ELECTRICAL ENGINEERING

Description

Website: http://engineering.unl.edu/ece/

The Electrical and Computer Engineering Department offers a complete electrical engineering undergraduate program to students on the City (Lincoln) and Scott (Omaha) campuses of the University of Nebraska. Curriculum requirements are nearly identical on both campuses and students can complete all degree requirements on either campus.

Electrical engineering is concerned with the production, transmission, and utilization of electrical energy and the creation, transmission and processing of information. This includes power generation and transmission systems, renewable energy, electric transportation, automated vehicle systems, control systems, and power electronics, as well as radio frequency (RF) systems, telecommunications, remote sensing, bioinformatics, computer vision, biomedical engineering, signal processing, analog and digital circuits, instrumentation, audio, video and opto-electronics. Employment opportunities for electrical engineers cover a wide spectrum of activities including design, development, research, sales, and management. These activities are carried on in industrial organizations, public and private utilities, the communications and computer industry, governmental and educational institutions, and consulting engineering firms. The objective of this major is to offer students an education to become productive electrical engineers and be active, contributing citizens of the nation and the world.

This department has over 40 faculty involved in research related to electronic materials, nanotechnology, optical systems, communications, biomedical applications, signal processing, integrated circuit design, energy systems, and electromagnetics. Students are encouraged to participate in research activities, and have opportunities to travel and present their research results.

The department has extensive research facilities for all areas including state of the art computing facilities, integrated circuits and systems research facilities, communications and signal processing laboratories, applied electromagnetics research, solid state laboratories, nanostructures research, electro-optics research and energy systems laboratories.

The curriculum is designed to provide a broad education in fundamental principles and laboratory applications and an awareness of the socioeconomic impact of technology. Technical electives are normally selected from advanced courses in electrical engineering to provide for specialization in selected areas. However, technical electives can also be selected from courses offered by other departments of the College of Engineering or from appropriate physics, chemistry, mathematics, and biological sciences courses.

Accreditation

The Electrical Engineering (BS) program is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, under the commission's General Criteria and Program Criteria for Electrical, Computer, Communications, Telecommunication(s) and Similarly Named Engineering Programs.

Program Educational Objectives

The Program Educational Objectives (PEOs) for the electrical engineering program are a statement of what its graduates are doing three to five years after graduation. Electrical engineering is concerned with the production, transmission, and utilization of electrical energy and the transmission and processing of information. Employment opportunities for electrical engineers cover a wide spectrum of activities including design, development, research, sales, and management. These activities are carried on in industrial organizations, public and private utilities, the communications and computer industry, governmental and educational institutions, and consulting engineering firms. Careers may encompass electronic materials, nanotechnology, optical systems, communications, biomedical applications, signal processing, integrated circuit design, energy systems, and electromagnetics. The objective of this program is to offer students an education to become productive electrical engineers and be active, contributing citizens of the nation and the world.

The Program Educational Objectives for the Electrical Engineering program are that graduates will be:

- Employed in business, academia or government.
- Successful engineers who have established productive careers in their field and have contributed to improve and provide innovative and effective solutions in electrical engineering or related fields.
- Demonstrating technical and decision-making processes and the human interactions necessary to provide viable, responsible, and sustainable technological solutions.
- Engaging in lifelong learning, which may include postgraduate education, to successfully adapt to technological, industry specific, and cultural changes and to foster adept functioning in society.
- Performing engineering practice in a context that reflects awareness of the ethics of their profession and of the impacts of their work on the profession and society at large.

These Program Educational Objectives were developed with input from the program's educational objectives constituency, consisting of employers (including the Industry Advisory Board), graduates of the program, and faculty of the department.

Major Department Admission

Admittance to the Degree Program

Students are required to achieve admission into the electrical engineering major. Students are eligible to be reviewed for professional admission after completion of 43 credit hours applicable to their electrical engineering degree and completion of both ECEN 215 Electronics and Circuits I and ECEN 216 Electronics and Circuits II. Transfer students must have completed 12 credit hours of degree applicable upper-level electrical engineering coursework at UNL prior to being reviewed.

After meeting the requirements for review, the appointed faculty committee will review students to see if they are meeting the following criteria:

- Completion of both ECEN 215 and ECEN 216 with a C or better
- Cumulative GPA of 2.40 or higher
- No more than seven retakes and withdrawals, excluding ACE elective coursework

Those who are not admitted to the degree program the first time are advised of the outcome and will be reviewed again after they have retaken the appropriate coursework and/or after the next semester. If after two reviews a student is not admitted to the degree program, the student is advised of other majors, in engineering or elsewhere, in which they may be likely to find success.

Other

EE Resource Room/Tutoring

The Department of Electrical and Computer Engineering has a resource room staffed by upper class undergraduates and graduate students. Students can get help with their homework, get answers to technical questions, etc. The room is open approximately 20 hours per week. Open hours for each semester are posted outside the room.

A list of tutors is available from the Department of Electrical and Computer Engineering. At the beginning of each semester students are invited to offer their services through these lists.

College Requirements

College Admission

College Entrance Requirements

Students must meet both the University and College of Engineering entrance requirements. The following includes both the University and College of Engineering entrance requirements.

Students must have high school credit for (one unit is equal to one high school year):

1. Mathematics – 4 units: 2 of algebra, 1 of geometry, and 1 of precalculus and trigonometry
2. English – 4 units
3. Natural sciences – 3 units that must include 1 unit of physics and 1 unit of chemistry (chemistry requirement waived for students in construction management or computer science)
4. Foreign language – 2 units of a single foreign language
5. Social studies – 3 units
6. Students having a composite ACT score of 28 or greater (or equivalent SAT score) will be admitted to the College of Engineering even if they lack any one of the following: trigonometry, chemistry, or physics. Students without test scores who are missing a full unit of trigonometry/pre-calculus/calculus or chemistry or physics will be evaluated through College Review.
7. Students having an ACT score of 19 or less in English (or equivalent SAT score) or a grade lower than B in high school English, must take ENGL 150 Writing and Inquiry or ENGL 151 Writing for Change.

A total of 16 units is required for admission.

Engineering requires that student performance meet one of the following standards: composite ACT of 24, SAT of 1180, ACT Math subscore of 24, SAT Math subscore of 580, or a 3.5 cumulative GPA.

Any domestic first-year student who does not gain admission to Engineering but does gain admission to the University of Nebraska-Lincoln (UNL) will be reviewed through College Review. College Review is conducted through the College Review Committee which considers factors beyond standardized testing. Any first-year student who is not admitted through college review is placed in Pre-Engineering (PENG) with the Exploratory and Pre-Professional Advising Center (Explore Center). Students in the Explore Center can transfer to the College of Engineering once college admission requirements are met.

Students for whom English is not their language of nurture must meet the minimum English proficiency requirements of the University.

Students who lack entrance units may complete precollege training by Independent Study through the University of Nebraska–Lincoln Office of On-line and Distance Education, in summer courses, or as a part of their first or second semester course loads while in the Explore Center or other colleges at UNL.

Students should consult their advisor, their department chair, or Engineering Student Services (ESS) if they have questions on current policies.

Other Admission Requirements

Students who transfer to the University of Nebraska–Lincoln from other accredited colleges or universities and wish to be admitted to the College of Engineering (COE) must meet COE first-year student entrance requirements, have a minimum cumulative GPA of 2.5, and be calculus-ready. Students not meeting either of these requirements must enroll in the Explore Center or another University college until they meet COE admission requirements. Students transferring from UNO, UNL, or UNK to the College of Engineering must be in good academic standing with their institution.

The COE accepts courses for transfer for which a C or better grade was received. Although the University of Nebraska–Lincoln accepts D grades from the University of Nebraska Kearney and the University of Nebraska Omaha, not all majors in the COE accept such low grades. Students must conform to the requirements of their intended major and, in any case, are strongly encouraged to repeat courses with a grade of C- or less.

Students who were previously admitted to COE and are returning to the College of Engineering must demonstrate a cumulative GPA of 2.5 to be readmitted to COE.

College Degree Requirements

Grade Rules

Grade Appeals

In the event of a dispute involving any college policies or grades, the student should appeal to their instructor, and appropriate department chair or school director (in that order). If a satisfactory solution is not achieved, the student may appeal their case through the College Academic Appeals Subcommittee.

