Engineering offers accredited programs of study leading to the bachelor’s degree in civil, computer, electrical/electronic, mechanical, and mechatronic engineering. All Engineering curricula are based on a thorough foundation in communication skills, humanities, mathematics, natural and social sciences, and engineering disciplines. Program faculty are committed to prepare engineering graduates who can work cooperatively with other engineers, scientists, and business professionals to develop innovative solutions to complex problems.

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 or computer aided drawing should be taken to prepare for Engineering. This program involves transferring 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.

FE (EIT) Examination
Senior engineering students are encouraged to take the Fundamentals of Engineering (EIT) 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 engineering professional societies have student chapters on campus. Student organizations sponsor guest speakers, social events, field trips, community service events, and organize teams to compete at regional and national engineering student competitions. Student organizations also offer peer advising and tutoring. The American Society of Civil Engineers, the Structural Engineers Association of California, the Institute of Transportation Engineers, Engineers Without Borders, the Society of Plastics Engineers, the Association for Computing Engineers, the Institute of Electrical and Electronics Engineers, the American Society of Mechanical Engineers, the Society of Manufacturing Engineers, the National Society of Black Engineers, and the Society of Women Engineers all have active chapters. The national honor societies Tau Beta Pi and Alpha Kappa Nu are also available to qualified students. As no national society exists for mechatronic engineers, 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 disadvantaged 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 infrastructure of transportation, water resources, structural, and environmental systems.

Electrical/electronic engineers are in demand by both industry and government. This demand is predicted to continue as electronic equipment and embedded systems become more vital to business, industry, and consumer products.

Mechanical Engineers are employed in a wide range of industries that include aerospace, automotive, manufacturing, power generation, HVAC (heating, ventilation, and air conditioning), electronics/computer, biomedical, food processing, pollution control, and many others.

Mechatronic engineers are in high demand as the number of “intelligent” products on the market increases. The need for graduates who can design products with embedded control is growing rapidly as microprocessors are integral to many devices and products.

* Accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, telephone: (410) 347-7700
Civil Engineering

Civil engineering graduates are well prepared for professional work or graduate school in a broad spectrum of engineering activities. The program is balanced, stressing environmental engineering; soil mechanics and foundations; structural analysis and design; surveying and mapping; transportation and traffic engineering; water resources and hydraulics. The program emphasizes quality undergraduate teaching and active student learning, including extensive use of laboratory and co-curricular activities.

Civil Engineering Program Mission

The civil engineering program prepares graduates for immediate entry into a variety of professional careers and provides a solid undergraduate foundation in general principles enabling continued education at advanced levels.

Civil Engineering Educational Objectives

Program educational objectives are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve.

1. Civil Engineering graduates will be prepared to be effective engineers and problem solvers.
2. They will be well educated in engineering sciences and proficient in at least four recognized civil engineering areas.
3. They will be able to appropriately utilize a variety of engineering tools and techniques to enhance their professional abilities.
4. They will be prepared with applied course content and a comprehensive understanding of professional issues.
5. They will be effective technical written and oral communicators.
6. They will be able to function effectively as members of multi-disciplinary teams.
7. They will have an appreciation for the individual, society, good citizenship, community service, ethical conduct, and they will be aware of the impact of their designs on mankind and the environment.

Civil Engineering Program Learning Outcomes

Program outcomes are narrower statements that describe what students are expected to know and be able to do by the time of graduation. Students completing the civil engineering program must demonstrate:

(a) an ability to apply knowledge of mathematics, science, and engineering, including; mathematics through differential equations, calculus-based physics, chemistry, biology, and four technical areas appropriate to civil engineering;
(b) an ability to design and conduct civil engineering experiments, as well as to analyze and interpret the resulting data;
(c) an ability to design a system, component, or process to meet desired needs in more than one civil engineering context and within realistic constraints;
(d) an ability to function on multidisciplinary teams;
(e) an ability to identify, formulate, and solve engineering problems;
(f) an understanding of professional ethical responsibility, including the importance of professional licensure;
(g) an ability to communicate effectively;
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context;
(i) a recognition of the need for, and an ability to engage in life-long learning;
(j) a knowledge of contemporary issues;
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice; and
(l) an understanding of basic concepts in management, business, public policy, and leadership.

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

American Public Works Association Internship Program

The APWA Internship Program provides civil engineering students with valuable real-world experience. Participation in the program is elective but can be used for academic credit towards the degree. While students are responsible for finding their own internship opportunity, the Experimental Education Office is an excellent resource for locating companies interested in hiring interns. Additional information is available at the department website http://www.ecst.csuchico.edu/ce/.

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 at http://em.csuchico.edu/aap/ProgramSearch.

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, will 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. upper-division theme modification has been approved for this major.

See the General Education chapter in the University Catalog for specifics on how to apply this modification.

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 Accreditation Board for Engineering and Technology (ABET). Consult your academic advisor for additional information.

Diversity Course Requirements: 6 units

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

U.S. History, Constitution, and American Ideals: 6 units

See “U.S. History, Constitution, and American Ideals” under “Bachelor's Degree Requirements”. For this major, this requirement is normally fulfilled by completing HIST 130 and POLS 155 or approved equivalents.

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: 107-109 units

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

Enrollment in any mathematics course requires a grade of C- or higher in all prerequisite courses or their transfer equivalents.

Lower-Division Requirements: 53-55 units

15 courses required:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Units</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL 110</td>
<td>Graphics for Civil Engineers</td>
<td>2.0</td>
<td>FS</td>
</tr>
<tr>
<td>Prerequisites: High school trigonometry and algebra.</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>CIVL 130</td>
<td>Surveying</td>
<td>3.0</td>
<td>FA</td>
</tr>
<tr>
<td>Prerequisites: MATH 120 (may be taken concurrently).</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>CIVL 131</td>
<td>Intro to Civil Engr Design</td>
<td>3.0</td>
<td>SP</td>
</tr>
<tr>
<td>Prerequisites: CIVL 110.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CIVL 205</td>
<td>Computer Applications in Engr</td>
<td>2.0</td>
<td>FS</td>
</tr>
<tr>
<td>Prerequisites: PHYS 204A (may be taken concurrently).</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>CIVL 211</td>
<td>Statics</td>
<td>3.0</td>
<td>FS</td>
</tr>
<tr>
<td>Prerequisites: MATH 121 and PHYS 204A. CIVL 110 (may be taken concurrently) or MECH 100 and MECH 100L (may be taken concurrently).</td>
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</tr>
<tr>
<td>CIVL 415</td>
<td>Reinforced Concrete Design</td>
<td>4.0</td>
<td>FS*</td>
</tr>
<tr>
<td>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.)</td>
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</tr>
<tr>
<td>CIVL 431</td>
<td>Environmental Engineering</td>
<td>3.0</td>
<td>FS</td>
</tr>
<tr>
<td>Prerequisites: MATH 121, PHYS 204B.</td>
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<td></td>
</tr>
</tbody>
</table>

Total 53-55 units
E CE 211L Linear Circuits I Activity 1.0 FS
Corequisites: E CE 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: MATH 120.

MATH 260 Elem Differential Equations 4.0 FS
Prerequisites: MATH 121.

MECH 210 Materials Science/Engineering 3.0 FS
Prerequisites: PHYS 204A; CHEM 111.

NSCI 102 Intro to Living Systems 3.0 FS *
Prerequisites: High school physics or faculty permission. Concurrent enrollment in or prior completion of MATH 121 (second semester of calculus) or equivalent.

PHYS 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.

1 course selected from:

MATH 220 Analytic Geometry and Calculus 4.0 FS
Prerequisites: MATH 121.

MATH 235 Elementary Linear Algebra 3.0 FS
Prerequisites: MATH 121.

MATH 350 Intro to Probability/Stat 3.0 FA
Prerequisites: MATH 121.

1 course selected from:

BIOL 211 Allied Health Microbiology 4.0 FS
Prerequisites: A college course in biology and in general chemistry.

CHEM 112 General Chemistry 4.0 FS
Prerequisites: CHEM 111 with a grade of C- or higher.

GEOS 102 Physical Geology 3.0 FS *
Prerequisites: High school chemistry or physics is recommended; students with no previous science courses are advised to enroll in GEOS 101. No college credit for those who have passed GEOS 101.

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: 54 units

13 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 with a grade of C- or higher; CIVL 110 or MECH 100 and MECH 100L; MATH 260 and MECH 210 (may be taken concurrently).

