ELECTRICAL & COMPUTER ENGINEERING (ECE)

ECE 1618 Introduction to Engineering I (2)
This course will provide an introduction to the practice of engineering and the various areas within the engineering disciplines. Students will be informed of engineering curricula and career opportunities within the various engineering disciplines. This course will also introduce students to important topics for academic success, both at the major level and at the university level. Each week meets for 50 minutes of lecture and 100 minutes of activity. There is a $15 course material fee.

General Education Attribute(s): First Year Seminar
Course Fee: Yes

ECE 1628 Introduction to Engineering II (2)
This course builds on the foundational skills in engineering design and practices developed in ENGR/ECE 1618. Students will design, build, test, and present engineering projects designed to solve specified problems within given constraints. Additionally, the impact of engineering from a global, social, economic, and environmental perspective is presented through case studies. Each week meets for 50 minutes of lecture and 100 minutes of activity. There is a $15 course material fee. Prerequisite: ECE/ENGR 1618. Completion of ECE/ENGR 1618 and ECE/ENGR 1628 satisfies general education requirement First Year Seminar.

Requisite(s): Prereqs: ENGR/ECE 1618
General Education Attribute(s): First Year Seminar
Course Fee: Yes

ECE 2070 Electric Circuits (4)
An introduction to the analysis of electrical circuits. Use of analytical techniques based on the application of circuit laws and network theorems. Analysis of DC and AC circuits containing resistors, capacitors, inductors, dependent sources and/or switches. Natural and forced responses of first and second order RLC circuits; the use of phasors; AC power calculations; power transfer; and energy concepts. 150 minutes lecture and 150 minutes laboratory. Prerequisites: PHYS 2220 with a grade of C- or better, or the equivalent, or permission of the instructor. Cross-listed as ECE 2070 or ENGR 2070 or PHYS 2070.

Requisite(s): PHYS 2220 or 222 with a C- or better
Course Fee: Yes

ECE 2770 Special Topics in Engineering (1-4)
This course will be used to supplement regularly scheduled courses with additional material at the beginning level. May be repeated for credit with different topics up to a maximum of 4 units.

Repeatable for Credit: Yes, up to 4 units

ECE 2771 Special Topics Laboratory (1)
Optional laboratory for the study of topics at the beginning level. Co-requisite: ECE 2770

Requisite(s): Coreq: ECE 2770

ECE 3040 Signals and Systems (4)
Design, construction, and debugging of analog electronic circuits. Diodes, filters, oscillators, transistors, JFETs, op-amps, and basic analog circuit design. Broadband applications in networking and communications. Each week lecture meets for 150 minutes and lab meets for 150 minutes. Prerequisites: MATH 2320 or MATH 2520 with a grade of C- or better, MATH 2610, and ENGR 2070 or ECE 2070 or PHYS 2070 with a grade of C- or better. There is a $10 course material fee.