Catalog Rule

Students must fulfill the requirements stated in the catalog for the academic year in which they are first admitted at the University of Nebraska–Lincoln. In consultation with advisors, a student may choose to follow a subsequent catalog for any academic year in which they are admitted to and enrolled as a degree-seeking student at Nebraska in the College of Engineering. Students must complete all degree requirements from a single catalog year. The catalog which a student follows for degree requirements may not be more than 10 years old at the time of graduation.

Students who have transferred from a community college may be eligible to fulfill the requirements as stated in the catalog for an academic year in which they were enrolled at the community college prior to attending the University of Nebraska-Lincoln.#This decision should be made in consultation with the student's College of Engineering academic advising team (e.g., ESS professional advisor and the chief faculty advisor for the student's declared degree program).#The chief faculty advisor has the final authority for this decision. Eligibility is based on a) enrollment in a community college during the catalog year the student wishes to utilize, b) maintaining continuous enrollment of at least 12 credit hours per semester at the previous institution for at least 2 semesters, and c)

continuous enrollment at the University of Nebraska-Lincoln within 1 calendar year from the student's last term at the previous institution. #Students must complete all degree requirements from a single catalog year and within the timeframe allowable for that catalog year.

Student Outcomes

Student Outcomes are those abilities that a graduate of the Electrical Engineering Program will have attained so that he/she can meet the educational objectives established for the program.

At the time of graduation, students in the ECE Electrical Engineering Program will have:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. an ability to communicate effectively with a range of audiences.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Major Requirements

Requirements for the Degree

Electrical Engineering Major Core

ECEN 102	Introduction to Electrical Engineering	2
ECEN 103	Electrical and Computer Engineering Fundamentals	4
ECEN 215	Electronics and Circuits I	3
ECEN 216	Electronics and Circuits II	3
ECEN 220	Introduction to Embedded Systems	3
ECEN 235	Introductory Electrical Laboratory I	1
ECEN 236	Introductory Electrical Laboratory II	1
ECEN 304	Signals and Systems I	3
ECEN 305	Probability Theory and Statistics for Electrical and Computer Engineers [1]	3
ECEN 306	Electromagnetic Field Theory	3
ECEN 307	Electrical Engineering Laboratory I	2
ECEN 316	Electronics and Circuits III	3
ECEN 327	Discrete Systems Laboratory	1
ECEN 347	Electrical Engineering Laboratory II	1
ECEN 370	Digital Logic Design	3
ECEN 494	Electrical Engineering Capstone I	2
ECEN 495	Electrical Engineering Capstone II	3

[1] *Both* RAIK 270H *and* RAIK 370H *together count for* ECEN 305 *for students in the Raikes program.*

Engineering Seminars

ENGR 10	Freshman Engineering Seminar	0
ENGR 20	Sophomore Engineering Seminar	0

Supporting Science and Engineering

CSCE 155E	Computer Science I: Systems Engineering Focus	3
PHYS 211	General Physics I	4
PHYS 212	General Physics II	4
PHYS 222	General Physics Laboratory II	1

Mathematics

MATH 106	Calculus I	5
MATH 107	Calculus II	4
MATH 208	Calculus III	4
MATH 221	Differential Equations	3

Math and Science Electives

Select at least seven credits from the following:

CHEM 109A & CHEM 109L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 113A & CHEM 113L	Fundamental Chemistry I and Fundamental Chemistry I Laboratory	4
LIFE 120 & LIFE 120L	Fundamentals of Biology I and Fundamentals of Biology I laboratory	4
MATH 314	Linear Algebra	3
PHYS 213	General Physics III	4

Written and Oral Communication Skills

JGEN 200	Technical Communication I	3
Select one of the following:		
COMM 286	Business and Professional Communication	
ENGR 100	Interpersonal Skills for Engineering Leaders	
JGEN 300	Technical Communication II	

Technical and Electrical Engineering Electives

Students will complete 27 total credits of technical electives. Of these 12 credits are specified as Electrical Engineering Electives and 15 are specified as Technical Electives. See below for details.

Electrical Engineering Electives

Electrical engineering majors will complete an additional 12 credits by fulfilling one of the following areas of study:

- Communications and Signal Processing
- Electromagnetic Fields and Optics
- Electronics
- Energy and Power Systems
- Materials and Devices
- Bioengineering

- Modeling and Simulation
- Telecommunications

Communications and Signal Processing Area of Study

Select one of the following:

ECEN 462	Communication Systems
ECEN 463	Digital Signal Processing

Select one of the following:

ECEN 410	Multivariate Random Processes
ECEN 462	Communication Systems
ECEN 463	Digital Signal Processing
ECEN 465	Introduction to Data Compression

Select at least 3 credits from ECEN 300/400 level courses not including ECEN 398, 399, 399R, 410, 462, 463, 465, 498, 499, 499H. Certain topics from ECEN 498 may apply – see advisor.

Select at least 3 credits from any ECEN 300/400 course besides ECEN 398, 399, 399R

Electromagnetic Fields and Optics Area of Study

ECEN 408	Engineering Electromagnetics

Select one of the following:

ECEN 468	Microwave Engineering
ECEN 479	Optical Fiber Communications
ECEN 480	Introduction to Lasers and Laser Applications
ECEN 486	Fundamentals of Photonics

Select at least 3 credits from ECEN 300/400 level courses not including ECEN 398, 399, 399R, 408, 468, 479, 480, 486, 498, 499, 499H. Certain topics from ECEN 498 may apply – see advisor.

Select at least 3 credits from any ECEN 300/400 course besides ECEN 398, 399, 399R

Electronics Area of Study

Select one of the following:

ECEN 361	Advanced Electronics and Circuits
ECEN 474	Digital Systems

Select one of the following:

ECEN 361	Advanced Electronics and Circuits
ECEN 362	Data and Telecommunications Transceivers
ECEN 469	Analog Integrated Circuits
ECEN 470	Digital and Analog VLSI Design
ECEN 474	Digital Systems

Select at least 3 credits from ECEN 300/400 level courses not including ECEN 361, 362, 398, 399, 399R, 469, 470, 474, 498, 499, 499H. Certain topics from ECEN 498 may apply – see advisor.

Select at least 3 credits from any ECEN 300/400 course besides ECEN 398, 399, 399R

Energy and Power Systems Area of Study

Select one of the following:

ECEN 338	Introduction to Power and Energy Systems
ECEN 428	Power Electronics

Select one of the following:

ECEN 338	Introduction to Power and Energy Systems
ECEN 406	Power Systems Analysis
ECEN 428	Power Electronics
ECEN 430	Wind Energy
ECEN 436	Electric Machines
ECEN 444	Linear Control Systems
ECEN 498	Research in Electrical Engineering IV (certain topics may count – see advisor)

Select at least 3 credits from ECEN 300/400 level courses not including ECEN 338, 398, 399, 399R, 406, 428, 430, 436, 444, 498, 499, 499H. Certain topics from ECEN 498 may apply – see advisor.

Select at least 3 credits from any ECEN 300/400 course besides ECEN 398, 399, 399R

Materials and Devices Area of Study

ECEN 421	Principles of Semiconductor Materials and Devices I

Select one of the following:

ECEN 420	Plasma Processing of Semiconductors
ECEN 422	Introduction to Physics and Chemistry of Solids

Select at least 3 credits from ECEN 300/400 level courses not including ECEN 398, 399, 399R, 420, 421, 422, 498, 499, 499H. Certain topics from ECEN 498 may apply – see advisor.

Select at least 3 credits from any ECEN 300/400 course besides ECEN 398, 399, 399R

Bioengineering Area of Study

ECEN 450	Bioinformatics

Select one of the following:

ECEN 453	Computational and Systems Biology
ECEN 460	Labview Programming
ECEN 498	Research in Electrical Engineering IV (certain topics may count – see advisor)

Select at least 3 credits from ECEN 300/400 level courses not including ECEN 398, 399, 399R, 450, 453, 460, 498, 499, 499H. Certain topics from ECEN 498 may apply – see advisor.

Select at least 3 credits from any ECEN 300/400 course besides ECEN 398, 399, 399R

Modeling and Simulation Area of Study

ECEN 498	Research in Electrical Engineering IV (Computational Modeling and Simulation: Discrete Systems)

Select one of the following:

ECEN 448	Decision Analysis
ECEN 498	Research in Electrical Engineering IV (certain topics may count – see advisor)

Select at least 3 credits from ECEN 300/400 level courses not including ECEN 398, 399, 399R, 448, 498, 499, 499H. Certain topics from ECEN 498 may apply – see advisor.