CIVL 312 Structural Testing Laboratory 1.0 FS
Prerequisites: CIVL 210; CIVL 311 with a grade of C- or higher.

CIVL 313 Structural Mechanics 4.0 FS
Prerequisites: CIVL 205 (may be taken concurrently); CIVL 311 with a grade of C- or higher.

CIVL 321 Fluid Mechanics 4.0 FS
Prerequisites: CIVL 211 with a grade of C- or higher. Recommended: MATH 260, MECH 320 (may be taken concurrently).

CIVL 402 Contracts/Specs/Tech Reports 4.0 FS WP
Prerequisites: ENGL 130 (or its equivalent) with a grade of C- or higher, junior standing.

CIVL 411 Soil Mechanics and Foundations 4.0 SP
Prerequisites: CIVL 312 and CIVL 321 (may be taken concurrently); ENGL 130 or equivalent.

CIVL 415 Reinforced Concrete Design 4.0 FA
Prerequisites: CIVL 312, CIVL 313. Recommended: CIVL 411.

CIVL 431 Environmental Engineering 4.0 SP
Prerequisites: BIOL 151 or NSCI 102; CHEM 107 or CHEM 111; Math 109 or MATH 120; junior standing.

CIVL 441 Transportation Engineering 4.0 FA
Prerequisites: CIVL 131; CIVL 302 (may be taken concurrently).

CIVL 495 Prof Issues in Eng 3.0 FS
Prerequisites: ENGL 130 or equivalent; senior standing.

MECH 320 Dynamics 3.0 FS
Prerequisites: CIVL 211 with a grade of C- or higher, MATH 260.

MECH 332 Thermodynamics 3.0 FS
Prerequisites: PHYS 204A. Recommended: PHYS 204C.

CIVL 302 and CIVL 495 are approved General Education courses for the Civil Engineering major.

6 units selected from:

Any 500-level CIVL, 400/500-level MECH, or 400-level ECE courses, or MECH 308 or MECH 338. No more than three units of CIVL 599 may be used for this requirement.

3 units selected from:

Other technical courses to be chosen from a list approved by the department.

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 mandatory for all majors in this degree program. Consult your undergraduate advisor 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 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 are:

1. You must take 6 units of Honors in the Major course work. You must complete the 6 units with a minimum grade of B.

2. You must have completed 9 units of upper-division course work or 21 units overall 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 department chair to apply.

Honors in Civil Engineering

The common elements of the Honors in the Major program listed above apply to Honors in Civil Engineering. Specific information for this program includes:

1. In addition to meeting the GPA requirements, you must be recommended by a faculty member.

2. Students who are admitted into the department's Honors in the Major program may elect to take any two upper-division civil engineering electives for honors credit. The honors section will be identified on your transcript. The courses are usually spread over two semesters. You must complete them with a minimum grade of B and maintain a minimum GPA of 3.0 overall.

3. Each Honors in the Major class will require completion of the course plus an additional honors project and culminates with a public presentation of your honors project.
**Civil Engineering Course Offerings**

Please see the section on “Course Description Symbols and Terms” in the University Catalog for a description 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 110** Graphics for Civil Engineers  
2.0 Fa/Spr  
Prerequisites: High school trigonometry and algebra. This course introduces the fundamentals of creating and reading civil engineering drawings by referencing architectural plans, subdivision maps and site plans, in addition to utilizing computer-aided drafting software to produce basic plans. Applications of the computer software include drawing accuracy, layer managing standards, dimensioning standards, sheet layouts, data extraction and drawing management. Topics are reinforced by a drawing project that requires sketching and measuring of existing features to create a set of as-built drawings. Additional course topics related to descriptive geometry include orthographic projections, auxiliary views, perspective drawings, and graphical solutions to vector analysis. 4.0 hours activity. Special fee required; see the Class Schedule. (020120)

**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. Error of combined measurements analysis. Use of scientific calculator required. 2.0 hours discussion, 3.0 hours laboratory. Special fee required; see the Class Schedule. (001484)

**CIVL 130X** Surveying Problem Session  
1.0 Inquire  
Prerequisites: Concurrent enrollment in CIVL 130. Supplemental applications and explanations intended to facilitate student understanding of content from CIVL 130. 2.0 hours activity. Credit/no credit grading only. (020155)

**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 those 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, and use of Civil 3D modeling software. A final assessment of plans and specifications is required. 2.0 hours activity. Credit/no credit grading only. (020693)

**CIVL 131A** Civil Engineering Design Project  
1.0 Spring  
Prerequisites: CIVL 131. Design of roadway alignments, to include horizontal curves, vertical curves, and earthwork using Civil 3D modeling software. A final assessment of plans and specifications is required. 2.0 hours activity. Credit/no credit grading only. (020156)

**CIVL 131X** Civil Engineering Design Problem Session  
1.0 Inquire  
Prerequisites: Concurrent enrollment in CIVL 131. Supplemental applications and explanations intended to facilitate student understanding of content from CIVL 131. 2.0 hours activity. Credit/no credit grading only. (020156)

**CIVL 198** 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. (001490)

**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 civil 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. (001488)

**CIVL 211** Statics  
3.0 Fa/Spr  
Prerequisites: MATH 121 and PHYS 204A. CIVL 110 (may be taken concurrently) or MECH 100 and MECH 201 (may be taken concurrently). Force systems, moments, equilibrium, centroids, and moments of inertia. 2.0 hours activity, 2.0 hours discussion. (001489)

**CIVL 211X** Statics Problem Session  
1.0 Inquire  
Prerequisites: Concurrent enrollment in CIVL 211. Supplemental applications and explanations intended to facilitate student understanding of content from CIVL 211. 2.0 hours activity. Credit/no credit grading only. (020157)

**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. (001495)

**CIVL 302X** Engineering Economy and Statistics Problem Session  
1.0 Inquire  
Corequisites: CIVL 302. Supplemental applications and explanations intended to facilitate student understanding of content from CIVL 302. 2.0 hours activity. Credit/no credit grading only. (020340)

**CIVL 311** Strength of Materials  
4.0 Fa/Spr  
Prerequisites: CIVL 211 with a grade of C- or higher; CIVL 110 or MECH 100 and MECH 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. (001491)

**CIVL 311X** Strength of Materials Problem Session  
1.0 Inquire  
Prerequisites: Concurrent enrollment in CIVL 311. Supplemental applications and explanations intended to facilitate student understanding of content from CIVL 311. 2.0 hours activity. Credit/no credit grading only. (020158)

**CIVL 312** Structural Testing Laboratory  
1.0 Fa/Spr  
Prerequisites: CIVL 205; CIVL 311 with a grade of C- or higher. 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. (001492)

**CIVL 313** Structural Mechanics  
4.0 Fa/Spr  
Prerequisites: CIVL 205 (may be taken concurrently); CIVL 311 with a grade of C- or higher. 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. (001499)

**CIVL 321** Fluid Mechanics  
4.0 Fa/Spr  
Prerequisites: CIVL 211 with a grade of C- or higher. 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. (001496)

**CIVL 321X** Fluid Mechanics Problem Session  
1.0 Inquire  
Prerequisites: Concurrent enrollment in CIVL 321. Supplemental applications and explanations intended to facilitate student understanding of content from CIVL 321. 2.0 hours activity. Credit/no credit grading only. (020159)
CIVL 389  Civil Engineering Internship  1.0–3.0 Fa/Spr
Prerequisites: Approval of supervising faculty member prior to off-campus assignment. This course 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. (001504)

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. (001505)

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. (001506)

CIVL 400  Civil Engineering Activity  1.0 Inquire
Prerequisites: Membership in a civil engineering student professional organization. Co-curricular activity associated with one or more student professional organizations. Examples include collegiate competitions, such as the concrete canoe and the steel bridge contests, and service projects. Substantial participation is required (approximately 30 hours minimum). 2.0 hours activity. Credit/no credit grading only. (020694)

CIVL 402  Contracts, Specifications, and Technical Reports  4.0 Fa/Spr
Prerequisites: ENGL 130 (or its 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 C- or better certifies writing proficiency for majors. (001494)

CIVL 411  Soil Mechanics and Foundations  4.0 Spring
Prerequisites: CIVL 312 and CIVL 121 (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. (001511)

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. (001514)

CIVL 431  Environmental Engineering  4.0 Spring
Prerequisites: BIOL 151 or NSCI 102; CHEM 107 or CHEM 111; Math 109 or MATH 120; junior standing.
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. (001529)