Requisite(s): Prereqs: C- or higher in all courses: ENGR/ECE/PHYS 2070 or ENGR/PHYS 207; MATH 2320 or 2520 or 203 or 233.
ECE 3280  Instrumentation, Control, and Data Acquisition (4)
Introduction to LabVIEW and NI Elvis board. Students learn how to use
NI virtual instruments, such as function generators, oscilloscopes, etc.,
design a variety of projects on analog and digital inputs, outputs, and
signal generations, and use both simulation and hardware test-beds to
verify their projects and performance. Each week lecture meets for 150
minutes and lab meets for 150 minutes. Prerequisites: ECE 3200. There is
a $10 course material fee.
Requisite(s): Prereqs: ECE 3200.
Course Fee: Yes
ECE 3320  Fields and Waves (4)
This course focuses on the fundamentals of electromagnetics. Students
are expected to acquire expertise in vector analysis, electrostatic and
magnetic fields, Maxwell's equations, plane waves, reflection, attenuation,
and impedance. Knowledge of circuit theory, Matlab, differential
equations, and calculus are required to successfully complete the course.
Each week lecture meets for 150 minutes and lab meets for 150 minutes.
Prerequisites: MATH 2320 or MATH 2520 with a C- or better; ENGR 2070
or ECE 2070 or PHYS 2070 with a C- or better.
Requisite(s): Prereqs: C- or higher in all courses: ENGR/ECE/PHYS 2070
or ENGR/PHYS 207; MATH 2320 or 2520 or 203 or 233.
ECE 3340  Control Systems (4)
Introduce control system analysis and design. Cover control system
modeling, time response, reduction of multiple systems, stability analysis,
steady-state errors, root locus technique, PID controller, and fuzzy
controller. Each week lecture meets for 150 minutes and lab meets for
150 minutes. Prerequisite: ECE 3040 with a grade of C- or better.
Requisite(s): Prereqs: C- or higher in ECE 3040.
ECE 3370  Power Systems Fundamentals (4)
This course is an introductory subject in the field of electric power
systems. Electric power systems have become increasingly important
as a way of transmitting and transforming energy in industrial, military
and transportation uses. The course covers basic elements of power
system, three-phase circuit analysis, transformers, transmission line
configuration, the per unit system and power flow. Each week lecture
meets for 150 minutes and lab meets for 150 minutes. Prerequisites: ECE 2070 or ENGR 2070 or PHYS 2070 with a grade of C- or better.
Requisite(s): Prerequisites: C- or higher in ECE/ENGR/PHYS 2070 or
ENGR/PHYS 207.
ECE 3770  Special Topics in Engineering (1-4)
This course will be used to supplement regularly scheduled courses with
additional material at the intermediate level. Course is repeatable, but
only a combined total of 4 units of ECE 377x, 477x, and 48xx may be used for
elective credit towards the major requirements.
Repeatable for Credit: Yes, up to 4 units
ECE 3771  Special Topics Laboratory (1)
Optional laboratory for the study of topics at the intermediate level.
Course is repeatable, but only a combined total of 4 units of ECE 377x,
477x, and 48xx may be used for elective credit towards the major
requirements. Corequisite: ECE 3770.
Requisite(s): Coreq: ECE 3770
ECE 4220  Digital Signal Processing (4)
This course provides an introduction to principles of Digital Signal
Processing (DSP) including sampling theory, aliasing effects, frequency
response, Finite Impulse Response filters, Infinite Impulse Response
filters, spectrum analysis, Z transforms, Discrete Fourier Transform
and Fast Fourier Transform. Overviews of modern DSP applications
such as modems, speech processing, audio and video compression
and expansion, and cellular protocols. Each week lecture meets for 150
minutes and lab meets for 150 minutes. Prerequisites: ECE 3040 with a C-
or better. There is a $10 course material fee.
Requisite(s): Prerequisites: ECE 3040 with a grade of C- or better.
Course Fee: Yes
ECE 4240  Microprocessor System Design (4)
Introduce microprocessor architecture and organization. Cover
bus architectures, types and buffering techniques, Memory and
I/O subsystems, organization, timing and interfacing, Peripheral
controllers and programming. Design a microprocessor system. Each
week lecture meets for 150 minutes and lab meets for 150 minutes.
Prerequisite: ENGR 2070 or ECE 2070 or PHYS 2070 with a C- or better;
ECE 3200. There is a $10 course material fee.
Requisite(s): Prerequisite: C- or higher on ENGR/ECE/PHYS 2070 or ENGR
207; ECE 3200 or 320.
Course Fee: Yes
ECE 4250  Wireless Communications (4)
In this course analytical characterizations of mobile communications
channels are developed. The main techniques for mitigating the mobile
communication channel effects such as Equalization, Diversity, etc. are
examined. Multiple access techniques used in wireless communications,
such as FDMA as well as digital TDMA and CDMA techniques are
presented. Each week lecture meets for 150 minutes and lab meets for
150 minutes. Prerequisites: ECE 3040 with a grade of C- or better.
Requisite(s): Prerequisites: ECE 3040 with a grade of C- or better.
ECE 4260  Wireless Network (4)
This course focuses on wireless data communications including wireless
internet. The students acquire knowledge into the current and future
state-of-the-art of technology in the field of wireless communications.
Another goal of the course is to ensure student(s) can explain the impact
of commercial, political, and regulatory factors on the design of wireless
systems. The course will treat current relevant technologies, and the
exact content may change from year to year. Each week lecture meets for
150 minutes and lab meets for 150 minutes. Prerequisite: MATH 2320 or
MATH 2520 with a grade of C- or better.
Requisite(s): Prerequisites: C- or higher on MATH 2320 or 2520 or 203 or 233
ECE 4370  Power Systems Analysis (4)
This course follows the discussions from the first course in power
systems. This course focuses on power flow, symmetrical components,
faulted system analysis, and protection schemes. Each week lecture
meets for 150 minutes and lab meets for 150 minutes. Prerequisite:
ECE 3370. There is a $10 course material fee.
Requisite(s): Prerequisite: ECE 3370 or 337.
Course Fee: Yes
ECE 4380  Power System Operation with Renewable Energy Resources (3)
Renewable energy, distributed generation, impacts of renewable energy
based generation on power system operation, electrical energy markets,
deregulated power system, hybrid power generation. Each week meets for
150 minutes of lecture. Prerequisite: ECE 3370
Requisite(s): Prerequisite: ECE 3370 or ECE 337.
ECE 4381  Power System Operation with Renewable Energy Resources
Laboratory (1)
Laboratory in power system operations with renewable energy based
generation. Completion of the laboratory component is required for
Electrical Engineering majors to get elective credit for this course. Each
week meets for 150 minutes of laboratory. Prerequisite or corequisite:
ECE 4380.
Requisite(s): Prerequisite or corequisite: ECE 4380

ECE 4460  Image Processing (4)
This course covers the following: digital image acquisition, image
enhancement and restoration, image compression, spatial and frequency-
based image filtering, color processing, low level image segmentation
and feature extraction. Each week lecture meets for 150 minutes and
lab meets for 150 minutes. Prerequisite: ECE 3040 with a grade of C- or
better. There is a $10 course material fee.
Requisite(s): Prereq: C- or higher in ECE 3040.