Select at least 3 credits from any ECEN 300/400 course besides ECEN 398, 399, 399R

Telecommunications Area of Study

ECEN 466	Telecommunications Engineering I

Select one of the following:

ECEN 362	Data and Telecommunications Transceivers	
ECEN 466	Telecommunications Engineering I	
Select at least 3 credits from ECEN 300/400 level courses not including ECEN 362, 398, 399, 399R, 466, 498, 499, 499H. Certain topics from ECEN 498 may apply – see advisor.		
Select at least 3 credits from any ECEN 300/400 course besides ECEN 398, 399, 399R		

Technical Electives

Complete an additional 15 credits from any 300 or 400 level course from the following subject codes: AGEN, BSEN, CHME, CIVE, CSCE, CONE, ECEN, MECH, MATL, SOFT, BIOS, CHEM, MATH, STAT, PHYS, ASTR as well as selected 100 and 200 classes listed below. No more than 6 hours may come from ECEN 399 or ECEN 399R. BIOS 310 and MATH 493 will not count towards technical electives.

Additional 100/200 level courses

AGEN 225 / BSEN 225	Engineering Properties of Biological Materials	3
ASTR 204	Introduction to Astronomy and Astrophysics	3
ASTR 224	Astronomy and Astrophysics Laboratory	1
BIOS 206	General Genetics	4
BIOS 213	Human Physiology	3
BSEN 206	Engineering Economics	3
CHEM 110A & CHEM 110L	General Chemistry II and General Chemistry II Laboratory	4
CHEM 114	Fundamental Chemistry II	3
CHEM 2**	(Any 200 level Chemistry)	
CHME 202	Mass and Energy Balances	3
CSCE 156	Computer Science II	4
CSCE 235	Introduction to Discrete Structures	3
CSCE 251	Unix Programming Environment	1
MATL 260	Elements of Materials Science	3
MATL 262	Materials Laboratory I	1
MECH 200	Engineering Thermodynamics	3
MECH 223	Engineering Statics	3
MECH 250	Mechanics I	2
PHYS 213	General Physics III	4

ACE Electives

Select one course from each of not yet satisfied ACE outcomes 5, 6, 7, 8, and 9.

Undergraduate Research

Students majoring in Electrical Engineering may complete two semesters of undergraduate research (ECEN 399 and ECEN 399R) for up to six credits that will count towards Technical Electives. Requirements for research are listed below:

1. Selection of a faculty advisor (ECE department faculty), research topic, and thesis committee (at least one other faculty).
2. Registration for 6 credit hours of undergraduate research (ECEN 399 and ECEN 399R) over at least two consecutive semesters on the same research topic.
3. GPA of above 3.0.
4. Write an undergraduate thesis or report and/or make an oral presentation to be graded by thesis committee members.

Additional Major Requirements

Grade Rules

C- and D Grades

- ECEN 216 Electronics and Circuits II – Prereq: A grade of C or better in ECEN 215; Prereq or Parallel: MATH 221 and ECEN 236
- ECEN 304 Signals and Systems I – Prereq: A grade of C or better in ECEN 216; MATH 221
- ECEN 316 Electronics and Circuits III - Prereq: A grade of C or better in ECEN 216
- ECEN 306 Electromagnetic Field Theory – Prereq: A grade of C or better in ECEN 216; PHYS 212; MATH 221

ECEN 102 Introduction to Electrical Engineering
Prerequisites: Open to first year students only or by permission.
Description: An overview of the electrical engineering field. Introduction to some basic concepts and skills needed in electrical engineering. Professionalism and ethics are addressed as well as the need for lifelong learning experiences. Information on professional careers available upon graduation.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
Grading Option: Graded
Course and Laboratory Fee: $25

ECEN 103 Electrical and Computer Engineering Fundamentals
Prerequisites: MATH 106 or (UNO) MATH 1950, or parallel.
Description: Introduction to DC circuit analysis and digital logic. Ohm's and Kirchoff's laws, mesh and nodal analysis, Boolean algebra, logic gates, minimization, counters, and flip-flops. Uses of computer based resources for data analysis and report generation. Use of internet to locate and retrieve engineering resources.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option
Offered: FALL/SPR
Prerequisite for: ECEN 106; ECEN 123; ECEN 213; ECEN 220; ECEN 225
Course and Laboratory Fee: $20

ECEN 106 Microprocessor Applications
Prerequisites: ECEN 103; CSCE 155A, 155E, 155H, 155N, 155T or (UNO) CIST 1400.
Description: Introduction to assembly language programming of microprocessors / microcontrollers, assemblers, and debugging tool utilization. Microprocessor system hardware components, control signals, and 'C' language micro-controller programming.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Prerequisite for: ECEN 224; ECEN 313; ECEN 327; ECEN 332; ECEN 345

ECEN 123 Introduction to Electrical and Computer Engineering
Prerequisites: ECEN 103 or parallel; CSCE155A/CSCE 155E/(UNO) CIST 1400 or parallel. Open to first year students only.
Description: Laboratory design projects introducing some basic concepts and skills needed in electrical and computer engineering.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Graded
Offered: FALL/SPR
Course and Laboratory Fee: $30

ECEN 155E Computer Science I: Systems Engineering Focus
Crosslisted with: CSCE 155E
Prerequisites: MATH 102 or a Math Placement Test score for MATH 103 or higher. Credit toward the degree may be earned in only one of: CSCE 155, CSCE 155A, CSCE 155E/ECEN 155E, CSCE 155H, CSCE 155N, or CSCE 155T.
Notes: Credit may be earned in only one CSCE 155 course. Recommended for students interested in systems engineering, such as operating systems, mobile computing, and embedded devices.
Description: Introduction to problem solving with computers. Topics include problem solving methods, software development principles, computer programming, and computing in society
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Prerequisite for: CIVE 201; CSCE 156, ECEN 156; CSCE 156H; CSCE 235; CSCE 235H; CSCE 311; CSCE 352; ECEN 106; ECEN 123; ECEN 220; ECEN 224; MECH 300
ACE: ACE 3 Math/Stat/Reasoning
Course and Laboratory Fee: $10

ECEN 156 Computer Science II
Crosslisted with: CSCE 156
Prerequisites: A grade of "P" or "C" or better in CSCE 155A, CSCE 155E, CSCE 155H, CSCE 155N, or CSCE 155T; coreq: MATH 106.
Notes: Laboratories supplement the lecture material and give an opportunity to practice concepts.
Description: Data structures, including linked lists, stacks, queues, and trees; algorithms, including searching, sorting, and recursion; programming language topics, including object-oriented programming; pointers, references, and memory management; design and implementation of a multilayer application with SQL database.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option
Offered: FALL/SPR
Prerequisite for: CSCE 235; CSCE 310; CSCE 310H; CSCE 322; CSCE 322H; CSCE 378; CSCE 378H; CSCE 453H, RAIK 453H; SOFT 162
Course and Laboratory Fee: $35

ECEN 164 Introduction to Computer Engineering
Crosslisted with: CSCE 164
Notes: Project-based introduction to the computer engineering field.
Description: Introduction to basic concepts and skills needed in computer engineering. Practical application of basic computing concepts through an introduction to programming an embedded system.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
Grading Option: Graded with Option
Offered: SPRING

ECEN 192 Special Topics in Electrical and Computer Engineering I
Notes: Requires an ECE departmentally approved proposal.
Description: Special topics in emerging areas of electrical and computer engineering which may not covered in other courses in the electrical and computer engineering curriculum.
Credit Hours: 1-3
Min credits per semester: 1
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

ECEN 194 Independent Study in Electrical and Computer Engineering I
Prerequisites: Freshman standing.
Description: Individual study in a selected area of Electrical and Computer Engineering under the supervision and guidance of an Electrical and Computer Engineering faculty member.
Credit Hours: 1-3
Min credits per semester: 1
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

ECEN 198 Undergraduate Research in Electrical and Computer Engineering I
Prerequisites: Permission.
Description: Supervised undergraduate research
Credit Hours: 1-3
Min credits per semester: 1
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