CIVL 441  Transportation Engineering  4.0 Fall
Prerequisites: CIVL 131; CIVL 302 (may be taken concurrently).
Transportation systems and facility planning, design, construction, operations, and maintenance. Pavement design and traffic engineering fundamentals. Advanced transportation studies include field studies, design exercises, and forecasting tasks. 3.0 hours discussion, 3.0 hours laboratory. (001520)

CIVL 489  Civil Engineering Internship  1.0–3.0 Fa/Spr
Prerequisites: Approval of supervising faculty member prior to off-campus assignment. This course is an internship offered for 1.0-3.0 units. You must register directly with a supervising faculty member. This program is designed for students who wish to gain practical work experience with participating civil engineering firms/organizations. You may take this course more than once for a maximum of 15.0 units. Credit/no credit grading only. (001513)

CIVL 495  Professional Issues in Engineering  3.0 Fa/Spr
Prerequisites: ENGL 130 or equivalent; senior standing.
History of engineering, professional registration, codes of ethics, management issues, diversity, outsourcing, intellectual property, international development and technology transfer, sustainable design. A substantial written project with oral presentation is required. 2.0 hours activity, 2.0 hours discussion. (0013716)

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. (001537)

CIVL 499  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. (001539)

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 from the 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-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. (001540)

CIVL 500  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. (001508)

CIVL 551  Foundations Engineering  3.0 Inquire
Prerequisites: CIVL 411; CIVL 415 (may be taken concurrently).
The application of soil mechanics principles to the design of foundations for buildings and earth structures. Integration of structural design and soil response. (001513)

CIVL 553  Nonlinear Structural Analysis  3.0 Inquire
Prerequisites: CIVL 313.
Advanced methods of structural analysis, including nonlinear static pushover methods and dynamic analysis. Element modeling based on fundamental stress-strain behavior and force-displacement behavior. Current codes and guidelines are utilized. Use of software for nonlinear structural analysis. 2.0 hours activity, 2.0 hours discussion. (001532)

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. (001500)

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. (001516)

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. (001517)

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 activity, 2.0 hours discussion. (001518)

CIVL 561  Open Channel Hydraulics  3.0 Inquire
Prerequisites: CIVL 205; CIVL 321 with a grade of C- or higher. Principles and applications of steady, gradually varying, and unsteady open channel flows. The course uses both analytical and computational methods to analyze flows in open channels. (001526)
Engineering

CIVL 562 Engineering Hydrology 3.0 Inquire
Prerequisites: CIVL 205; CIVL 321 (may be taken concurrently); CIVL 321 with a grade of C- or higher or faculty permission.
An introduction to modern hydrology emphasizing quantitative analysis of components of the hydrologic cycle including precipitation, overland flow, stream flow, infiltration, groundwater flow, and evapotranspiration. Use of modeling tools and techniques is emphasized. (001498)

CIVL 567 Applied Hydraulics 3.0 Inquire
Prerequisites: CIVL 102; CIVL 121 with a grade of C- or higher; CIVL 411 (may be taken concurrently).
Quantitative analysis of pressurized pipelines, pipe networks, and well fields. The course includes analysis of transients in pipeline systems caused by valve movement, pump power failure, etc; design of transient control devices; analysis of well drawdowns and aquifer performance tests. (001528)

CIVL 571 Natural Systems for Wastewater Treatment 3.0 Inquire
Prerequisites: CIVL 431 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. (001533)

CIVL 573 Water Quality Engineering 3.0 Inquire
Prerequisites: CIVL 431 or faculty permission.
Water quality criteria and standards; engineering design; management and monitoring of water quality. (001535)

CIVL 575 Solid and Hazardous Waste Management 3.0 Inquire
Prerequisites: CIVL 431 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. (001536)

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. (001522)

CIVL 582 Asphalt Paving Materials 3.0 Inquire
Prerequisites: CIVL 441 or faculty permission.
Asphalt mix types and their use in flexible pavements. Properties of asphalt and aggregates that determine mix properties. Design of asphalt aggregate mix to meet the structural and environmental requirements. Construction of asphalt mixes, including equipment, procedures, influence on properties, constraints, specification, and quality control. Surface treatment of asphalt pavement. Recycling of previously used materials. Recent developments in asphalt mix technology. (020712)

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. (001524)

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. (010128)

CIVL 592 Construction Management 3.0 Inquire
Prerequisites: CIVL 205; CIVL 321 (may be taken concurrently). Recommended: CIVL 302.
Introduction to construction engineering and management. Cost estimation for contract construction and engineering, including labor, material, equipment, and overhead costs. 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. Planning, scheduling, and progress controls of construction operations. One or two three-hour field trips may be required. (001510)

CIVL 598 Advanced Special Topics 1.0–3.0 Fa/Spr
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. (020084)

CIVL 599 Special Problems 1.0–3.0 Inquire
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. (020171)

CIVL 656 Advanced Timber Design Activity 1.0 Inquire
Prerequisites: CIVL 558 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. (001542)

CIVL 658 Advanced Earthquake and Wind Engineering Activity 1.0 Inquire
Prerequisites: CIVL 558 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. (001544)

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. (001549)

CIVL 662 Introduction to Pavement Preservation 3.0 Inquire
Prerequisites: Bachelor's Degree or faculty permission.
An overview of terms related to pavement management systems and their use in identifying both functional and structural distresses in flexible and rigid pavement and their role in pavement preservation strategies. (020773)

CIVL 663 Flexible Pavement Preservation 3.0 Inquire
Prerequisites: CIVL 682 or faculty permission.
Flexible pavement distress causes and measurements; project selection for preservation methods; construction best practices for preservation, maintenance, and rehabilitation processes. (020774)

CIVL 664 Rigid Pavement Preservation 3.0 Inquire
Prerequisites: CIVL 682 or faculty permission.
Rigid pavement distress causes and measurements; project selection for preservation methods; construction best practices for preservation, maintenance, and rehabilitation processes. (020775)

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. (001546)

CIVL 682 Pavement Management Systems 3.0 Inquire
Prerequisites: To be established when courses are formulated.
Development of pavement management databases; construction of performance models; forecasting of pavement performance; life cycle cost analyses for highway construction. (020776)

CIVL 683 Independent Study 1.0–3.0 Fa/Spr
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. (001511)

CIVL 699T Master's Study 1.0–6.0 Fa/Spr
Prerequisites: Faculty permission.
This course is a master's study offered as either a Master's Thesis or as a Master's Project for 1.0-6.0 units. You must register directly with a supervising faculty member. (001535)
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. (003699)

**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 the integration of both 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) 347-7700.

**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:
1. Apply knowledge of mathematics, science, and engineering to identify, formulate, and solve computer engineering problems.
2. Use industry standard tools to analyze, design, develop, and test computer-based systems containing both hardware and software components.
3. Achieve success in graduate programs in computer engineering, electrical engineering, or computer science.
4. Continue to develop their knowledge and skills after graduation in order to succeed personally and contribute to employer success.
5. Work effectively as a member of a multi-disciplinary development team and undertake leadership roles when appropriate.
6. Communicate their thoughts, in both written and oral forms, so that others can comprehend and build on their work.
7. 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 it 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 senior year when all students are required to identify a design 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 advisor or view it and other current advising information at http://em.csuchico.edu/aap/ProgramSearch.

**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 U.S. Diversity or Global Cultures requirement is recommended.
3. Select one course from Breadth Area D1 or D2 or D3. A course that also fulfills the U.S. Diversity or Global Cultures requirement is recommended.
4. Upper-division theme modification has been approved for this major. See the General Education chapter in the University Catalog for specifics on how to apply this modification.

**Diversity Course Requirements: 6 units**
See “Diversity* in the University Catalog. Most courses used to satisfy these requirements may also apply to General Education Areas C and D.

**U.S. History, Constitution, and American Ideals 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**
Completion of the following courses, or their approved transfer equivalents, are required of all candidates for this degree.

