

ELECTRICAL AND COMPUTER ENGINEERING

Electrical and Computer Engineering Department (<https://www.csuchico.edu/academics/college/engineering/departments/electrical-computer-engineering/>)
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Insight

The Department of Electrical and Computer Engineering offers accredited programs of study leading to a bachelor's degree in electrical/electronic engineering or computer 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 preparing engineering graduates to work collaboratively with other engineers, scientists, and business professionals in developing innovative solutions to complex problems.

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, computer programming, physics, and chemistry should be taken to assist in transitioning 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.

Students are highly encouraged to take other courses related to engineering and technology such as mechanical drafting, computer-aided design, Project Lead the Way courses, and/or participate in FIRST Robotics or other engineering-related clubs and activities, which help expose students to some of the concepts and practices that they will develop during their academic careers at California State University, Chico.

Experience

FE (EIT) Examination. Senior engineering students are encouraged to take the National Council of Examiners for Engineering and Surveying (NCEES) Fundamentals of Engineering (Engineer-In-Training) exam, which is the first of two exams required to become a licensed Professional Engineer (PE).

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.

Active chapters on campus include:

- Institute of Electrical and Electronics Engineers
- Association for Computing Machinery
- National Society of Black Engineers
- Society of Women Engineers
- American Society of Civil Engineers

- Structural Engineers Association of California
- Engineers for Alternative Energy
- Society of Plastics Engineers
- American Institute of Mechatronic Engineers
- Chico Rocketry and Aerospace Club
- Materials Research Society
- American Society of Mechanical Engineers
- Society of Manufacturing Engineers

The national honor societies Tau Beta Pi and Eta Kappa Nu are also available to qualified students.

Chico STEM Connections Engineering. This program is a comprehensive recruitment, retention, and graduation effort that assists underrepresented and disadvantaged students pursuing degrees in engineering and computer science. The program offers tutoring, academic advising, and counseling, and includes a study center.

Outlook

According to the Occupational Outlook Handbook published by the Bureau of Labor Statistics of the U.S. Department of Labor,

- "Overall employment in architecture and engineering occupations is projected to grow faster than the average for all occupations from 2022 to 2032."
- "About 188,000 openings are projected each year, on average, in these occupations due to employment growth and the need to replace workers who leave the occupations permanently."
- The Bureau of Labor Statistics stated that in May 2022 the median annual wage for architecture and engineering occupations was \$83,700, which was higher than the median annual wage for all occupations of \$46,310; for computer hardware engineers the median annual wage was \$132,360; for electrical and electronics engineers it was \$104,610.

The increasing demand for computer and electrical/electronic engineers is fueled, in part, by the explosive growth of cloud computing, the Internet of Things, machine learning, robotics and other autonomous systems, and clean energy systems.

Computer hardware engineers are some of the most recruited graduates on campus. Recent surveys indicate that the demand for engineers with computer hardware and software design experience will continue to increase in both private and government sectors.

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

Accreditation

The Computer Engineering and Electrical/Electronic Engineering programs at Chico State are accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>, under the General Criteria and the Electrical, Computer, Communications, Telecommunication(s) and Similarly Named Program Criteria.

Programs

Undergraduate

Bachelor's

- Computer Engineering BS (<https://catalog.csuchico.edu/colleges-departments/college-engineering-computer-science-construction-management/electrical-computer-engineering/computer-engineering-bs/>)
- Electrical/Electronic Engineering BS (<https://catalog.csuchico.edu/colleges-departments/college-engineering-computer-science-construction-management/electrical-computer-engineering/electrical-electronic-engineering-bs/>)

Minors

- Biomedical Engineering Minor (<https://catalog.csuchico.edu/colleges-departments/college-engineering-computer-science-construction-management/electrical-computer-engineering/biomedical-engineering-minor/>)
- Computer Engineering Minor (<https://catalog.csuchico.edu/colleges-departments/college-engineering-computer-science-construction-management/electrical-computer-engineering/computer-engineering-minor/>)

Graduate

Master's

- Electrical and Computer Engineering MS (<https://catalog.csuchico.edu/colleges-departments/college-engineering-computer-science-construction-management/electrical-computer-engineering/electrical-computer-engineering-ms/>)

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

Electrical/Electronic Engineering

EECE 101 Exploration of Electrical and Computer Engineering 2 Units

Typically Offered: Fall only

Discussions of electrical and computer engineering and their roles in society and your contributions to creating our exciting future. Exploration of the fields of electrical and computer engineering through demonstrations and hands-on projects. Development of skills and resources to launch a successful professional engineering career. 2 hours activity, 1 hour lecture. (022027)