ECEN 211 Elements of Electrical Engineering I
Prerequisites: Prerequisite or parallel: MATH 107/(UNO) MATH 1960 and PHYS 211/(UNO) PHYS 2110.
Notes: Not for electrical engineering majors.
Description: Basic circuit analysis including direct and alternating currents and operational amplifiers. Digital signals and circuits.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Prerequisite for: AGEN 325, BSEN 325; AREN 320; AREN 322; ECEN 231; MECH 350

ECEN 213 Electrical Circuits I
Prerequisites: ECEN 103; ECEN 225; MATH 221/221H/821 or (UNO) MATH 2350, or parallel.
Description: Electrical circuit theory, Kirchoff's and Ohm's laws, circuit analysis theorems, Norton and Thevenin equivalence. The analysis of resistor circuits, with capacitors and inductors, in DC and AC steady state. Transients and variable frequency responses are studied, including computer solutions to circuit problems.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Offered: FALL/SPR
Prerequisite for: ECEN 217; ECEN 218; ECEN 222; ECEN 345

ECEN 214 Electrical Circuits II
Prerequisites: ECEN 213; ECEN 218; (UNO) MATH 2050 or parallel.
Description: Introduction to the analysis of electrical circuits in sinusoidal steady states. The concepts of impedance, phasors, power, frequency response, resonance, magnetic circuits, and two-port networks. Transform techniques for circuit analysis.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Prerequisite for: ECEN 304; ECEN 338; ECEN 355

ECEN 215 Electronics and Circuits I
Prerequisites: Prerequisite or parallel: MATH 208/(UNO) MATH 1970.
Description: Introduction to electrical engineering circuit theory. Kirchhoff's laws and circuit analysis theorems applied to steady state DC resistive circuits. Analysis of transient RLC and sinusoidal steady-state circuits. Modern computer methods employed.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Prerequisite for: ECEN 216; ECEN 235; ECEN 345

ECEN 216 Electronics and Circuits II
Prerequisites: ECEN 215 with a grade of "C" or better. Prerequisite or parallel: MATH 221/(UNO) MATH 2350 or MATH 221H.
Description: Steady state power calculations for sinusoidal single-phase and balanced three-phase circuits. Mutual inductance. Frequency response. Introduction to fundamentals of semiconductor theory and their application to p-n junction devices. Kirchhoff's laws and circuit analysis theorems applied to steady state diode circuits. Modern computer methods employed.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Prerequisite for: ECEN 304; ECEN 306; ECEN 316; ECEN 338

ECEN 217 Electrical Circuits III
Prerequisites: ECEN 213
Notes: This course is for computer engineering majors only.
Description: Analysis of first and second order RLC circuits using differential equations and Laplace transforms. Variable frequency network performance analysis.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Graded with Option

ECEN 218 Electrical Circuits Laboratory
Prerequisites: ECEN 213 or parallel.
Notes: Lab to accompany ECEN 213
Description: The use of laboratory tools for measurement and verification of electrical concepts. Experiments using both passive and semiconductor devices at audio frequencies. Analysis verification with computer simulation.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Graded with Option
Prerequisite for: ECEN 214; ECEN 222
Course and Laboratory Fee: $15

ECEN 220 Introduction to Embedded Systems
Prerequisites: CSCE 155E; ECEN 103 or CSCE 230
Description: Basic hardware and software concepts of embedded microprocessor systems and interfacing with other hardware components. Simple circuits are designed and drivers to run them are written. Design and build hardware and write drivers in assembly or C programming languages.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
Offered: FALL/SPR
Prerequisite for: CSCE 488; ECEN 307; ECEN 327; ECEN 345
Course and Laboratory Fee: $25

ECEN 222 Electronic Circuits I
Prerequisites: ECEN 213 with a grade of "C" or better; ECEN 218
Description: Analysis and design of modern electronic circuits. Diode circuits, bipolar and field effect transistor switching and amplifier circuits, and operational amplifier circuits.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option
Offered: FALL/SPR
Prerequisite for: ECEN 310; ECEN 325; ECEN 347; ECEN 352; ECEN 494
Course and Laboratory Fee: $30

ECEN 224 Introduction to Signal Processing
Prerequisites: ECEN 106; CSCE 155A, 155E, 155H, 155N, 155T or (UNO) CIST 1400; MATH 107/107H or (UNO) MATH 1960.
Description: The use of mathematical and digital computation tools key to engineering applications. Auditory and visual senses are used in the presentation and study of sinusoidal signals, sampling, frequency response and filtering theory.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option

ECEN 225 Electrical and Computer Engineering Seminar
Prerequisites: ECEN 103 or parallel
Description: An overview of electrical, computer, electronics and telecommunication fields. There will be information on professional careers available upon graduation. Professionalism and ethics are addressed as well as the need for lifelong learning experiences.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Graded with Option
Prerequisite for: ECEN 213

ECEN 230 Computer Organization
Crosslisted with: CSCE 230
Prerequisites: A grade of 'P' or 'C' or better in CSCE 235, CSCE 235H, or RAIK 184H.
Notes: Laboratories supplement the lecture material and give an opportunity to practice concepts.
Description: Introduction to organization and structure of computer systems. Boolean logic, digital arithmetic, processor organization, machine language programming, input/output, memory organization, system support software, communication, and ethics.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option
Offered: FALL
Prerequisite for: CSCE 336; CSCE 351, ECEN 351; ECEN 220; ECEN 370, CSCE 335
Course and Laboratory Fee: $20

ECEN 231 Electrical Engineering Laboratory
Prerequisites: Prerequisite or parallel: ECEN 211
Description: Laboratory accompanying ECEN 211
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Graded with Option
Prerequisite for: MECH 380
Course and Laboratory Fee: $15

ECEN 235 Introductory Electrical Laboratory I
Prerequisites: Prerequisite or parallel: ECEN 215
Description: Laboratory accompanying ECEN 215
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Graded with Option
Prerequisite for: ECEN 236
Course and Laboratory Fee: $15

ECEN 236 Introductory Electrical Laboratory II
Prerequisites: ECEN 235; Prerequisite or parallel: ECEN 216
Description: Laboratory accompanying ECEN 216
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Graded with Option
Prerequisite for: ECEN 307
Course and Laboratory Fee: $15

ECEN 251 Unix Programming Environment
Crosslisted with: CSCE 251
Notes: Familiarity with at least one high-level programming language.
Description: Introduction to the Unix operating system. Unix file system. Unix tools and utilities. Shell programming.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Graded with Option
Offered: FALL
Course and Laboratory Fee: $25

ECEN 292 Special Topics in Electrical and Computer Engineering II
Prerequisites: Sophomore standing.
Notes: Requires a ECE departmentally approved proposal.
Description: Special topics in emerging areas of Electrical and Computer Engineering which may not be covered in other courses in the Electrical and Computer Engineering curriculum.
Credit Hours: 1-6
Min credits per semester: 1
Max credits per semester: 6
Max credits per degree: 6
Grading Option: Graded with Option

ECEN 294 Independent Study in Electrical and Computer Engineering II
Prerequisites: Sophomore standing.
Description: Individual study in a selected area of Electrical and Computer Engineering under the supervision and guidance of an Electrical and Computer Engineering faculty member.
Credit Hours: 1-3
Min credits per semester: 1
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

ECEN 298 Undergraduate Research in Electrical and Computer Engineering II
Prerequisites: Permission.
Description: Supervised undergraduate research.
Credit Hours: 1-3
Min credits per semester: 1
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

ECEN 304 Signals and Systems I
Prerequisites: ECEN 214 or ECEN 216 with a grade of "C" or better; MATH 221 or 221H or (UNO) MATH 2350.
Description: Mathematical modeling of physical systems and signals. Representation of signals in terms of basis functions. Fourier series expansions, Fourier Transforms, Laplace and z-Transforms. Input-output relations, convolution. Transfer functions. System Stability. Poles/zeros and s- and z-plane methods. Applications.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Prerequisite for: ECEN 494

ECEN 305 Probability Theory and Statistics for Electrical and Computer Engineers
Prerequisites: MATH 208/(UNO) MATH 1970.
Description: Random experiment model, random variables, functions of random variables, and introduction to random processes; statistics and practical data analysis.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Prerequisite for: ECEN 325; ECEN 435, ECEN 835; ECEN 850, ECEN 450