**Enrollment in any mathematics course requires a grade of C- or higher in all prerequisite courses or their transfer equivalents.**

**Lower-Division Requirements: 52 units**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
<th>Notes</th>
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</thead>
</table>
| CSCI 211 | Programming and Algorithms II | 4.0 | FS*
| Prerequisites: CSCI 111 or EECE 135 with a grade of C- or higher. |
| EECE 144 | Logic Design Fundamentals | 4.0 | FS*
| Prerequisites: Recommended: EECE 101, MECH 100. |
| EECE 211 | Linear Circuits I | 3.0 | FS*
| EECE 2111 | Linear Circuits I Activity | 1.0 | FS*
| 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: MATH 120. |
| MATH 220 | Analytic Geometry and Calculus | 4.0 | FS*
| Prerequisites: MATH 121. |
| MATH 260 | Elem Differential Equations | 4.0 | FS*
| Prerequisites: MATH 121. |
| 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: 56 units

13 courses required:
CIVL 302 Engineering Econ & Statistics 3.0 FS
Prerequisites: MATH 121, junior standing.
CIVL 495 Prof Issues in Eng 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 211, EECE 211L.
Corequisites: EECE 311, MATH 260.
EECE 320 System Architecture/Performance 3.0 FS
Prerequisites: CSCI 221 with a grade of C- or higher.
EECE 335 Proj Requirements/Design/Test 3.0 FS
Prerequisites: ENGL 130 or either CSCI 211 or CSCI 221.
EECE 337 Embedded Systems Development 4.0 FS
Prerequisites: EECE 135; CSCI 221; Recommended: CSCI 211, EECE 320.
EECE 343 Computer Interface Circuits 4.0 FS
Prerequisites: EECE 144, EECE 315.
EECE 344 Digital Systems Design 4.0 FS
Prerequisites: EECE 144, CSCI 221; either EECE 310 or EECE 412 and EECE 211L.
EECE 365 Signals, Systems, & Transforms 4.0 FS
Prerequisites: EECE 311, MATH 266.
CSCI 430 Software Engineering 3.0 FS
Prerequisites: CSCI 311 or EECE 337, ENGL 130 with a grade of C- or higher.
EECE 337 Real-Time Embedded Systems 4.0 SP
Prerequisites: CSCI 131L, CSCI 131H; Recommended: CSCI 211; EECE 320.
EECE 444 Microprocessor Systems Design 4.0 SP
Prerequisites: EECE 344.
EECE 490A Senior Project Design/Document 3.0 FS WP
Prerequisites: ENGL 130 (or its equivalent) with a grade of C- or higher; EECE 335, EECE 343, EECE 344; either EECE 316 or EECE 444 (may be taken concurrently).
EECE 490B Senior Project Implementation 2.0 FS
Prerequisites: EECE 490A; either EECE 316 or EECE 444.

4 units selected from:
Any approved upper-division engineering, science, or math courses not otherwise required for graduation.

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.
All students must attain a 2.0 Grade Point Average (GPA) in all college courses attempted and for all courses attempted at Chico. Computer Engineering majors must also attain a 2.0 GPA in:
(a) all courses required for the major, and
(b) all Electrical and Computer Engineering (ECE) and Computer Science (CSCI) courses taken to meet major requirements at CSU, Chico.

Advising Requirement:
Advising is mandatory for all majors in this degree program. Consult your undergraduate advisor 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, CSU, Chico, CA 95929-0888, or on the department's web site.

Honors in the Major
Honors in the Major is a program of independent work in your major. It requires 6 units of honors course work completed over two semesters. 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 academic competition. Such experience is valuable for graduate school and professional life. 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.
Some common features of Honors in the Major program are
1. You must take 6 units of Honors in the Major course work. All 6 units are honors classes (marked by a suffix of H), and at least 3 of these units are independent study (399H, 499H, 599H) 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 for your major 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% of majors in your department.
4. Your GPA in your major should be at least 3.5 or within the top 5% 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 to apply.

The Minor in Computer Engineering
Course Requirements for the Minor: 27-28 units

The following courses, or their approved transfer equivalents, are required of all candidates for this minor.
3-4 units selected from:
EECE 110 Basic Electricity/Instruments 3.0 FS
Prerequisites: None. This course is not intended for engineering majors.
OR (the following course may be substituted for the above)
EECE 211 Linear Circuits I 3.0 FS
Prerequisites: MATH 121, PHYS 204B.
AND (Both the above and following course must be taken)
EECE 211L Linear Circuits I Activity 1.0 FS
Corequisites: EECE 211.

5 courses required:
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.
CSCI 221 Assembly Language Programming 3.0 FS
Prerequisites: CSCI 111 or EECE 135 with a grade of C- or higher.
EECE 344 Digital Systems Design 4.0 FS
Prerequisites: EECE 144, CSCI 221; either EECE 310 or EECE 211 and EECE 211L.

8 units selected from:
A minimum of 8 units of upper-division EECE or CSCI courses, of which at least 3 units must be approved upper-division EEEC units.

The Faculty

Engineering

Electrical and Computer Engineering
Uma Balaji, 2005, Assist Professor, PhD, U Victoria.
Roy E. Crosbie, 1983, Director of Academic Develop., Professor Emeritus, PhD, D, Liverpool.
Adel Ghandakly, 2005, Chair, Professor, PhD, U Calgary.
Hede Ma, 2000, Professor, PhD, SUNY Binghamton.
Albert O. Richardson, 1989, Professor, PhD, Pennsylvania State U.
Ben-Dau Tseng, 1982, Professor, PhD, U Windsor.
Dale Word, 2002, Assoc Professor, M5, CSU Chico.

Emeritus Faculty
Richard A. Bednar, 1979, Professor Emeritus, PE, PhD, Michigan State U.
Arthur Gee, 1977, Professor Emeritus, PE, MSEE, Polytechnic U.
Louis R. Harrold, 1984, Professor Emeritus, MSEE, UC Davis.
Philip H. Hoff, 1970, Professor Emeritus, PhD, UC Berkeley.
William G. Lane, 1960, Professor Emeritus, PE, PhD, UC Davis.
Larry L. Wear, 1972, Professor Emeritus, PhD, Santa Clara U.
John J. Zener, 1982, Professor Emeritus, PhD, U Missouri.

PE designates Registered Professional Engineer
enwise 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 2.0 Fa/Spr
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. (002092)

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 circuit theory, AC circuit theory, 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 activity, 2.0 hours discussion. (002612)

EECE 120X Analytical Geometry & Calculus Problem Session 1.0 Inquire
Corequisites: MATH 120
Supplemental applications and explanations to facilitate student understanding of content from MATH 120. 2.0 hours activity. Credit/no credit grading only. (002442)

EECE 135 Algorithms and Programs for Engineers 3.0 Fa/Spr
Prerequisites: MATH 120 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 activity, 2.0 hours discussion. (002518)

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. (002615)

EECE 144 Logic Design Fundamentals 4.0 Fa/Spr
Prerequisites: Recommended: EECE 101, MECH 100.
Definition and properties of 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. 2.0 hours activity, 3.0 hours lecture. (002614)

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. (015817)

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. 3.0 hours activity. (002094)

EECE 211 Linear Circuits I 3.0 Fa/Spr
Prerequisites: MATH 121, 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, impedances, resonances and AC power, three-phase AC circuit analysis. Special fee required; see the Class Schedule. (002519)

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. (002520)

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. (002616)

EECE 221 Processor Architecture and Assembly Language Programming 3.0 Fa/Spr
Prerequisites: EECE 135.
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, test, and input/output instructions. 2.0 hours activity, 2.0 hours lecture. (002093)

EECE 235 Algorithms and Data Structures for Engineers 4.0 Spring
Prerequisites: EECE 135
A second semester programming course that addresses more advanced programming concepts, including the design and development of large scale programs, algorithm analysis and Object Oriented Development. Topics include: recursion, linked lists, searching and sorting algorithms, algorithm analysis, dynamic memory allocation, file I/O, Operating System interaction, Object Oriented Development and hardware level programming techniques. Data structures and algorithms and system performance are studied and analyzed with their relative merits using both mathematical and empirical measurements. Students are required to design, implement, test and analyze their programs in C and C++. (020634)

EECE 235X Algorithms and Data Structures Problem 1.0 Spring Session
Corequisites: EECE 235
Designed to supplement EECE 235 with additional applications and extended explanations of concepts encountered in algorithms and data structures. Provides students with an opportunity for additional assistance in the EECE 235 experience. 2.0 hours activity. Credit/no credit grading only. (020655)

EECE 311 Linear Circuits II 4.0 Fa/Spr
Prerequisites: EECE 211; MATH 260 (may be taken concurrently).