Grade Basis: Graded

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

Course Attributes: Lower Division; Laptop required

EECE 110 Basic Electricity and Instruments 3 Units GE

Typically Offered: Spring only

The course introduces students to electricity and magnetism as applied in audio engineering. Connections between the fundamental concepts and the physical properties of materials to digital and analog electronic circuits that are used to pick up sound; filters to remove noise and other artifacts; to amplify and distort specific frequencies; to digitize and store audio files; and to produce sound will be described. Students develop the ability to identify components from circuit schematics, construct audio circuits, and quantify the characteristics of the circuits. 2 hours activity, 2 hours discussion. (002612)

General Education: Laboratory Activity (B3); Physical Science (B1)

Grade Basis: Graded

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

Course Attributes: Lower Division; Laptop required

EECE 111 Smart Electronics 3 Units GE

Typically Offered: Fall only

Innovations in the age of electronics has shrunk a room-size computer from the 1950s to today's hand-held devices that allow users to communicate with people around the world by text, voice, and/or streaming video. Sensors enable devices to monitor users so electronic systems can respond to voice and hand commands. To understand how these systems work, the course introduces students to concepts in electricity and magnetism. Applications of these concepts in electrical and electronic technology will be discussed including the operation of analog and digital circuits and systems in smart phones, robots, home automation systems, and other electronic systems that are designed to improve the quality of life. The impact of these systems on daily life, the economy, energy demand, and electronic waste, data privacy, and cybersecurity will be evaluated. 2 hours activity, 2 hours discussion. (022273)

General Education: Laboratory Activity (B3); Physical Science (B1)

Grade Basis: Graded

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

Course Attributes: Lower Division; Laptop required

EECE 144 Logic Design Fundamentals 4 Units

Prerequisite: GE Mathematics/Quantitative Reasoning Ready.

Typically Offered: Fall and spring

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 hours activity, 3 hours lecture. (002614)

Grade Basis: Graded

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

Course Attributes: Lower Division

EECE 198 Special Topics 1-3 Units

Typically Offered: Inquire at department

This course is for special topics offered for 1.0-3.0 units. Typically the topic is offered on a one-time-only basis and may vary from term to term and be different for different sections. See the Class Schedule for the specific topic being offered. 3 hours activity. (002094)