Course Fee: Yes

ECE 4470  Computer Vision (4)
This course covers the following: Image formation, early vision, image
morphology, image segmentation, object/feature representation and an
introduction to supervised and unsupervised learning with an emphasis
on image understanding. Each week lecture meets for 150 minutes and
lab meets for 150 minutes. Prerequisite: MATH 2320 or MATH 2520
with a grade of C- or better; CMPS 3120 with a grade of C- or better
and CMPS 3040 with a grade of C- or better. There is a $10 course material fee.
Requisite(s): Prerequisite: MATH 2320 or MATH 2520 or 203 or 233 with
C- or better and CMPS 3120 or 312 with C- or better or ECE 3040 or 304
with C- or better.

Course Fee: Yes

ECE 4550  Applied Machine Learning (4)
Students will learn the basics of machine learning including: supervised
vs. unsupervised learning, regression, dimensionality reduction and
reinforcement learning. Focus will be given to experimental setup
including normalization, evaluation criteria and outlier detection.
Experiments will be carried out with contemporary and classical methods
on real world data sets in a wide range of applications. Each week lecture
meets for 150 minutes and lab meets for 150 minutes. Prerequisite: MATH 3200. Cross-listed as CMPS 4550 or ECE 4550.
Requisite(s): Prerequisite: MATH 3200.

ECE 4570  Robotics (4)
Introduce robotic systems. Cover Mindstorms NXT, motion control, target
steering and trajectory planning, obstacle avoidance, line tracking, and
multiple sensor fusion. Each week lecture meets for 150 minutes and lab
meets for 150 minutes. Prerequisites: CMPS 2010 and ECE 3040 with a
grade of C- or better. There is a $10 course material fee.
Requisite(s): Prerequisites: CMPS 2010 and ECE 3040 with a grade of C-
or better.

Course Fee: Yes

ECE 4770  Special Topics in Engineering (1-4)
This course will often be used to supplement other courses with
additional work at a more advanced level. Course is repeatable, but only
a combined total of 4 units of ECE 377x, 477x, and 48xx may be used for
elective credit towards the major requirements. Prerequisite: Permission
of the instructor. May be repeated for credit up to a maximum of 4 units.
Repeatable for Credit: Yes, up to 4 units

Course Fee: Yes
ECE 4910  Senior Project I (2)
After consultation with the faculty supervisor and investigation of relevant literature, the student(s) shall prepare a substantial project with significance in the designated area. The timeline, teamwork responsibilities, milestones, and presentation(s) will be scheduled. Prerequisite: At least 12 units of 3000- or 4000-level ECE and CMPS courses. There is a $10 course material fee.
Requisite(s): Prereqs: at least 12 semester units of upper division ECE or CMPS courses
Course Fee: Yes

ECE 4928  Senior Project II (2)
This is the completion phase of the project. Students will present a project report to the entire class, explaining the nature of the work, the finished product, and its relationship to the field. Students will demonstrate proficiency in critical thinking, information literacy, written communication, and quantitative reasoning in their written project report. Additionally, students will demonstrate an understanding of their academic pursuits by reflecting on their studies of the arts, humanities, natural sciences, behavioral sciences, and social sciences. Prerequisite: at least 90 units, completion of JYDR; and ECE 4910. For engineering majors only. Satisfies general education requirement Senior Capstone. There is a $25 materials fee.
Requisite(s): Prerequisite: At least 90 units, completion of JYDR; and ECE 4910.
General Education Attribute(s): Capstone
Course Fee: Yes

ECE 4960  Leadership in Engineering (1-2)
Leadership in computer and electrical engineering related activities that meet campus and/or community needs. Offered on a credit, no-credit basis only. Course credits cannot be used as elective credit towards the major requirements but can be used as additional university units. Prerequisite: Permission of the instructor. May be repeated up to a maximum of 2 units.
Repeatable for Credit: Yes, up to 2 units

ECE 4970  Service Learning in Engineering (1-2)
Service learning in computer and electrical engineering related activities that meet campus and/or community needs. Students will design and/or implement a service learning project in consultation with their faculty supervisor and, if applicable, community partners. Offered on a credit, no-credit basis only. Course credits cannot be used as elective credit towards the major requirements but can be used as additional university units. Prerequisite: Permission of the instructor. May be repeated up to a maximum of 2 units.
Repeatable for Credit: Yes, up to 2 units

ECE 4980  Teaching in Engineering (1-2)
Experience supporting teaching activities in department courses, providing tutoring in the department tutoring center, leading problem-solving sessions, and/or supporting other instructional activities in the department. Offered on a credit, no-credit basis only. Course credits cannot be used as elective credit towards the major requirements but can be used as additional university units. Prerequisite: Permission of the instructor. May be repeated up to a maximum of 2 units.
Repeatable for Credit: Yes, up to 2 units