EECE 315 Electronics I 4.0 Fa/Spr
Prerequisites: EECE 211, EECE 211L.
Corequisites: EECE 311, MATH 260.
Ideal diode. Zener diodes and regulation. Photodiodes and solar cells. Biasing and DC behavior of bipolar transistors. JFETs and MOSFETS. Small-signal AC equivalent circuits. Single-state transistor amplifiers. Low-frequency response. Discrete feedback amplifiers. 3.0 hours laboratory, 3.0 hours lecture. (002530)

EECE 316 Electronics II 4.0 Spring
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, 3.0 hours laboratory. (002534)

EECE 320 System Architecture and Performance 3.0 Fall
Prerequisites: CSCE 221 with a grade of C- or higher.
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 throughput; distributed systems and coprocessors; vector and parallel architectures. (002104)

EECE 335 Project Requirements, Design, and Testing 3.0 Fa/Spr
Prerequisites: ENGL 130; either EECE 211 or CSCE 221.
Students are introduced to methodologies used to specify system descriptions. Hardware and software documentation standards are described. Methodologies for modeling systems and development of presentation materials are discussed, and students are required to make both written and oral presentations. 2.0 hours activity, 2.0 hours discussion. (002099)
EECE 337  Embedded Systems Development  4.0 Fall
Prerequisites: EECE 135; CSCI 221. Recommended: CSCI 211, EECE 320.
This course presents concepts and techniques associated with designing, developing, and testing embedded systems software. Topics include
the nature and uses of embedded systems, embedded development and debugging environments, embedded programming techniques, embedded software design, embedded processor characteristics, interrupt handling, and low level device I/O. (020657)

EECE 337X Embedded Systems Development Problem  1.0 Fall
Session
Corequisites: EECE 337
Designed to supplement EECE 337 with additional applications and extended explanations of concepts encountered in embedded system
development tools. The student will find this especially helpful for additional assistance in the EECE 337 experience. 2.0 hours activity. Credit/no credit grading only. (020658)

EECE 343  Computer Interface Circuits  4.0 Fa/Spr
Prerequisites: EECE 144, CSCI 221.
Circuit design techniques for interfacing computers and digital systems to analog systems. Topics include interfacing to sensors, transduction, pulse
 generation and shaping, level detection, triggering, A/D and D/A conversion,
timers, pulse width modulation, VGA signal generation and mouse
design. Interface-development methodologies, implementation tools, test-
ing, and quality assurance including VHDL and PSPICE. State machine
design and analysis. (002105)

EECE 344  Digital Systems Design  4.0 Fa/Spr
Prerequisites: EECE 144, CSCI 221, either EECE 110 or both EECE 211 and EECE
211L.
Explores the study of digital circuits to LSIs and VLSIs 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. 3.0 hours discussion. 3.0 hours laboratory.
Special fee required; see the Class Schedule. (002102)

EECE 365  Signals, Systems, and Transforms  4.0 Fa/Spr
Prerequisites: EECE 311, MATH 260.
Modeling and analysis of Signals and Systems both continuous and
discrete, in the time and frequency domains. Topics include theory and
application of Fourier series, Fourier transforms, Parseval's Theorem and the
Convolution, Laplace Transform Sampling Theorem, Z transform, discrete
Fourier Transform and FFT. (002528)

EECE 375  Fields and Waves  3.0 Spring
Prerequisites: EECE 211, EECE 211L, MATH 260.
Transmission lines. Frequency-domain techniques. Fields and field
operators. Electromagnetic and capacitance. Magnetic-static fields and
inductance. Time-varying fields and Maxwell equations. Skin effect. Plane
electromagnetic waves. Reflection and refraction. Waveguides and optical
fibers. Radiation and antennas. (002529)

EECE 375X Fields and Waves Problem Solving Session  1.0 Spring
Corequisites: EECE 375
Supplemental applications and explanations intended to facilitate student
understanding of content from EECE 375. 2.0 hours activity. Credit/no
credit grading only. (020663)

EECE 381  Micromouse Design and Construction  1.0 Fa/Spr
Prerequisites: CSCI 223, EECE 144, EECE 211, EECE 211L.
This class covers the design and construction of a self-contained robot that
will meet the requirements for the IEE Micromouse competition. Con-
straints 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. (020618)

EECE 389  Internship in Electrical and Computer  1.0–3.0 Inquire
Engineering
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. (002106)

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 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 spe-
cific topic being offered. (002541)

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. (002542)

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. (002557)

EECE 425  Advanced Computer Architecture  4.0 Spring
Prerequisites: EECE 320.
The application, design, and performance aspects of parallel processor
structures, arithmetic pipelines and vector processing units; environmental
classification; memory structures, multiprocessor systems; interconnection
networks, multiprocessor control and scheduling; parallel algorithms. (002110)

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. (002109)

EECE 431  Software Engineering--Requirements and Design  3.0 Fall
Prerequisites: CSCI 211.
This course examines the requirements and design processes. Require-
ments 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 methodolo-
gies. The course also compares software design methodologies includ-
ing data flow, data structure, and object-oriented analysis and design. (002620)

EECE 447  Real-Time Embedded Systems  4.0 Spring
Prerequisites: CSCI 311; CSCI 221. Recommended: CSCI 211; EECE 320.
This course presents the concepts and techniques associated with designing,
developing, and testing real-time and embedded systems. Topics in-
clude 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. (002118)

EECE 444  Microprocessor Systems Design  4.0 Spring
Prerequisites: EECE 344.
Advanced microprocessor design concepts and techniques. Timing con-
siderations and calculations for reliable high-speed processor operating
frequencies. Interrupts for real-time processing; interfacing microproces-
sors to dynamic Random Access Memories. Designing DRAM controllers
using state machine design procedures. Direct Memory Access Controllers
(DMACs) and multi-master systems. Programmable Parallel Ports and Tim-
ers. Special purpose processors for digital signal processing, communica-
tions and multimedia applications. 2.0 hours activity, 3.0 hours discuss-
ion. Special fee required; see the Class Schedule. (002120)

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/timing analysis. (002112)

EECE 450  Optics  3.0 Spring
Prerequisites: PHYS 204A, PHYS 204B, PHYS 204C.
Geometrical and physical optics, interference, diffraction, reflection, dis-
ersion, resolution, polarization, fiber optics, laser optics, and holography.
2.0 hours discussion. 3.0 hours laboratory. This course is also offered as
PHYS 450. (002549)

EECE 451  Lasers and Their Applications  3.0 Fall
Prerequisites: PHYS 204C. Recommended: EECE 450 or PHYS 450.
The theory and mechanism of laser action, various types of lasers and their
applications and future use. Laboratory involves measurements with la-
sers, fiber optics, data transmission, and holography. 2.0 hours discussion,
3.0 hours laboratory. This course is also offered as PHYS 451. (002550)
EECE 453 Communication Systems Design 4.0 Spring
Prerequisites: EECE 365 or MATH 150.
Co-requirements: Civil 302.

EECE 455 Introduction to Network Engineering 4.0 Fall
Prerequisites: Either EECE 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. (002560)

EECE 465 Digital Signal Processing 4.0 Spring
Prerequisites: EECE 365.
Properties of continuous and discrete signals. Z-transform and Fast-Fourier Transform. Digital filtering techniques. Finite word length effects on digital signal processing elements. 2.0 hours activity, 3.0 hours discussion. (002580)

EECE 481 Electromechanical Conversion 4.0 Fall
Prerequisites: EECE 211. Principles of electromagnetic conversion, traditional and renewable energy sources, magnetic circuits and steady state performance of synchronous, dc and induction motors, state space models and dynamic performance of electric motors, linearized models and common control schemes for various motors. (020256)

EECE 482 Control System Design 4.0 Fall
Prerequisites: EECE 211, EECE 365, MATH 260. Recommended: MCA 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. 2.0 hours activity, 3.0 hours lecture. (002577)

EECE 483 Power Systems Operation 4.0 Fall
Prerequisites: EECE 311 (may be taken concurrently).
Power system structure, components and single line diagrams, per unit calculations, transmission line modeling, network matrices and Y-bus, load flow, economic power dispatch, basic relays and system protection schemes. (020499)

EECE 484 Power System Distribution and Analysis 4.0 Spring
Prerequisites: EECE 311 (may be taken concurrently).
Power system symmetrical components, fault analysis, transient stability analysis, sequence impedances of transmission systems, and distribution networks. (020500)

EECE 490A Senior Project Design and Documentation 3.0 Fa/Spr
Prerequisites: ENGL 130 (or its equivalent) with a grade of C- or higher; EECE 335, EECE 343, EECE 344; either EECE 316 or EECE 444 (may be taken concurrently).
Students prepare, plan, design, and document a senior project. The complete design and documentation process must include the project concept with ethical, environmental, and social impact; project requirements; full and complete design; work schedule. Requirements and design address human factors, safety, reliability, maintainability, and customer cost. In addition to communicating and documenting the project, the oral and written reports meet the University's writing proficiency requirement and provide materials for evaluating several ABET outcomes assessment criteria. 1.0 hours lecture, 4.0 hours activity. This is a writing proficiency, WP, course; a grade of C- or better certifies writing proficiency for majors. (002569)