Grade Basis: Graded

Repeatability: You may take this course more than once

Course Attributes: Lower Division

<p>EECE 211 Linear Circuits I 3 Units Prerequisite: PHYS 204B (may be taken concurrently). Corequisites: EECE 211L. Typically Offered: Fall and spring This course introduces students to core concepts related to analysis and applications of linear circuits. Topics include electrical quantities and components; Kirchhoff's Laws and circuits analysis methods; Thevenin and Norton theorems; operational amplifiers and applications; first-order transient response of RC and RL circuits; AC steady-state analysis including phasors and impedance; circuit simulation and analysis using SPICE. 3 hours discussion. (002519) Grade Basis: Graded Repeatability: You may take this course for a maximum of 3 units Course Attributes: Lower Division; Laptop required</p>	<p>EECE 237X Embedded Systems Development Problem Solving 1 Unit Corequisites: EECE 237. Typically Offered: Fall and spring Supplemental applications and explanations intended to facilitate student understanding of content from EECE 237. 2 hours activity. (021640) Grade Basis: Credit/No Credit Repeatability: You may take this course for a maximum of 1 unit Course Attributes: Lower Division</p>
<p>EECE 211L Linear Circuits I Activity 1 Unit Corequisites: EECE 211. Typically Offered: Fall and spring Experiments to reinforce the principles taught in EECE 211. 2 hours activity. (002520) Grade Basis: Graded Repeatability: You may take this course for a maximum of 1 unit Course Attributes: Lower Division</p>	<p>EECE 311 Linear Circuits II 4 Units Prerequisite: EECE 211 with a grade C- or higher; MATH 260 (may be taken concurrently); PHYS 204B. Typically Offered: Fall and spring This course introduces students to advanced concepts related to analysis and applications of linear circuits. Topics include circuit analysis techniques for networks with both independent and dependent sources; Fourier Series and circuits response; transfer functions, poles and zeros; frequency response of passive and active circuits, Bode plots; frequency-selective circuits and applications; circuits analysis with Laplace Transforms; introduction to MATLAB. 4 hours discussion. (002527) Grade Basis: Graded Repeatability: You may take this course for a maximum of 4 units Course Attributes: Upper Division</p>
<p>EECE 215 Practical Circuits and Electronics 4 Units Prerequisite: MATH 109, MATH 119 (or high school equivalent), or MATH 120, or passing score on the Math department administered calculus readiness exam. Typically Offered: Fall and spring Applications-based introduction to electricity, magnetism, and electrical and electronic components used in electromechanical and other engineering systems. Course topics include DC and AC circuit analysis; component selection and circuit design; applications of diodes, transistors, and operational amplifiers; logic gates and digital circuits; microcontroller applications and interfacing with external components; and three-phase circuits and ideal transformers. Instruments in basic electrical and electronic circuits are discussed, demonstrated, and employed. This course does not satisfy prerequisite requirements for EECE 311 or EECE 315. Mechanical Engineering majors may substitute EECE 211 and EECE 211L for this course. 2 hours activity, 3 hours discussion. (022099) Grade Basis: Graded Repeatability: You may take this course for a maximum of 4 units Course Attributes: Lower Division; Laptop required</p>	<p>EECE 314 Bioinstrumentation 3 Units Prerequisite: EECE 211 and EECE 211L, or EECE 215, or PHYS 327; PHYS 204A. Typically Offered: Fall only An introduction to recording and analyzing electronic data collected from biological systems. Topics include measurement methods, design principles of biomedical instruments, bioelectronics, sensors, transducers, interface electronics, and embedded data acquisition systems. Explores sources of biomedical signals, bioelectrical signal monitoring, acquisition, processing, analysis, and interpretation of results. 3 hours discussion. (022130) Grade Basis: Graded Repeatability: You may take this course for a maximum of 3 units Course Attributes: Upper Division; Laptop required</p>
<p>EECE 237 Embedded Systems Development 3 Units Prerequisite: CSCI 111. Typically Offered: Fall and spring This course presents the concepts and techniques associated with developing low level Embedded Systems Applications, using both Assembly Language and C. Topics include microprocessor architecture concepts, instruction set architectures, Assembly Language programming, data representations, interrupt handling and execution modes, low level C programming, and the use of on-chip and external peripherals. 2 hours activity, 2 hours lecture. (021437) Grade Basis: Graded Repeatability: You may take this course for a maximum of 3 units Course Attributes: Lower Division; Laptop required</p>	<p>EECE 314L Bioinstrumentation Activity 1 Unit Prerequisite: CSCI 111 or MECH 208; EECE 314 (may be taken concurrently). Typically Offered: Fall only Experiments to reinforce the principles taught in EECE 314. 2 hours activity. (022131) Grade Basis: Graded Repeatability: You may take this course for a maximum of 1 unit Course Attributes: Upper Division; Laptop required</p>
<p>EECE 315 Electronics I 4 Units Prerequisite: EECE 211, EECE 211L; EECE 311 and MATH 260 (may be taken concurrently). Typically Offered: Fall and spring Ideal diodes. 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 hours laboratory, 3 hours lecture. (002530) Grade Basis: Graded Repeatability: You may take this course for a maximum of 4 units Course Attributes: Upper Division</p>	