ECEN 306 Electromagnetic Field Theory
Prerequisites: ECEN 216; PHYS 212 or (UNO) PHYS 2120; MATH 208 or (UNO) MATH 1970; MATH 221 or (UNO) 2350.
Description: Complex vectors. Maxwell's equations. Uniform plane waves. Wave reflection and transmission at interfaces. Waveguides and resonators. Transmission line principles. Antennas. Topics in waves.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
Prerequisite for: ECEN 494

ECEN 307 Electrical Engineering Laboratory I
Prerequisites: ECEN 220 or (UNO) ECEN 1060 and ECEN 236 or (UNO) ECEN 2220; prereq or parallel ECEN 370 or (UNO) ECEN 3700 or (UNO) ECEN 3130; admission to the College of Engineering.
Description: Laboratory work on circuits and systems, digital and analog electronic circuits.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
Grading Option: Graded with Option
Offered: FALL/SPR
Course and Laboratory Fee: $10

ECEN 310 Digital Design and Interfacing
Prerequisites: ECEN 222; ECEN 313 or parallel.
Notes: Lab exercises provide practical experience with design tools and the design process.
Description: Digital design from both the circuit and system perspectives. The structure and analysis of digital integrated circuits, interface signal integrity, Field Programmable Gate Array (FPGA) design and synthesis, and software simulation.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option
Course and Laboratory Fee: $10

ECEN 313 Switching Circuits Theory
Prerequisites: ECEN 106
Description: Combinational circuit analysis and design. State machine analysis and design. Synchronous/clock mode circuits and asynchronous sequential circuits. Minimization, race, and hazard elimination are covered. Circuits are implemented in discrete logic and in CPLD and FPGA devices. VHDL hardware description language is used to describe circuits. Circuits are implemented in discrete logic and in CPLD/FPGA devices.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option
Prerequisite for: ECEN 310; ECEN 494
Course and Laboratory Fee: $10

ECEN 316 Electronics and Circuits III
Prerequisites: ECEN 216 with a grade of 'C' or better.
Description: Kirchhoff's laws and circuit analysis theorems applied to steady state transistor circuits. Frequency response of filters and amplifiers. Basic power amplifier types. Advanced operational amplifier circuits. Introduction to the fundamentals of semiconductor theory and their application to p-n junction and field devices.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Prerequisite for: ECEN 347; ECEN 361; ECEN 494

ECEN 325 Communication and Networking
Prerequisites: ECEN 222; Pre or Co ECEN 305
Description: Communication: amplitude-, frequency/phase-modulation, sampling theorem, pulse-code modulation, OFDM, channel coding, and communication system/analysis. Networking: multiplexing, WANs, ATM, LANs, Internet/transport protocols, and data/computer communications.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option
Offered: SPRING
Course and Laboratory Fee: $30

ECEN 327 Discrete Systems Laboratory
Prerequisites: ECEN 106 or ECEN 220
Description: Laboratory work on discrete systems.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Graded
Course and Laboratory Fee: $15

ECEN 328 Applied Fields and Lines I
Prerequisites: MATH 208/208H or (UNO) MATH 1970; MATH 221/821 or (UNO) MATH 2350.
Description: Transmission lines. Discontinuities, different termination, and matching methods. Application of vector analysis to Maxwell's equations. Uniform plane waves including reflection/transmission. S-parameters. Principles of antennas. LW, MW, SW, USW propagation.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Prerequisite for: ECEN 329

ECEN 329 Applied Fields and Lines II
Prerequisites: ECEN 328
Description: Metallic wave guides with rectangular, circular, and coaxial cross section, antennas, free space, propagation in free space, applications.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

ECEN 332 Assembly Language Programming
Prerequisites: ECEN 106
Description: Architecture and assembly language programming of 8-bit and 32-bit microcontrollers. Assemblers and debugging tool utilization.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Graded with Option

ECEN 338 Introduction to Power and Energy Systems
Prerequisites: ECEN 216 or ECEN 214 with a grade of "C" or better.
Description: Energy sources, environmental impacts, power systems principles, three-phase circuits, transmission lines, transformers, per unit analysis, generators, loads, and power system modeling.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Offered: FALL/SPR

ECEN 345 Mobile Robotics I
Prerequisites: ECEN 106 or ECEN 220; ECEN 213 or ECEN 215
Description: Introduction to the primary issues spanning the field of mobile robotics, including robotics history, robot components (sensors, actuators), robot system design considerations, low-level control (feedback control) and robotics control architectures. The lab focuses on the practical implementation of autonomous robot control on a real mobile robot using behavior-based methods in the C language.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option
Course and Laboratory Fee: $5

ECEN 347 Electrical Engineering Laboratory II
Prerequisites: ECEN 307/(UNO) ECEN2350; pre- or parallel ECEN 222/(UNO) ECEN 2220 or ECEN 316/(UNO) ECEN 3160
Description: Lab work on electromagnetics, fields and waves, solid state devices and control systems.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Graded
Prerequisite for: ECEN 494
Course and Laboratory Fee: $10

ECEN 350 Electrical and Computer Engineering Cooperative Educational Experience
Prerequisites: Co-requisite UGEP 350/(UNO) ENGR 3500. Open to Electrical and Computer Engineering majors only. Approval of faculty sponsor prior to the Co-op is required.
Notes: International students have to complete a curricular practical training (CPT) application for the campus which issued their I-20. Students should start with ISSO at UNL if they are City Campus, or ISA at UNO if they are Scott Campus. They need to then meet with Engineering Career Services.
Description: For Cooperatives primarily technical in nature lasting 4.5 months or greater. Weekly communication and/or final report required. Must be taken during or after the semester in which the Co-op occurs.
Credit Hours: 1-3
Min credits per semester: 1
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

ECEN 351 System Resource Management
Crosslisted with: CSCE 351
Prerequisites: A grade of "P" or "C" or better in CSCE 230 or CSCE 231 and CSCE 310, CSCE 310H, CSCE 311, SOFT 260, SOFT 260H or RAIK 283H.
Description: An introduction to management of computing resources, including CPUs, shared memory, I/O devices, address spaces, and threads of execution, with a focus on implementation.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Offered: FALL
Course and Laboratory Fee: $40

ECEN 352 Electronics Circuits II
Prerequisites: ECEN 222/(UNO) CEEN 2220.
Description: Operational amplifier circuit design and analysis feedback and stability. Design and analysis of large signal power amplifiers. Other integrated devices such as: regulators, comparators, Schmitt triggers, oscillators, and active filters.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option
Prerequisite for: ECEN 362
Course and Laboratory Fee: $20

ECEN 355 Signals and Linear Systems
Prerequisites: ECEN 214
Description: Continuous and discrete representations of signals. System modeling and analysis using differential and difference equations. Fourier, Laplace, and Z transforms. State description of continuous and discrete time transfer functions. The primary mathematical tools used in the analysis of continuous and discrete time systems.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

ECEN 361 Advanced Electronics and Circuits
Prerequisites: ECEN 316
Description: Analog and digital electronics for discrete and integrated circuits. Multistage amplifiers, frequency response, feedback amplifiers, simple filters and amplifiers, MOS and bipolar logic gates and families, A/D and D/A converters.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded

ECEN 362 Data and Telecommunications Transceivers
Prerequisites: ECEN 352; ECEN 325 or parallel; and ECEN 328 or parallel.
Description: Noise and signal distortions in communication systems, impedance matching techniques, high frequency measurement techniques, design of high frequency amplifiers and oscillators, PLL and frequency synthesizers, data synchronization and multiplexing techniques, Antennas and their arrays.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option
Course and Laboratory Fee: $10

ECEN 370 Digital Logic Design
Crosslisted with: CSCE 335
Prerequisites: ECEN 103 or CSCE 230
Description: Combinational and sequential logic circuits. MSI chips, programmable logic devices (PAL, ROM, PLA) used to design combinational and sequential circuits. CAD tools. LSI and PLD components and their use. Hardware design experience.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
Prerequisite for: ECEN 307; ECEN 494

ECEN 392 Special Topics in Electrical and Computer Engineering III
Prerequisites: Permission
Notes: Requires a ECE departmentally approved proposal.
Description: Special topics in emerging areas of Electrical and Computer Engineering which may not be covered in other courses in the Electrical and Computer Engineering curriculum.
Credit Hours: 1-3
Min credits per semester: 1
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