EECE 499 Independent Study 1.0-3.0 Fa/Spr
This course is an independent study of special problems and is 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. (002583)

EECE 499H Honors Project 3.0 Inquire
Prerequisites: ENGL 130 (or its equivalent) with a grade of C- or higher, faculty permission. Completion of all junior-level EECE courses required in the major; 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 E E and CMPE majors who have a GPA among the top 5% of ECE 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 EECE 4999H certifies the designation of “Honors in the Major” to be printed on the transcript and the diploma. 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. This is a writing proficiency, WP, course; a grade of C- or better certifies writing proficiency for majors. (002584)

EECE 615 High-Frequency Design Techniques 4.0 Fall
Prerequisites: EECE 315, PHYS 204C.
Study of the problems associated with passive components at high frequencies, high-frequency measurement techniques, transmission lines, line reflections, matching and terminations, scattering parameters, ground and power planes, and printed circuit board design considerations. (002625)

EECE 617 High-Frequency Analog Design 4.0 Spring
Prerequisites: EECE 417, EECE 615.
Design, analysis and construction of high-frequency amplifiers, oscillators and mixers are covered in this course. (002627)

EECE 631 Processes Improvement 4.0 Spring
Prerequisites: CSCI 430.
Explore the Capability Maturity Model (CMM) developed by the Software Engineering Institute process maturity model; examine the differences between the CMM and ISO 9001; understand the key process areas for the CMM levels 2 and 3; participate in peer reviews and other quality assurance methods. (002623)

EECE 636 Project Implementation and Testing 4.0 Inquire
Prerequisites: CSCI 631.
This course is for students who have completed a graduate course in project requirements analysis and design. The class project involves implementation and testing of a large software system. Topics include advanced implementation and automated testing techniques. (002624)

EECE 639 Topics in Software Engineering 4.0 Fall
Prerequisites: CSCI 430.
Study of advanced topics in software engineering as presented in recent journals. Topics reflect research interest of department faculty. (002588)

EECE 643 Computer-Aided Circuit Engineering 4.0 Spring
Prerequisites: EECE 615.
The use of computer-aided design tools to analyze, design, and test both analog and digital circuits and devices. (002629)

EECE 655 Topics in Computer Networking 4.0 Spring
Prerequisites: EECE 144, EECE 455.

EECE 659 Topics in Communication Systems 4.0 Inquire
Prerequisites: EECE 453.
Advanced study of selected topics in the area of communication systems such as error detection and correction, information encoding and decryption, and real-time performance. Other topics include material in recently published journals and research projects of department faculty. You may take this course more than once for a maximum of 8.0 units. (002583)

EECE 669 Topics in Digital Signal Processing 4.0 Inquire
Prerequisites: EECE 465.
Study of selected topics in the area of digital signal processing such as computer aided filter design, two-dimensional signal processing, DSP chips, and pattern recognition. Other topics include material in recently published journals and research projects of department faculty. You may take this course more than once for a maximum of 8.0 units. (002587)
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 advisor or view it and other current advising information at http://em.csuchico.edu/aap/ProgramSearch.

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 U.S. Diversity or Global Cultures requirement is recommended.
4. Select one course from Breadth Area D1 or D2 or D3. A course that also fulfills the U.S. Diversity or Global Cultures requirement is recommended.
5. Upper-division theme modification has been approved for this major. See the General Education chapter in the University Catalog for specifics on how to apply this modification.

Diversity Course Requirements: 6 units

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

U.S. History, Constitution, and American Ideals 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

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

4. Continue to develop their knowledge and skills after graduation in order to succeed personally and contribute to employer success.
5. Work effectively as a member of a multi-disciplinary development team and undertake leadership roles when appropriate.
6. Communicate their thoughts, in both written and oral forms, so that others can comprehend and build on their work.
7. Appreciate the importance of ethics in the profession and the need to act in society’s best interest.

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:

1. Apply knowledge of mathematics, science, and engineering to identify, formulate, and solve electrical/electronic engineering problems.
2. Use industry standard tools to analyze, design, develop, and test computer-based systems containing both hardware and software components.
3. Achieve success in graduate programs in electrical engineering or a related field.

Highlighted text indicates a change from the original publication.
Enrollment in any mathematics course requires a grade of C- or higher in all prerequisite courses or their transfer equivalents.

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.)
- 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.
- EECE 211 Linear Circuits I 3.0 FS
  Prerequisites: EECE 121, PHYS 204B.
- EECE 211L Linear Circuits I Activity 1.0 FS
  Corequisites: EECE 211.
- CSCI 221 Assembly Language Programming 3.0 FS
  Prerequisites: CSCI 111 or EECE 135 with a grade of C- or higher.
- 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: MATH 120.
- MATH 220 Analytic Geometry and Calculus 4.0 FS
  Prerequisites: MATH 121.
- MATH 260 Elem Differential Equations 4.0 FS
  Prerequisites: MATH 121.
- 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: 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: 57 units

15 courses required:

- CIVL 302 Engineering Econ & Statistics 3.0 FS
  Prerequisites: MATH 121, junior standing.
- CIVL 495 Prof Issues in Eng 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 211, EECE 211L.
- EECE 204A Computer Interface Circuits 4.0 FS
  Corequisites: EECE 311, MATH 260.
- EECE 316 Electronics II 4.0 SP
  Prerequisites: EECE 315.
- EECE 335 Prof Requirements/Design/Test 3.0 FS
  Prerequisites: ENGL 130 or either CSCI 221 or CSCI 222.
- EECE 343 Computer Interface Circuits 4.0 FS
  Prerequisites: EECE 144, EECE 315.
- EECE 344 Digital Systems Design 4.0 FS
  Prerequisites: EECE 144, CSCI 221, either EECE 110 or EECE 211 and EECE 211L.
- EECE 365 Signals, Systems, & Transforms 4.0 FS
  Prerequisites: EECE 311, MATH 260.
- EECE 375 Fields and Waves 3.0 SP
  Prerequisites: EECE 211, EECE 211L, MATH 260.
- EECE 453 Communication Systems Design 4.0 SP
  Prerequisites: EECE 365 or MATH 350.
  Corequisites: CIVL 302.
- EECE 465 Digital Signal Processing 4.0 SP
  Prerequisites: EECE 365.
- EECE 482 Control System Design 4.0 FA
  Prerequisites: EECE 211, EECE 365, MATH 260. Recommended: MEGA 380, MECH 320; either EECE 135 or MECH 308.
- EECE 490A Senior Project Design/Dissertation 3.0 FS WP
  Prerequisites: ENGL 130 (or its equivalent) with a grade of C- or higher; EECE 335, EECE 341, EECE 444; either EECE 116 or EECE 444 may be taken concurrently.
- EECE 490B Senior Project Implementation 2.0 FS
  Prerequisites: EECE 490A; either EECE 316 or EECE 444.
  Note: EECE 453 and EECE 465 may be replaced by EECE 481 and EECE 483 for Power Systems Specialization.
  CIVL 302 and CIVL 495 are approved General Education courses for Electrical/Electronic Engineering majors.

4 units selected from:

Any approved upper-division engineering, science, or math courses not otherwise required for graduation, or EECE 484 for Power Systems Specialization.

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.

All students must attain a 2.0 Grade Point Average (GPA) in all college courses attempted and for all courses attempted at Chico. Electrical/Electronic Engineering majors must also attain a 2.0 GPA in:

(a) All courses required for the major, and
(b) All Electrical and Computer Engineering (ECE) courses taken to meet major requirements at CSU, Chico.

Advising Requirement:

Advising is mandatory for all majors in this degree program. Consult your undergraduate advisor 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 and Computer Engineering

The MS in Electrical and Computer 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 and/or CSU Chico Open University course work 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 and Computer 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 and Computer 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 Studies.
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, CSCI 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:

Highlighted text indicates a change from the original publication.
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 and Computer 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
      - EECE 643 Computer-Aided Circuit Eng, 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 (EECE); 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 access 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 access 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 Coordinator 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
- EECE 631 Processes Improvement, 4.0 SP
- EECE 655 Topics in Comp Networking, 4.0 SP
Prerequisites: CSCI 430.
- EECE 434, 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
- EECE 617 High-Frequency Analog Design, 4.0 SP
- 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.