<p>EECE 316 Electronics II 4 Units Prerequisite: EECE 311, EECE 315. Typically Offered: Inquire at department Op Amp circuits, waveform generation and shaping, sinusoidal oscillators, high frequency amplifiers, active filters, power supply regulators, power electronics, advanced linear ICs. 3 hours discussion, 3 hours laboratory. (002534) Grade Basis: Graded Repeatability: You may take this course for a maximum of 4 units Course Attributes: Upper Division; Laptop required</p>	<p>EECE 344 Digital Systems Design 4 Units Prerequisite: EECE 144, EECE 237; EECE 110 or EECE 215 or EECE 211 and EECE 211L (All with a grade C- or higher). Typically Offered: Fall and spring Extends the study of digital circuits to LSI and VLSI devices. Microcontrollers, architecture, bus organization and address decoding. Design concepts for microcontroller systems, including A/D and D/A conversion, serial communications, bus interfacing, interrupt processing, power regulations, timers, pulse width modulation, programmable I/O ports, and error control coding. 3 hours laboratory, 3 hours lecture. (002102) Grade Basis: Graded Repeatability: You may take this course for a maximum of 4 units Course Attributes: Upper Division; Laptop required</p>
<p>EECE 320 System Architecture and Performance 3 Units Prerequisite: CSCI 217, EECE 144, or MATH 217; CSCI 221 or EECE 237. Typically Offered: Fall and spring 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. 3 hours discussion. (002104) Grade Basis: Graded Repeatability: You may take this course for a maximum of 3 units Course Attributes: Upper Division</p>	<p>EECE 344X Digital Systems Design Problem Solving Session 1 Unit Corequisites: EECE 344. Typically Offered: Fall and spring Supplemental applications and explanations intended to facilitate student understanding of content from EECE 344. 2 hours activity. (021638) Grade Basis: Credit/No Credit Repeatability: You may take this course for a maximum of 1 unit Course Attributes: Upper Division</p>
<p>EECE 335 Project Requirements, Design, and Testing 3 Units Prerequisite: CSCI 211, ENGL 130W. Typically Offered: Fall and spring 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. 3 hours discussion. (002099) Grade Basis: Graded Repeatability: You may take this course for a maximum of 3 units Course Attributes: Upper Division</p>	<p>EECE 345 Introduction to Internet of Things System Design 4 Units Prerequisite: CSCI 111; CINS 220, CSCI 221, or EECE 237 with a C- or higher. Typically Offered: Fall only This course introduces students to Internet of Things (IoT) systems using a project-based learning approach. Students learn programming skills in Python and apply these skills as they design, construct, and test IoT systems. Topics include the development of the field, IoT architecture, tools used in IoT system design, device interfacing, IoT platforms, and challenges in the field. 2 hours activity, 3 hours lecture. (022316) Grade Basis: Graded Repeatability: You may take this course for a maximum of 4 units Course Attributes: Upper Division; Laptop required</p>
<p>EECE 343 Computer Architecture Performance and Implementation 4 Units Prerequisite: EECE 144, EECE 237 (both with a C- or higher). Typically Offered: Fall only Exploration of computer architecture fundamentals through analysis and implementation in a hardware description language. Coverage includes instruction set architecture, macro and micro architecture, the memory hierarchy, and performance techniques. Implementation and testing occurs through the introduction of modern digital design techniques using a hardware description language and commercial tools. 2 hours activity, 3 hours lecture. (002105) Grade Basis: Graded Repeatability: You may take this course for a maximum of 4 units Course Attributes: Upper Division; Laptop required</p>	<p>EECE 365 Signals, Systems, and Transforms 4 Units Prerequisite: EECE 211 (with a grade C- or higher), MATH 260. Typically Offered: Fall and spring 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. 4 hours discussion. (002528) Grade Basis: Graded Repeatability: You may take this course for a maximum of 4 units Course Attributes: Upper Division</p>
<p>EECE 343X Advanced Logic Design Problem Solving Session 1 Unit Corequisites: EECE 343. Typically Offered: Fall and spring Supplemental applications and explanations intended to facilitate student understanding of content from EECE 343. 2 hours activity. (021639) Grade Basis: Credit/No Credit Repeatability: You may take this course for a maximum of 1 unit Course Attributes: Upper Division</p>	<p>EECE 375 Fields and Waves 4 Units Prerequisite: MATH 260, PHYS 204B. Typically Offered: Inquire at department Transmission lines. Frequency-domain techniques. Fields and field operators. Electrostatic fields and capacitance. Magneto-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. 4 hours discussion. (002529) Grade Basis: Graded Repeatability: You may take this course for a maximum of 4 units Course Attributes: Upper Division; Laptop required</p>

