 211, either EECE 482 or MECA 482 (may be taken concurrently).
Machine automation concepts in electrical circuits, precision mechanics, control systems, and programming. Motor sizing, gearing, couplings, ground loops, effective use of step motors, servo control loops, regeneration, networking, I/O, power supplies, vibration and resonance, mechanical tolerancing, linear bearings and drive mechanisms, and troubleshooting. Labs simulate application concepts such as point-to-point coordinated moves, registration, following, camming, and CAD-to-Motion by combining various motor technologies with various mechanical drive types. 2.0 hours discussion, 4.0 hours activity. Formerly MECA 202.

MECA 498  Special Topic  1.0-3.0 Inquire
Prerequisites: To be established when course is formulated.
Special topic generally offered one time only. Different sections may have different topics. See The Class Schedule for the specific topic being offered. Formerly MECA 298.

MECA 499  Special Problems  1.0-3.0 Inquire
Prerequisites: Approval of supervising faculty member.
Independent study of a special problem. See the department office for registration procedure. You may take this course more than once for a maximum of 6.0 units. Credit/no credit grading only. Formerly MECA 299.

MECA 499H  Honors Project  3.0 Inquire
Prerequisites: Completion of 12 units of upper-division EECE, MECH, or MECA courses, faculty permission.
Open by invitation to MECA majors who have a GPA among the top 5% of MECA students based on courses taken at CSU, Chico. This is an “Honors in the Major” course; a grade of B or better in 6 units of 499H certifies the designation of “Honors in the Major” can be printed on the transcript and the diploma. If taken twice, prerequisite to the second semester is a grade of B or better in the first semester. Each 3-unit course will require both formal written and oral presentations. You may take this course more than once for a maximum of 6.0 units. Formerly MECA 299H.

MECA 697  Independent Study  1.0-3.0 Inquire
Prerequisites: Approval of supervising faculty member.
Independent study of a special problem. See department office for registration procedure. You may take this course more than once for a maximum of 6.0 units. Credit/no credit grading only. Formerly MECA 398.

MECA 698  Advanced Topic  1.0-3.0 Inquire
Prerequisites: Specific to the topic being offered.
Advanced topic generally offered one time only. Different sections may have different topics. See The Class Schedule for specific topics being offered. You may take this course more than once for a maximum of 3.0 units. Formerly MECA 397.

MECA 699P  Master's Project  1.0-6.0 Inquire
Prerequisites: Approval of supervising faculty member.
Independent study of a special project approved by the student's graduate advisory committee. See the department office for registration procedures. You may take this course more than once for a maximum of 6.0 units. Formerly MECA 399P.

MECA 699T  Master's Thesis  1.0-6.0 Inquire
Prerequisites: Approval of supervising faculty member.
Independent study leading to a Master's Thesis of a special problem approved by the student's graduate advisory committee. See the department office for registration procedures. You may take this course more than once for a maximum of 6.0 units. Formerly MECA 399T.