Grade Requirement in Writing Proficiency:
Writing proficiency is a graduation requirement.
Electrical Engineering students will demonstrate their writing competence through successfully completing either a departmentally administered examination or EECE 333. Consult the Graduate Coordinator for specific information.

Graduate Grading Requirements:
All courses in the major (with the exceptions of Independent Study - 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 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 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 students a high-quality undergraduate engineering education with
1. A curriculum that is firmly grounded in engineering fundamentals
2. A faculty that provides superior teaching and mentoring both in and out of the classroom
3. A faculty whose focus is undergraduate education
4. Class sizes that encourage student participation
5. Project experiences that build on fundamentals and develop team skills
6. Facilities and equipment that are readily accessible
7. An environment that is conducive to learning and encourages students from different genders and backgrounds.
The faculty is committed to offering 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:
1. Be effective engineers and problem solvers.
2. Be well educated in the mechanical engineering sciences.
3. Be able to use engineering tools that will enhance their productivity.
4. 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.
5. Be effective oral, written, and graphical communicators.
6. Be able to function effectively as members of multi-disciplinary teams.
7. 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.
8. 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 final 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 advisor or view it and other current advising information at http://em.csuchico.edu/aap/ProgramSearch.

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. Two courses, one selected from each of the Core Areas A1 and A2.
2. One course selected from Breadth Area B2.
3. One course selected from Breadth Area C1 or C2 or C3.
4. One course selected from Breadth Area D1 or D2 or D3.
5. Upper-division modification has been approved for this major. See the General Education chapter in the University Catalog for specifics on how to apply this modification or go to http://www.csuchico.edu/aap/ProgramSearch.

Diversity Requirement: 6 units
Complete two Diversity courses, one U.S. Diversity and one Global Cultures. (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.

U.S. History, Constitution, and American Ideals 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
Completion of the following courses, or their approved transfer equivalents, are required of all candidates for this degree.

Enrollment in any mathematics course requires a grade of C- or higher in all prerequisite courses or their transfer equivalents.

Lower-Division Requirements: 52 units
17 courses required:

CIVL 211 Statics 3.0 FS
Prerequisites: MATH 121 and PHYS 204A. CIVL 110 (may be taken concurrently) or MATH 100 and MECH 100L (may be taken concurrently).

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 211L Linear Circuits I Activity 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: MATH 120.

MATH 220 Analytic Geometry and Calculus 4.0 FS
Prerequisites: MATH 121.

MATH 260 Elem Differential Equations 4.0 FS
Prerequisites: MATH 121.

MECH 100 Graphics I 1.0 FS
Corequisites: MECH 100L.

MECH 100L Graphics I Laboratory 1.0 FS
Corequisites: MECH 100 (may be taken prior to taking MECH 100L).

MECH 140 Intro to Engineering Design 3.0 FS
Prerequisites: MATH 100 and MECH 100L.

MECH 210 Materials Science/Engineering 3.0 FS
Prerequisites: PHYS 204A; CHEM 111.

MFGT 160 Manufacturing Processes 3.0 FS
Prerequisites: PHYS 204A.

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 with a grade of C- or higher; CIVL 110 or MATH 100 and MECH 100L; MATH 260 and MATH 210 (may be taken concurrently).

CIVL 321 Fluid Mechanics 4.0 FS
Prerequisites: CIVL 211 with a grade of C- or higher. Recommended: MATH 260, MATH 320 (may be taken concurrently).

CIVL 495 Practicum in Eng 3.0 FS
Prerequisites: ENGL 130 or equivalent; senior standing.

MECA 380 Measurements & Instrumentation 3.0 SP
Corequisites: ECE 211, ECE 211L; either ECE 135 or MECH 306. Recommended: CIVL 302.

MECA 482 Control System Design 4.0 FA
Prerequisites: ECE 211, MATH 260. Recommended: MECA 380, MEC 320; either ECE 135 or MECH 306.

MECH 306 Equation Solving Techniques 4.0 FA
Prerequisites: MATH 260. Recommended: PHYS 204A.
MECH 308  Finite Element Analysis  3.0  SP  
Prerequisites: CIVL 311 with a grade of C- or higher, MECH 306. Recommended: PHYS 204C.  
MECH 320  Dynamics  3.0  FS  
Prerequisites: CIVL 211 with a grade of C- or higher, MATH 260.  
MECH 332  Thermodynamics  3.0  FS  
Prerequisites: PHYS 204A. Recommended: PHYS 204C.  
MECH 338  Heat Transfer  4.0  SP  
Prerequisites: CIVL 212, MECH 332. Recommended: MECH 306.  
MECH 340  Mechanical Engineer Design  3.0  SP  
Prerequisites: CIVL 311 with a grade of C- or higher, MECH 100, MECH 100L, MECH 210. Recommended: MECH 160, 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 200, MECH 340, MGT 160. Recommended: CIVL 302, MECA 380, MECH 308, MECH 338.  
MECH 440B  Mech Engr Design Project II  2.0  SP  
Prerequisites: MECH 440A. Recommended: CIVL 302, MECA 380, MECH 308, MECH 338.  

3 units selected from:  
A technical elective with advisor's approval. See http://www.csuchico.edu/mmem

**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**  
The Fundamentals of Engineering 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 mandatory for all majors in this degree program. Consult your undergraduate advisor for specific information.

**Honors in the Major**  
Honors in the Major is a program of independent work in your major. It requires 6 units of honors course work completed over two semesters. 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 academic competition. Such experience is valuable for graduate school and professional life. 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.

Some common features of Honors in the Major program are:

1. You must take 6 units of Honors in the Major course work. All 6 units are honors classes (marked by a suffix of H), and at least 3 of these units are independent study (399H, 499H, 599H) 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 for your major 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% of majors in your year.
4. Your GPA in your major should be at least 3.5 or within the top 5% 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. They then 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 to apply.

**The Faculty**

**Mechanical Engineering**  
Joseph P. Greene, 1998, Professor, PhD, U Michigan.  
Chuen H. Hsu, 1982, Professor, PhD, Iowa State U.  
Gregory A. Kallio, 1988, Professor, PhD, Washington State U.  
Albert O. Richardson, 1989, Professor, PhD, Pennsylvania State U.  
Ronald L. Roth, 1986, Chair, Professor, PhD, Stanford U.  
Jimmy Tan-atitch, 1987, Professor, PhD, Illinois Inst of Tech.  
Ramesh M. Varahamurthi, 1984, Professor, PhD, Washington State U.  
Michael G. Ward, 1988, Dean, Professor, PE, PhD, Stanford U.  

**Emeritus Faculty**

Charles Allen, 1966, Professor Emeritus, PE, PhD, UC Davis.  
Dennis O. Blackett, 1984, Professor Emeritus, PE, PhD, U Arizona.  
Robert G. Colwell, 1966, Professor Emeritus, PE, PhD, Oregon State U.  
William A. Gelenek, 1982, Professor Emeritus, PE, MA, CSU Chico.  
Ralph C. Huntsinger, 1971, Professor Emeritus, PE, PhD, Montana State U.  
Donald S. Smith, 1969, Professor Emeritus, PE, UC Berkeley.  

**Adjunct Faculty**

Nicholas G. Rapanich, 2001, Lecturer A, BS, Cal Poly SLO. PE designates Registered Professional Engineer

**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. Many syllabi are available on the Chico Web.

**MECH 100  Graphics I**
Corequisites: MECH 100L. Introduction to engineering graphics. Orthographic projection, auxiliary views, isometric views, dimensioning, tolerancing, drawing standards, working drawings, free-hand sketching, solid modeling. Special fee required; see the Class Schedule. (015811)

**MECH 100L  Graphics I Laboratory**
1.0 Fa/Spr  
Corequisites: MECH 100 (may be taken prior to taking MECH 100L). Introduction to solid modeling using a parametric, feature-based application software, SolidWorks. Solid modeling of parts and assemblies, detail and assembly drawings. 3.0 hours laboratory. (020257)

**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 devices. Projects requiring design, construction, and testing of devices, including a computer-controlled electromechanical system. 2.0 hours activity, 2.0 hours discussion. Special fee required; see the Class Schedule. (005401)

**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. (005406)

**MECH 200  Graphics II**
2.0 Fa/Spr  
Prerequisites: MECH 100 and MECH 100L. Drawing standards, geometric dimensioning and tolerancing, working drawings, product data management, intermediate solid modeling, introduction to Rapid Prototyping and specialized graphic applications. 1.0 hours lecture, 3.0 hours laboratory. Special fee required; see the Class Schedule. (015834)