<p>EECE 389 Intern in Elect & Comp Engr 1-3 Units Typically Offered: Inquire at department This internship is offered for 1.0-3.0 units. Students must register directly with a supervising faculty member. 9 hours supervision. (002106) Grade Basis: Credit/No Credit Repeatability: You may take this course for a maximum of 15 units Course Attributes: Upper Division</p>	<p>EECE 446 Introduction to Computer Networks and Network Management 3 Units Prerequisite: CSCI 211; CINS 220, CSCI 221, or EECE 237 all with a C or higher. Typically Offered: Fall and spring This course is an introduction to basic networking technologies and network management concepts, including major network operating systems, communication architecture focusing on ISO and Internet models with discussion of current standards and protocols, and applications of probability and statistics in computer networking. Significant laboratory work using current networking equipment reinforces lectures and provides fundamental experience with router and switch management. 3 hours laboratory, 2 hours lecture. (002340) Cross listing(s): CSCI 446 Grade Basis: Graded Repeatability: You may take this course for a maximum of 3 units Course Attributes: Upper Division</p>
<p>EECE 398 Special Topics 1-3 Units Typically Offered: Fall and spring 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 hours supervision. (002541) Grade Basis: Graded Repeatability: You may take this course more than once Course Attributes: Upper Division</p>	<p>EECE 450 Optics 3 Units Prerequisite: PHYS 204A, PHYS 204B, PHYS 204C. Typically Offered: Fall only Geometrical and physical optics, interference, diffraction, reflection, dispersion, resolution, polarization, fiber optics, laser optics, and holography. 2 hours discussion, 3 hours laboratory. (002549) Cross listing(s): PHYS 450 Grade Basis: Graded Repeatability: You may take this course for a maximum of 3 units Course Attributes: Upper Division</p>
<p>EECE 399 Special Problems 1-3 Units Typically Offered: Fall and spring 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. 3 hours supervision. (002542) Grade Basis: Credit/No Credit Repeatability: You may take this course for a maximum of 6 units Course Attributes: Upper Division</p>	<p>EECE 451 Lasers and Their Applications 3 Units Prerequisite: PHYS 204C. Recommended: EECE 450 or PHYS 450. Typically Offered: Spring only The theory and mechanism of laser action, various types of lasers and their applications and future use. Laboratory involves measurements with lasers, fiber optics, data transmission, and holography. 2 hours discussion, 3 hours laboratory. (002550) Cross listing(s): PHYS 451 Grade Basis: Graded Repeatability: You may take this course for a maximum of 3 units Course Attributes: Upper Division</p>
<p>EECE 416 CMOS Digital Integrated Circuits Design 4 Units Prerequisite: EECE 144, EECE 315. Typically Offered: Inquire at department This course provides an introduction to the design of CMOS digital integrated circuits. Topics include CMOS devices and integrated circuit fabrication, static CMOS inverters and gates, pass-transistor and dynamic-logic gates, propagation delay, power, scaling, and sequential circuits. CAD tools for simulation and layout are used for assignments and a course design project. 4 hours lecture. (021718) Grade Basis: Graded Repeatability: You may take this course for a maximum of 4 units Course Attributes: Upper Division; Laptop required</p>	<p>EECE 453 Communication Systems Design 4 Units Prerequisite: EECE 365 or MATH 350. Typically Offered: Inquire at department Introduction to the principles of functional communication systems, design and performance analysis. Analog and digital modulation techniques. Information measures. Application of probability theory to the analysis of communication systems performance. Transmission and encoding of information. Spread spectrum systems. 4 hours discussion. (002548) Grade Basis: Graded Repeatability: You may take this course for a maximum of 4 units Course Attributes: Upper Division</p>
<p>EECE 437 Real-Time Embedded Systems 4 Units Prerequisite: EECE 344. Recommended: EECE 320. Typically Offered: Fall only This course presents the concepts and techniques associated with designing, developing, and testing real-time and embedded systems. Topics include the nature and uses of real-time systems, architecture and design of real-time systems, embedded development and debugging environments, embedded programming techniques, real-time operating systems and real-time scheduling and algorithms. Special attention is given to the study of real-time process scheduling and performance, including mathematical analysis of scheduling algorithms. 4 hours discussion. (002118) Grade Basis: Graded Repeatability: You may take this course for a maximum of 4 units Course Attributes: Upper Division</p>	<p>EECE 465 Digital Signal Processing 4 Units Prerequisite: EECE 365. Typically Offered: Fall only Properties of continuous and discrete signals. Z-transform and Fast-Fourier Transform. Digital filtering techniques. Finite word length effects on digital signal processing elements. 4 hours discussion. (002580) Grade Basis: Graded Repeatability: You may take this course for a maximum of 4 units Course Attributes: Upper Division</p>

- EECE 481 Electromechanical Conversion** **4 Units**
Prerequisite: EECE 211 (with a grade of C- or higher) or EECE 215 (with a grade of C- or higher).
Typically Offered: Spring only
 Principles of electromechanical 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. 4 hours lecture. (020256)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Upper Division; Laptop required
- EECE 482 Control System Design** **4 Units**
Prerequisite: EECE 365.
Typically Offered: Inquire at department
 Modeling and simulation of dynamic system performance. Control system design for continuous systems using both analog and digital control techniques. 4 hours lecture. (002577)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Upper Division; Laptop required
- EECE 483 Solar Energy Devices and Systems** **4 Units**
Prerequisite: GE Physical Science (B1); MATH 120; EECE 215 (with a grade of C- or higher) or EECE 211 and 211L (both with grades of C- or higher).
Typically Offered: Fall only
 This course is an introduction to the fundamentals of solar energy devices and systems and their impacts on society, economy, and the environment. Basic physics of semiconductors in solar devices, operation of solar devices, design and characteristics of common types of solar cells, and approaches to increase solar cell efficiency are discussed. The operation of DC-DC and DC-AC circuits, maximum power point tracking, and energy storage systems are evaluated. Economic regulatory, political, social, and environmental aspects of energy production, distribution, and consumption are explored. 2 hours activity, 3 hours lecture. (020499)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Upper Division; Laptop required
- EECE 484 Power System Distribution and Analysis** **4 Units**
Prerequisite: EECE 311 (may be taken concurrently).
Typically Offered: Spring only
 Power system symmetrical components, fault analysis, transient stability analysis, sequence impedances of transmission systems, and distribution networks. 4 hours lecture. (020500)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Upper Division
- EECE 489 Internship in Comp Engineering** **1-3 Units**
Typically Offered: Inquire at department
 This internship is offered for 1.0 - 3.0 units. Students must register directly with a supervising faculty member. 3 hours lecture. (002124)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 15 units
Course Attributes: Upper Division
- EECE 490AW Engineering Profession and Design (W)** **4 Units W, GW**
Prerequisite: GE Oral Communication (A1) requirement, GE Written Communication (A2) requirement; EECE 343 (may be taken concurrently), EECE 344 for Computer Engineering majors; EECE 315, EECE 344, EECE 365 (all may be taken concurrently) for Electrical/Electronic Engineering majors.
Typically Offered: Fall only
 Exploration of engineering as a profession over an entire career, including technical, sociological, physiological, and psychological aspects. Readings and discussions explore the importance of life-long learning to engineering professionals. Students prepare, plan, design, present, and document a senior project. Design requirements address human factors, safety, reliability, testability, engineering standards, and costs. Students evaluate the impact of statistics and probabilistic events on project design, operation, and/or characterization. 3 hours lecture, 0 hours supervision. (002569)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Upper Division; Laptop required; Writing Course; Graduation Writing Assessment
- EECE 490B Engineering Economics and Project Implementation** **4 Units**
Prerequisite: EECE 490AW (with a grade C- or higher); EECE 343 for Computer Engineering majors; EECE 315, EECE 344 for Electrical/Electronic Engineering majors.
Typically Offered: Spring only
 Continuation of EECE 490AW, where students implement, construct, test, and demonstrate their senior design projects. A survey of economic analysis and technology markets, including market organization and regulation, incumbent and startup actors, engineering costs and return on investment, entrepreneurship, patents, and investment and funding avenues. Contemporary issues provide a framework for discussion and analysis based on professional, ethical, and economic concerns. 2 hours discussion, 0 hours supervision. (002570)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Upper Division; Laptop required
- EECE 498 Advanced Topics** **1-5 Units**
Prerequisite: To be established when courses are formulated.
Typically Offered: Inquire at department
 This course is for special topics offered for 1.0-5.0 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. 1 hour discussion. (002582)
Grade Basis: Graded
Repeatability: You may take this course more than once
Course Attributes: Upper Division
- EECE 499 Special Problems** **1-3 Units**
Typically Offered: Fall and spring
 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. 1 hour supervision. (002583)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Upper Division

- EECE 499HW Honors Project (W)** **3 Units W, GW**
Prerequisite: GE Written Communication (A2) requirement, faculty permission.
Typically Offered: Inquire at department
 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 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. 9 hours supervision. (002584)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Upper Division; Writing Course; Graduation Writing Assessment
- EECE 525 High Performance Computing** **4 Units**
Prerequisite: EECE 343.
Typically Offered: Spring only
 The course covers high performance computer architecture including: branch prediction, out-of-order execution, cache coherence and consistency, many-core processors, vector processing, dynamic scheduling, instruction level parallelism, thread level parallelism, and memory hierarchy design. 4 hours lecture. (002110)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Upper Division; Laptop required
- EECE 537 Smart Device Security** **4 Units**
Prerequisite: CSCI 111 and EECE 237 or equivalent for all majors; EECE 344 or equivalent for computer, electrical/electronic, and mechatronic engineering majors; CSCI 440 or equivalent for CSCI and CINS majors.
Typically Offered: Spring only even years
 This course presents the concepts and techniques associated with designing, developing, and testing secure smart devices, such as smartphones, smartwatches, and implantable medical devices. Smart devices usually have limited computing resources but may send data to cloud computing data centers. Topics in this course include preventing hackers from stealing our password by measuring them physically from our devices, selecting appropriate encryption algorithms for resource-constraint devices, and understanding the limit in protecting your secret data during wireless network transmission. Particular attention focuses on the study of hardware security in smart embedded systems. 4 hours discussion. (022223)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Upper Division; Laptop required
- EECE 544 Embedded Systems Design** **4 Units**
Prerequisite: EECE 144, EECE 211 (both with a grade C- or higher).
Typically Offered: Fall only
 An accelerated discussion of embedded systems design, including C programming, HDI, design, embedded systems, hardware and software debugging, and system design and implementation. Coverage of advanced digital design topics including hardware/software co-design, embedded and soft-core processors, multiprocessor architectures, and concurrent/parallel programming. Not available for students with credit for EECE 344 or equivalent. 2 hours activity, 3 hours lecture. (021523)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Upper Division
- EECE 555 Advanced Computer Networks** **4 Units**
Prerequisite: CSCI 446 or EECE 446.
Typically Offered: Spring only
 Examination of computer network protocol design issues and a selection of advanced computer networking topics, such as multimedia networking, wireless networks, optical networks and network security, using current and proposed standards as examples. 3 hours discussion, 3 hours laboratory. (002560)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Upper Division; Laptop required
- EECE 565 Bioimaging Systems** **4 Units**
Prerequisite: PHYS 202A or PHYS 204A; EECE 314 or EECE 365; and Senior Standing.
Typically Offered: Inquire at department
 Fundamentals of bioimaging, signals and systems, tomography modalities, pattern recognition, and computer vision methods as applied to clinical diagnostics. Optics and photonics techniques, digital signal and imaging data processing, analysis, and characterization. Introduction to research methodologies and research on optical imaging systems and applications. Students presentations and written reports in cutting edge technologies. 4 hours lecture. (022132)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Upper Division; Laptop required
- EECE 566 Applied Digital Image Processing** **4 Units**
Prerequisite: MATH 120; PHYS 202B or PHYS 204B.
Typically Offered: Inquire at department
 This course covers image processing principles, techniques, and algorithms. Topics in image acquisition, representation, analysis, filtering, segmentation, and feature extraction. use of image processing software tools for assignments and projects. 4 hours lecture. (022109)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Upper Division
- EECE 598 Special Topics** **1-4 Units**
Typically Offered: Fall and spring
 This course is for special topics offered for 1.0-4.0 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. 0 hours supervision. (021268)
Grade Basis: Graded
Repeatability: You may take this course more than once
Course Attributes: Upper Division