**MECH 210  Materials Science and Engineering**
3.0 Fa/Spr  
Prerequisites: PHYS 204A; CHEM 111. Processing, structure, properties, and performance of engineering materials. Applied knowledge of material properties as engineering design parameters. Advanced manufacturing processes, including microfabrication. 1.0 hours discussion, 2.0 hours activity, 3.0 hours laboratory. Special fee required; see the Class Schedule. (005402)

**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. (015855)

**MECH 306  Equation Solving Techniques**
4.0 Fall  
Prerequisites: MATH 260. Recommended: 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. 2.0 hours activity, 3.0 hours discussion. Special fee required; see the Class Schedule. (005413)
MECH 308  Finite Element Analysis  3.0 Spring
Prerequisites: CIVL 311 with a grade of C- or higher, MECH 306. Recommended: 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 activity, 2.0 hours lecture. Special fee required; see the Class Schedule. (005439)

MECH 320  Dynamics  3.0 Fa/Spr
Prerequisites: CIVL 211 with a grade of C- or higher, MATH 260. Kinematics and dynamics of mechanical systems composed of rigid bodies. Moments and products of inertia, forces of interaction, inertia forces and torques. Equations of motion of non-planar systems. (005409)

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. (005414)

MECH 338  Heat Transfer  4.0 Spring
Prerequisites: CIVL 321, MECH 332, Recommended: 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, systems for electronics cooling, heat exchangers, and solar collectors. 2.0 hours activity, 3.0 hours discussion. (005448)

MECH 340  Mechanical Engineering Design  3.0 Spring
Prerequisites: CIVL 311 with a grade of C- or higher, MECH 100, MECH 100L, MECH 1210. Recommended: MECH 120, MFGT 160. 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 activity, 1.0 hours discussion. Special fee required; see the Class Schedule. (005411)

MECH 389  Industrial Internship  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. Credit/no credit grading only. (005454)

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. (005424)

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. (005426)

MECH 410  Advanced Materials Science and Engineering  3.0 Inquire
Prerequisites: MATH 260, MECH 210. Recommended: CIVL 311. Design, manufacture, and practical applications of advanced engineering materials. Failure analysis and prevention of material failure in mechanical design. Microfabrication of micromechanical devices. (005428)

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. (005437)

MECH 432  Energy Systems  4.0 Fall
Prerequisites: MECH 338. 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. (005442)

MECH 434  Compressible Flow  3.0 Inquire
Prerequisites: CIVL 321, MATH 260, MECH 332. Recommended: MECH 106. 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. (005447)

MECH 435  Low Speed Aerodynamics  3.0 Inquire
Prerequisites: CIVL 321, MATH 260. Recommended: MECH 106. Flow around elementary shapes, concepts of flow circulation, lift and drag. Incompressible inviscid flows around thin airfoils and wings of finite span. (005444)

MECH 436  Air Pollution Control  3.0 Inquire
Prerequisites: CIVL 321 (or faculty permission), CHEM 111; either CHEM 331 or MECH 332. Recommended: CIVL 302, MECH 306. 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. (005443)

MECH 439  Building Energy Analysis and Design  3.0 Inquire

MECH 440A  Mechanical Engineering Design Project I  3.0 Fall
Prerequisites: ENGL 130 (or its equivalent) with a grade of C- or higher, MECH 200, ME CH 340, MFGT 160. Recommended: CIVL 302, MECA 380, MECH 308, MECH 338. System design methods applied to mechanical systems. Group design project. 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 lecture, 3.0 hours independent study. This is a writing proficiency, WP, course; a grade of C- or better certifies writing proficiency for majors. (005433)

MECH 440B  Mechanical Engineering Design Project II  2.0 Spring
Prerequisites: MECH 440A. Recommended: CIVL 302, MECA 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. 1.0 hours lecture, 3.0 hours independent study. (005434)

MECH 440H  Mechanical Engineering Design Project I - Honors  3.0 Inquire
Prerequisites: ENGL 130 (or its equivalent) with a grade of C- or higher, MECH 140, MFGT 160, acceptance into the Honors in the Major program. Recommended: CIVL 302, MECA 380, MECH 308, MECH 338. System design methods applied to mechanical systems. 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. (005435)

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. (005456)

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 registering. You may take this course more than once for a maximum of 6.0 units. Credit/no credit grading only. (005457)

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. (005458)
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 at http://em.csuchico.edu/aap/ProgramSearch.

**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. Two courses, one selected from each of the Core Areas A1 and A2.
2. One course selected from B1 or B2.
3. One course selected from B1 or B2.
4. One course selected from B1 or B2.
5. Upper-division theme modification has been approved for this major. See the General Education chapter in the University Catalog for specifics on how to apply this modification or go to http://www.csuchico.edu/mmem.

**Diversity Requirement: 6 units**

Complete two Diversity courses, one U.S. Diversity and one Global Cultures. (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 Mechatronic Engineering degree.

**U.S. History, Constitution, and American Ideals 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**

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

**Enrollment in any mathematics course requires a grade of C- or higher in all prerequisite courses or their transfer equivalents.**

**Lower-Division Requirements: 53 units**

**17 courses required:**

- **CIVL 211 Statics** 3.0 FS
- **CHEM 111 General Chemistry** 4.0 FS*
- **ECE 135 Algorithms & Progs for Engrs** 3.0 FS
- **ECE 144 Logic Design Fundamentals** 4.0 FS

**Highlighted text** indicates a change from the original publication.
Honors in the Major

Honors in the Major is a program of independent work in your major. It requires 6 units of honors course work completed over two semesters. The Honors in the Major program allows you to work closely with a faculty mentor in your area of interest on an original 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 academic competitions. Such experience is valuable for graduate school and professional life. Your honors work will be recognized at your graduation, on your permanent transcripts, and on your diploma. It is often accompanied by a letter of commendation from your mentor in the department or the department chair.

Some common features of Honors in the Major program are:

1. You must take 6 units of Honors in the Major course work. All 6 units are honors classes (marked by a suffix of H), and at least 3 of these units are independent study (399H, 499H, 599H) 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 for your major 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% of majors in your department.
4. Your GPA in your major should be at least 3.5 or within the top 5% 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 to apply.

The Faculty

Mechatronics Engineering

Adel Ghandakly, 2005, Chair, Professor, PhD, U Calgary.
Chuen H. Hsu, 1982, Professor, PhD, Iowa State U.
Gregory A. Kallio, 1988, Professor, PhD, Washington State U.
Ronald L. Roth, 1986, Chair, Professor, PhD, Stanford U.
Jimmy Tan-itchat, 1987, Professor, PhD, Illinois Inst of Tech.
Ramesh M. Varahamurti, 1984, Professor, PhD, Washington State U.
Michael G. Ward, 1988, Dean, Professor, PE, PhD, Stanford U.
Dale Word, 2002, Assoc Professor, MS, CSU Chico.

Adjunct Faculty

Nicholas G. Repanich, 2001, Lecturer A, BS, Cal Poly SLO.
PE designates Registered Professional Engineer

Mechatronics 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. (0035652)

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. (015849)
MECA 380 Measurements and Instrumentation 3.0 Spring
Prerequisites: EECE 211, EECE 211L; either EECE 135 or MECH 306. 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. (005420)

MECA 389 Industrial Internship 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. Written report prepared under the direction of a faculty member is required. May be taken only once for credit. Credit/no credit grading only. (005659)

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. (005653)

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. (005654)

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, MFGT 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 lecture, 3.0 hours independent study. This is a writing proficiency, WP course; a grade of C- or better certifies writing proficiency for majors. (005656)

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. 1.0 hours lecture, 3.0 hours independent study. (005657)

MECA 440H Mechatronic Engineering Design Project 3.0 Inquire - Honors
Prerequisites: ENGL 130 (or its equivalent) with a grade of C- or higher, EECE 344, MECH 340, MFGT 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. (005658)

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. 2.0 hours activity, 3.0 hours lecture. Special fee required; see the Class Schedule. (005407)

MECA 486 Motion and Machine Automation 4.0 Fall
Prerequisites: EECE 211L, MECH 340; 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 lecture, 4.0 hours activity. (005655)

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. (005660)

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. (015851)

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. 9.0 hours supervision. You may take this course more than once for a maximum of 6.0 units. (005661)

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. (015838)

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. (015839)

MECA 699P Master's Project 1.0–6.0 Inquire
Prerequisites: Approval of supervising faculty member. Independent study of a special problem approved by 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. (015840)

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 procedure. You may take this course more than once for a maximum of 6.0 units. (015841)