- EECE 637 Advanced Embedded Systems** **4 Units**
Prerequisite: EECE 437 or ECCE 537, or classified graduate standing.
Typically Offered: Inquire at department
 This course focuses on high performance and multicore systems. Prerequisite knowledge includes extensive C programming experience, exposure to real-time operating systems concepts and development, extensive embedded systems development experience, and knowledge of computing architecture concepts. 4 hours lecture. (021524)
Grade Basis: Graduate Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Graduate Division; Laptop required
- EECE 643 Digital Design** **4 Units**
Prerequisite: EECE 343.
Typically Offered: Spring only
 Design and implementation of large digital systems through computer-aided tools. Study of algorithms and techniques used for architectural design, synthesis, optimization, placement, routing, timing analysis, and verification in programmable logic and VLSI implementations. 4 hours discussion. (002629)
Grade Basis: Graduate Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Graduate Division
- EECE 644 Advanced Cryptographic Protocols for Secure Distributed Computing** **4 Units**
Prerequisite: EECE 344.
Typically Offered: Inquire at department
 This course covers topics on information-theoretic secure multiparty computation (ITS-MPC), homomorphic encryption (HE), functional encryption (FE), blockchain, and their applications to distributed computing. All these protocols allow the outsourcing of sensitive data to trusted third-party computing platforms. The discussion includes their computing model, parameters chosen, and engineering application deployment. 4 hours discussion. (022550)
Grade Basis: Graduate Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Graduate Division; Laptop required
- EECE 653 Software Defined Radio** **4 Units**
Prerequisite: EECE 311 and EECE 315; or classified graduate standing.
Typically Offered: Inquire at department
 This course provides the advanced concepts related to digital and wireless communication. Introductions to the constraints in the practical communication systems. Understanding the concept of SDR (Software Defined Radio). Implementation of the signal generation, capture, automatic gain control, and coherent, modulation, carrier synchronization, and demodulation. Design and implementations of the transmitter and receiver for SDR. 4 hours discussion. (021573)
Grade Basis: Graduate Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Graduate Division; Laptop required
- EECE 655 Topics in Computer Networking** **4 Units**
Prerequisite: CSCI 446 or EECE 446; EECE 555 recommended.
Typically Offered: Inquire at department
 Further study of selected topics from current networking research as presented in recently published journals. 4 hours seminar. (002626)
Grade Basis: Graduate Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Graduate Division; Laptop required
- EECE 664 Machine Learning for Engineers** **4 Units**
Prerequisite: Graduate standing.
Typically Offered: Fall only
 This course presents a hands-on approach of exploring machine learning (ML) techniques and state-of-the-art tools for engineering problems. Students gain the ability to identify types of data, formatting and cleaning data for an ML model. Students build, train, and test machine learning models using cutting-edge machine learning frameworks and modern artificial intelligence (AI) development environments along with ML deployment on hardware. 4 hours lecture. (022551)
Grade Basis: Graduate Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Graduate Division; Laptop required
- EECE 665 Deep Learning Processing** **4 Units**
Prerequisite: EECE 465.
Typically Offered: Inquire at department
 This course enables students to enter the field of artificial intelligence (AI) in general and deep learning in particular for practical engineering applications. Students develop deep convolutional neural networks for pattern and image recognition and experience training and testing of various deep learning models using state-of-the-art tools and modern methods. 4 hours lecture. (022579)
Grade Basis: Graduate Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Graduate Division; Laptop required
- EECE 682 Digital Control System Design Using Artificial Intelligence** **4 Units**
Prerequisite: Classified graduate standing.
Typically Offered: Inquire at department
 This course presents fundamental techniques for designing digital control systems using a hands-on approach and cutting edge artificial intelligence (AI) tools for real-world applications. Knowledge of classical control is assumed. Familiarity with linear algebra is assumed. 4 hours lecture. (020259)
Grade Basis: Graduate Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Graduate Division; Laptop required
- EECE 685 Adaptive Control Systems by Artificial Intelligence** **4 Units**
Prerequisite: EECE 482.
Typically Offered: Inquire at department
 This course offers the foundation of adaptive control and discusses its interconnections with machine learning. Topics include parameter estimation, recursive algorithms, stability properties, and conditions for convergence and their relationship with machine learning, including the minimization of a performance error and fast convergence. 4 hours lecture. (020722)
Grade Basis: Graduate Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Graduate Division

EECE 693 Research Methods in Electrical and Computer Engineering 3 Units

Prerequisite: Candidate status.

Typically Offered: Fall and spring

This course is designed to provide graduate students in the field of electrical and computer engineering with a comprehensive understanding of research methods, simulation and/or experimentation, technical writing, and communication skills. Through immersive learning experiences, students gain practical knowledge in conducting research, interpreting results, technical writing, and oral presentation of scientific ideas. The course culminates in a comprehensive research project with a final defense. 9 hours supervision. (022594)

Grade Basis: Report in Progress: ABC/NC

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

Course Attributes: Graduate Division

EECE 697 Independent Study 1-6 Units

Typically Offered: Fall and spring

This course is a graduate-level independent study offered for 1.0-6.0 units. You must register directly with a supervising faculty member. Independent study and investigation of special problems in the student's area of concentration. Both registration and study plan must have approval of the instructor and the student's graduate advisory committee chair. 9 hours supervision. (002592)

Grade Basis: Report in Progress: Graded

Repeatability: You may take this course for a maximum of 6 units

Course Attributes: Graduate Division

EECE 698 Seminar in Advanced Topics 1-4 Units

Typically Offered: Fall and spring

This course is offered for 1.0-3.0 units. Typical subjects that will be taught include embedded systems design, high-speed networking, program management, and fault-tolerant system design. Consult the Class Schedule for listings. 3 hours lecture. (002630)

Grade Basis: Graduate Graded

Repeatability: You may take this course for a maximum of 12 units

Course Attributes: Graduate Division

EECE 699P Master's Project 1-6 Units

Typically Offered: Fall and spring

This course is offered for 1.0-6.0 units. Independent study and investigation of special problems in student's area of concentration. Both registration and study plan must have approval of the instructor and the student's graduate advisory committee chair. 9 hours supervision. (002139)

Grade Basis: Report in Progress: CR/NC

Repeatability: You may take this course for a maximum of 6 units

Course Attributes: Graduate Division

EECE 699T Master's Thesis 1-6 Units

Prerequisite: Classified graduate standing and completion of graduate literacy requirement, faculty permission.

Typically Offered: Fall and spring

This course is offered for 1.0-6.0 units. You must register directly with a supervising faculty member. Independent study and investigation of special problems in the student's area of concentration. Both registration and study plan must have approval of the instructor and the student's graduate advisory committee chair. Master's Thesis courses earn a Credit grade upon completion. 3 hours supervision. (002137)

Grade Basis: Report in Progress: CR/NC

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

Course Attributes: Graduate Division

Electrical and Computer Engineering Department

The Faculty

Zahrasadat Alavi 2017
Associate Professor
Doctor of Philosophy Univ Of Wisconsin-Milwaukee

Meghdad Hajimorad 2015
Associate Professor
Doctor of Science Univ Of Cal-Berkeley

Mohammadreza Khani 2022
Assistant Professor
Doctor of Philosophy Western Michigan Univ

Kurtis B Kred 2010
Chair
Doctor of Philosophy Univ Of Cal-Davis

Ghang-Ho Lee 2011
Professor
Doctor of Philosophy Purdue Univ Main Campus

Kathleen Meehan 2017
Professor
Doctor of Engineering Univ Of Illinois Urbana Campus

Hadil S Mustafa 2014
Associate Professor
Doctor of Engineering; Doctor of Philosophy Univ Of Cal-Irvine; Univ Of Cal-Irvine

Hassan Shahidi Salehi 2018
Associate Professor
Doctor of Philosophy Univ Of Connecticut

David Silveira 2015
Lecturer
Bachelor of Science CSU-Chico

Zhaohong Wang 2016
Associate Professor
Doctor of Science Univ Of Kentucky

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Glenn S Duncan 1956
Emeritus

Adel A Ghandakly
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Philip H Hoff 1970
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Larry L Wear 1972

Emeritus

Doctor of Philosophy Santa Clara Univ