ECEN 394 Independent Study in Electrical and Computer Engineering III
Prerequisites: Permission
Description: Individual study in a selected area of Electrical and Computer Engineering under the supervision and guidance of Electrical and Computer Engineering faculty member.
Credit Hours: 1-3
Min credits per semester: 1
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

ECEN 395 Electrical and Computer Engineering Internship Educational Experience
Prerequisites: Open to Electrical and Computer Engineering majors only. Approval of faculty sponsor prior to the internship is required.
Notes: Weekly communication and/or final report is required. Must be taken during or after the semester in which internship occurs.
Description: Provides the experience of Internship Education
Credit Hours: 1-3
Min credits per semester: 1
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Experiential Learning: Internship/Co-op

ECEN 398 Undergraduate Research in Electrical and Computer Engineering III
Prerequisites: Permission.
Description: Supervised undergraduate research.
Credit Hours: 1-3
Min credits per semester: 1
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

ECEN 399 Undergraduate Research
Prerequisites: Electrical engineering seniors.
Description: Research accompanied by a written report of the results.
Credit Hours: 1-3
Min credits per semester: 1
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Experiential Learning: Research

ECEN 399R Undergraduate Research
Notes: ECEN 399 and ECEN 399R should be taken in consecutive semesters.
Description: Independent research project executed under the guidance of a member of the faculty of the Department of Electrical Engineering which contributes to the advancement of knowledge in the field. Culminates in a written thesis or report and an oral presentation. For electrical engineering majors selecting the research option.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

ECEN 400 Electronic Instrumentation
Crosslisted with: ECEN 800
Prerequisites: Senior standing in engineering
Description: Applications of analog and digital devices to electronic instrumentation. Includes transducers, instrumentation amplifiers, mechanical and solid-state switches, data acquisition systems, phase-lock loops, and modulation techniques. Demonstrations with working circuits and systems.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded

ECEN 406 Power Systems Analysis
Crosslisted with: ECEN 806
Prerequisites: ECEN 338 or ECEN 838
Description: Symmetrical components and fault calculations, power system stability, generator modeling (circuit view point), voltage control system, high voltage DC transmission, and system protection.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
Prerequisite for: ECEN 957

ECEN 407 Power Systems Planning
Crosslisted with: ECEN 807
Prerequisites: ECEN 305
Description: Economic evaluation, load forecasting, generation planning, transmission planning, production simulation, power plant reliability characteristics, and generation system reliability.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded

ECEN 408 Engineering Electromagnetics
Crosslisted with: ECEN 808
Prerequisites: ECEN 306
Notes: Laboratory experiments.
Description: Applied electromagnetics: Transmission lines in digital electronics and communication. The quasistatic electric and magnetic fields: electric and magnetic circuits and electromechanical energy conversion. Guided waves: rectangular and cylindrical metallic waveguides and optical fibers. Radiation and antennas: line and aperture antennas and arrays.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded

ECEN 410 Multivariate Random Processes
Crosslisted with: ECEN 810
Prerequisites: ECEN 305
Description: Probability space, random vectors, multivariate distributions, moment generating functions, conditional expectations, discrete and continuous-time random processes, random process characterization and representation, linear systems with random inputs.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
Prerequisite for: ECEN 911; ECEN 912; ECEN 915; ECEN 946

ECEN 416 Materials and Devices for Computer Memory, Logic, and Display
Crosslisted with: ECEN 816
Prerequisites: PHYS 212/(UNO) PHYS 2120
Description: Survey of fundamentals and applications of devices used for memory, logic, and display. Magnetic, superconductive, semiconductive, and dielectric materials.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded

ECEN 420 Plasma Processing of Semiconductors
Crosslisted with: ECEN 820
Prerequisites: Senior or graduate standing.
Description: Physics of plasmas and gas discharges developed. Includes basic collisional theory, the Boltzman equation and the concept of electron energy distributions. Results are related to specific gas discharge systems used in semiconductor processing, such as sputtering, etching, and deposition systems.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded

ECEN 421 Principles of Semiconductor Materials and Devices I
Crosslisted with: ECEN 821
Prerequisites: PHYS 213/(UNO) PHYS 2130
Description: Introduction to semiconductor fundamentals, charge carrier concentration and carrier transport, energy bands, and recombination. PN junctions, static and dynamic, and special PN junction diode devices.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded

ECEN 422 Introduction to Physics and Chemistry of Solids
Crosslisted with: PHYS 422, PHYS 822, ECEN 822
Prerequisites: PHYS 213 or CHEM 481/881, MATH 221/821.
Description: Introduction to structural, thermal, electrical, and magnetic properties of solids, based on concepts of atomic structure, chemical bonding in molecules, and electron states in solids. Principles underlying molecular design of materials and solid-state devices.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

ECEN 424 Digital Signal Processing
Crosslisted with: ECEN 824
Prerequisites: ECEN 355
Description: The temporal and spectral analysis of digital signals and systems, the design of digital filters and systems, and advanced systems including multi-rate digital signal processing techniques.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Prerequisite for: ECEN 815; ECEN 926

ECEN 428 Power Electronics
Crosslisted with: ECEN 828
Prerequisites: ECEN 304 and ECEN 316
Description: Basic analysis and design of solid-state power electronic devices and converter circuitry.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded
Prerequisite for: ECEN 932

ECEN 430 Wind Energy
Crosslisted with: ECEN 830
Prerequisites: Senior standing
Description: Engineering principles of both the mechanical/aero dynamical and electrical components and systems, along with economic and environmental considerations for citing and public policy, to appropriately cover the relevant topics associated with all scales of wind energy implementations.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

ECEN 433 Microprocessor System Design
Crosslisted with: ECEN 833
Prerequisites: ECEN 310 with a grade of "C" or better; ECEN 332 with a grade of "C" or better.
Description: Discussion of different microprocessor hardware and software systems designs including; microprocessor bus interfacing, memory systems, peripheral design and interfacing, interrupts, Direct Memory Access, and other hardware related topics. Software includes system code, firmware generation, and designing device drivers. Design, build, program, and show successful operation of a microprocessor board with memory, I/O and other related peripheral systems.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option
Offered: FALL/SPR
Prerequisite for: ECEN 435, ECEN 835; ECEN 496
Course and Laboratory Fee: $25

ECEN 435 Embedded Microcontroller Design
Crosslisted with: ECEN 835
Prerequisites: ECEN 433/833 with a grade of "C" or better; ECEN 305
Notes: The prerequisite is different from the syllabus.
Description: Microcontroller architecture: design, programming, and interfacing for embedded systems. Including advanced RISC based microcontroller architecture and design, standard asynchronous and synchronous serial communications, I2C, SPI, USB, and related board design, development, and fabrication with surface mount technology. Design, build, program and show successful operation of a single microcontroller board with a specific application.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option
Offered: FALL/SPR
Prerequisite for: ECEN 437, ECEN 837
Course and Laboratory Fee: $25

ECEN 436 Electric Machines
Crosslisted with: ECEN 836
Prerequisites: PHYS 212/(UNO) PHYS 2120 and ECEN 216
Description: Provides a solid background in electric machine analysis, covering fundamental concepts, techniques, and methods for analysis and design. Discussion of transformers and presentation of some new systems and applications.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Prerequisite for: ECEN 932

ECEN 437 Parallel and Distributed Processing
Crosslisted with: ECEN 837
Prerequisites: ECEN 435/835
Description: Parallel and distributed processing concepts, principles, techniques, and machines.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

ECEN 438 Integrated Systems Programming
Crosslisted with: ECEN 838
Prerequisites: ECEN 310 and ECEN 332
Description: Introduction to the basics of computer architectural details under the context of computer system programming. Topics include representing and manipulating information, machine level representation of programs, processor architecture and pipelining, compiling and linking, optimizing program performance from the system level, memory hierarchy, dynamic memory allocation and exceptional control flow. Linux system programming tool chain will also be introduced.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
Offered: FALL/SPR
Prerequisite for: ECEN 406, ECEN 806

ECEN 442 Basic Analytical Techniques in Electrical Engineering
Crosslisted with: ECEN 842
Prerequisites: MATH 221/(UNO) MATH 2350
Description: Applications of partial differential equations, matrices, vector analysis, complex variables, and infinite series to problems in electrical engineering.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded

ECEN 444 Linear Control Systems
Crosslisted with: ECEN 844
Prerequisites: ECEN 304
Description: Classical (transfer function) and modern (state variable) control techniques. Both time domain and frequency domain techniques are studied. Traditional proportional, lead, lag, and PID compensators are examined, as well as state variable feedback.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded

ECEN 448 Decision Analysis
Crosslisted with: ECEN 848
Prerequisites: ECEN 305 or STAT 380/(UNO) STAT 3800
Description: Principles of engineering economy including time value of money, net present value and internal rate of return. Use of influence diagram and ecision tree to structure and analyze decision situations under uncertainty including use of stochastic dominance, value of information, and utility theory. Fundamentals of two-person matrix games including Nash equilibrium.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

ECEN 450 Bioinformatics
Crosslisted with: ECEN 850
Prerequisites: Computer programming language and ECEN 305 or MECH 321 or STAT 380/(UNO) STAT 3800 or equivalent
Description: Examination of how information is organized in biological sequences such as DNA and proteins and computational techniques which make use of this structure. Various biochemical processes that involve these sequences are studied to understand how these processes affect the structure of these sequences. In the process bioinformatics algorithms, tools, and techniques which are used to explore genomic and amino acid sequences are also introduced.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

ECEN 451 Introduction to VLSI System Design
Crosslisted with: ECEN 851
Prerequisites: ECEN 310
Description: The concepts, principles, and methodology at all levels of digital VLSI system design and focused on gate-level VLSI implementation.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

ECEN 452 Introduction to Computer-Aided Digital Design
Crosslisted with: ECEN 852
Prerequisites: ECEN 310
Description: The concepts, simulation techniques and methodology in computer-aided digital design at system and logic levels.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

ECEN 453 Computational and Systems Biology
Crosslisted with: ECEN 853
Prerequisites: By permission.
Notes: Basic knowledge of probability and statistics (e.g. ECEN 305 or STAT 380) and basic programming skills are recommended. May also be taught as a distance course for the Omaha campus.
Description: Provides the required biology primer and covers functional genomics, transcriptomics, differential expression, clustering, classification, prediction, biomarker discovery, pathway analysis and network based approaches to high throughput biological data analysis. Includes the development of databases, algorithms, web-based and other tools regarding management and analysis of life science data. Areas of study include DNA, RNA, and protein sequence analysis, functional genomics and proteomics, 3D macromolecule structure prediction, and systems/network approach.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
Offered: SPRING

ECEN 454 Power Systems Operation and Control
Crosslisted with: ECEN 854
Prerequisites: ECEN 338
Description: Characteristics and generating units. Control of generation, economic dispatch, transmission losses, unit commitment, generation with limited supply, hydrothermal coordination, and interchange evaluation and power pool.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded

ECEN 456 Real Time DSP Applications
Crosslisted with: ECEN 856
Prerequisites: ECEN 220; ECEN 463
Description: Introduction to concepts, principles, and state-of-the-art methods in creating embedded real-time digital signal processing systems.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded

ECEN 460 Labview Programming
Crosslisted with: ECEN 860
Prerequisites: Prior programming experience
Description: Labview as a programming language and for applications to acquire and analyze data, to access the network, control lab instruments, and for video and sound applications.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

ECEN 462 Communication Systems
Crosslisted with: ECEN 862
Prerequisites: ECEN 304 and ECEN 305
Description: Mathematical descriptions of signals in communication systems. Principles of analog modulation and demodulation. Performance analysis of analog communication systems in the presence of noise.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
Prerequisite for: CSCE 954; ECEN 911

ECEN 463 Digital Signal Processing
Crosslisted with: ECEN 863
Prerequisites: ECEN 304
Description: Discrete system analysis using Z-transforms. Analysis and design of digital filters. Discrete Fourier transforms.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
Prerequisite for: ECEN 915

ECEN 464 Digital Communication Systems
Crosslisted with: ECEN 864
Prerequisites: ECEN 462
Description: Principals of digital transmission of information in the presence of noise. Design and analysis of baseband PAM transmission systems and various carrier systems including ASK, FSK, PSK.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
Prerequisite for: ECEN 911; ECEN 912; ECEN 959

ECEN 465 Introduction to Data Compression
Crosslisted with: ECEN 865
Prerequisites: ECEN 305
Description: Introduction to the concepts of Information Theory and Redundancy removal. Simulation of various data compression schemes such as Delta Modulation, Differential Pulse Code Modulation, Transform Coding and Runlength Coding.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded

ECEN 466 Telecommunications Engineering I
Crosslisted with: ECEN 866
Prerequisites: ECEN 362; ECEN 461/861 or parallel.
Description: Standard telecommunications protocols, architecture of long distance integrated data networks, local area networks, wide area networks, radio and satellite networks. Network management, internetworking, system modeling and performance analysis.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option

ECEN 468 Microwave Engineering
Crosslisted with: ECEN 868
Prerequisites: ECEN 306
Description: Applications of active and passive devices to microwave systems. Includes impedance matching, resonators, and microwave antennas.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
Prerequisite for: ECEN 965

ECEN 469 Analog Integrated Circuits
Crosslisted with: ECEN 869
Prerequisites: ECEN 361
Description: Analysis and design of analog integrated circuits both bipolar and MOS. Basic circuit elements such as differential pairs, current sources, active loads, output drivers used in the design of more complex analog integrated circuits.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
Prerequisite for: ECEN 913

ECEN 470 Digital and Analog VLSI Design
Crosslisted with: ECEN 870
Prerequisites: ECEN 316; ECEN 370 or ECEN 313
Description: Introduction to VLSI design techniques for analog and digital circuits. Fabrication technology and device modelling. Design rules for integrated circuit layout. LSI design options with emphasis on the standard cell approach of digital and analog circuits. Lab experiments, computer simulation and layout exercises.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded

ECEN 471 Computer Communication Networks
Crosslisted with: ECEN 871
Prerequisites: ECEN 325
Description: High-speed access control protocols, routing protocols, traffic management, and network topologies. Giga-bit Ethernet, ATM, and TCP/IP. Performance modeling and simulation techniques.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option

ECEN 472 Image Understanding, Perception, and Signal Processing
Crosslisted with: ECEN 872
Prerequisites: ECEN 304 or graduate standing
Description: Introduces fundamental principles and theory for computer vision, image understanding, and pattern recognition, perception, and signal processing. Specific attention given to analysis of the geometric properties and appearance of objects in images, such as region size, connectedness, topology, color, and texture.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded

ECEN 473 Mobile and Personal Communications
Crosslisted with: ECEN 873
Prerequisites: ECEN 325
Description: Concepts on mobile and personal communications. Modulation techniques for mobile radio, equalization, diversity, channel coding, and speech coding.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option

ECEN 474 Digital Systems
Crosslisted with: ECEN 874
Prerequisites: ECEN 370
Description: Synthesis using state machines; design of digital systems; micro programming in small controller design; hardware description language for design and timing analysis.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
Prerequisite for: ECEN 477, ECEN 877

ECEN 475 Satellite Communications
Crosslisted with: ECEN 875
Prerequisites: ECEN 325
Description: The fundamental concepts of satellite communications. Orbits, launching satellites, modulation and multiplexing, multiple access, earth stations, coding, interference and special problems in satellite communications.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option

ECEN 476 Wireless Communications
Crosslisted with: ECEN 876
Prerequisites: ECEN 325 or ECEN 462 or parallel
Description: The fundamental concepts of wireless communications. Basic communications concepts such as multiple access and spectrum. Propagation, radio standards and internet working. Current issues in wireless communications.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Prerequisite for: ECEN 926; ECEN 977

ECEN 477 Digital Systems Organization and Design
Crosslisted with: ECEN 877
Prerequisites: ECEN 474 or ECEN 874
Description: Hardware development languages, hardware organization and realization, microprogramming, interrupt, intersystem communication, and peripheral interfacing.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded

ECEN 478 Practical Machine Learning
Crosslisted with: ECEN 878
Prerequisites: CSCE/ECEN 155E, CSCE 155A, or CSCE 155N
Description: Designed to provide a solid grasp of the methods of machine learning (ML) and how to build powerful ML models for discovering statistical regularities from both structured and unstructured data. Offers an introduction to Deep Learning for Computer Vision and Natural Language Processing.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded

ECEN 479 Optical Fiber Communications
Crosslisted with: ECEN 879
Prerequisites: ECEN 461/861
Description: Fundamentals of lightwave communication in optical fiber waveguides, physical description of fiber optic systems. Properties of the optical fiber and fiber components. Electro-optic devices: light sources and modulators, detectors and amplifiers; optical transmitter and receiver systems. Fiber optic link design and specification; fiber optic networks.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option
Prerequisite for: ECEN 979

ECEN 480 Introduction to Lasers and Laser Applications
Crosslisted with: ECEN 880, PHYS 480, PHYS 880
Prerequisites: PHYS 213/(UNO) PHYS 2130
Description: Physics of electronic transition production stimulated emission of radiation. Threshold conditions for laser oscillation. Types of lasers and their applications in engineering.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

ECEN 482 Antennas and Radio Propagation for Wireless Communications
Crosslisted with: ECEN 882
Prerequisites: ECEN 328
Description: Fundamental theory of antennas and radio propagation for wireless communications. Basic antenna characteristics and various antennas and antenna arrays. Basic propagation mechanisms and various channel models, such as Friis free space model, Hata model, lognormal distribution, and multipath model. Includes practical antenna design for high radio frequency (RF) with modeling software tools such as Numerical Electromagnetic Code (NEC) and Advanced Design System (ADS). Design projects will be assigned as the main part of course.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option

ECEN 484 Network Security
Crosslisted with: ECEN 884
Prerequisites: ECEN 325
Description: Network security and cryptographic protocols. Classical encryption techniques, block ciphers and stream cyphers, public-key cryptography, authentications digital signatures, key management and distributions, network vulnerabilities, transport-level security, IP security.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option

ECEN 486 Fundamentals of Photonics
Crosslisted with: ECEN 886
Prerequisites: ECEN 306
Description: Introduction to the use of electromagnetic radiation for performing optical measurements in engineering applications. Basic electromagnetic theory and light interaction with matter are covered with corresponding laboratory experiments conducted.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
Prerequisite for: ECEN 986

ECEN 487 Data and Network Security
Crosslisted with: CSCE 463, CSCE 863, ECEN 887
Prerequisites: A grade of "P" or "C" or better in CSCE 310, CSCE 310H, CSCE 311, SOFT 260, SOFT 260H or RAIK 283H.
Description: Concepts and principles of data and network security. Focuses on practical aspects and application of crypto systems in security protocols for networks such as the Internet. Topics include: applications of cryptography and cryptosystems for digital signatures, authentication, network security protocols for wired and wireless networks, cyberattacks and countermeasures, and security in modern computing platforms.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Offered: SPRING

ECEN 488 Wireless Security
Crosslisted with: ECEN 888
Prerequisites: ECEN 325
Description: A comprehensive overview on the recent advances in wireless network and system security. Covers security issues and solutions in emerging wireless access networks and systems as well as multihop wireless networks.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option

ECEN 491 Special Topics in Electrical and Computer Engineering IV
Crosslisted with: ECEN 891
Prerequisites: Senior standing
Description: Special topics in the emerging areas of electrical, computer, and electronics engineering which may not be covered in other courses in the electrical and computer engineering curriculum.
Credit Hours: 1-4
Min credits per semester: 1
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option

ECEN 492 Special Topics in Electrical and Computer Engineering IV
Crosslisted with: ECEN 892
Prerequisites: Senior standing
Notes: Requires an ECE departmentally approved proposal.
Description: Special topic in emerging areas of electrical and computer engineering which may not be covered in other courses in the electrical and computer engineering curriculum.
Credit Hours: 1-3
Min credits per semester: 1
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

ECEN 494 Electrical Engineering Capstone I
Prerequisites: ECEN 222 or ECEN 316; ECEN 313 or ECEN 370; ECEN 304; ECEN 306; ECEN 347; ENGL 151 (or JGEN 200)/(UNO) ENGL 1160
Notes: The first in a two semester electrical engineering capstone senior design course sequence.
Description: A substantial design project that allows application of electrical engineering skills to a multidisciplinary project. Requires project definition, planning and scheduling, effective written and oral communication of technical ideas, incorporation of realistic constraints and engineering standards, functioning effectively on a multidisciplinary team, and applying new ideas as needed to meet project goals.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
Grading Option: Graded
Offered: FALL/SPR
Prerequisite for: ECEN 495
Course and Laboratory Fee: $10

ECEN 495 Electrical Engineering Capstone II
Prerequisites: ECEN 494 or permission; admission to the College of Engineering.
Notes: The second in a two semester capstone senior design course sequence.
Description: A substantial design project that allows application of electrical engineering skills to a multidisciplinary project. Requires project definition, planning and scheduling, effective written and oral communication of technical ideas, incorporation of realistic constraints and engineering standards, functioning effectively on a multidisciplinary team, and applying new ideas as needed to meet project goals.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
ACE: ACE 10 Integrated Product
Course and Laboratory Fee: $10
Experiential Learning: Case/Project-Based Learning

ECEN 496 Computer Engineering Capstone I
Prerequisites: ECEN 433; ENGL 151 or JGEN 200 or (UNO) ENGL 1160.
Notes: The first in a two semester computer engineering capstone senior design course sequence.
Description: A substantial design project that allows application of computer engineering skills to a multidisciplinary project. Requires project definition, planning and scheduling, effective written and oral communication of technical ideas, incorporation of realistic constraints and engineering standards, functioning effectively on a multidisciplinary team, and applying new ideas as needed to meet project goals.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
Grading Option: Graded
Offered: FALL/SPR
Prerequisite for: ECEN 499

ECEN 498 Research in Electrical Engineering IV
Crosslisted with: ECEN 898
Prerequisites: Permission
Description: Research in a selected area of electrical engineering under the supervision and guidance of an Electrical and Computer Engineering faculty member.
Credit Hours: 1-6
Min credits per semester: 1
Max credits per semester: 6
Max credits per degree: 18
Grading Option: Graded with Option

ECEN 499 Computer Engineering Capstone II
Prerequisites: ECEN 496 or permission; admission to the College of Engineering.
Notes: The second in a two semester capstone senior design course sequence.
Description: A substantial design project that allows application of computer engineering skills to a multidisciplinary project. Requires project definition, planning and scheduling, effective written and oral communication of technical ideas, incorporation of realistic constraints and engineering standards, functioning effectively on a multidisciplinary team, and applying new ideas as needed to meet project goals.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
ACE: ACE 10 Integrated Product
Course and Laboratory Fee: $10

ECEN 499H Honors Thesis
Prerequisites: Senior standing in electrical engineering; admission to the University Honors Program
Description: Honors thesis research project meeting the requirements of the University Honors Program. Independent research project executed under the guidance of a member of the faculty of the Department of Electrical Engineering which contributes to the advancement of knowledge in the field. Culminates in the presentation of an honors thesis to the department and college.
Credit Hours: 1-3
Min credits per semester: 1
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

Career Information

The following represents a sample of the internships, jobs and graduate school programs that current students and recent graduates have reported.

Jobs of Recent Graduates

- Design Engineer & Project Manager, LI-COR Biosciences - Lincoln, NE
- Operations Management Trainee, Union Pacific - Hermston, OR
- Protection and Controls Engineer, Lincoln Electric System - Lincoln, NE
- System Engineer, NASA Marshall Space Flight Center - Huntsville, AL
- Engineering Leadership Program, National Instruments - Austin, TX
- Controls Engineer, Cleaver-Brooks - Lincoln, NE
- Assistant Electrical Engineer, Burns and McDonnell - Kansas City, MO
- Avionics Engineer, Textron Aviation - Wichita, KS
- Electrical Engineer, Black & Veatch - Kansas City, KS
- Instrumentation Engineer, ExxonMobil - Beaumont, TX
- Embedded Systems Engineer, Lockheed Martin - Denver, CO
- Orbital Vehicle Program Manager, United States Air Force - White Sands, NM
- Staff Engineer, IBM - Poughkeepsie, NY
- Software Engineer, Microsoft - Redmond, WA
- Protection Engineer, Nebraska Public Power District - Columbus, NE
- Electrical Engineer, U.S. Army Corps of Engineers - Omaha, NE
- Design Engineer, Garmin - Olathe, KS
- Technical Services Engineer, Epic Systems Corporation - Madison, WI
- Electrical Engineer, Raytheon - Tuscon, AZ
- Electrical Engineer, EAD Engineering - Omaha, NE
- Research Scientist, Pacific Gas & Electric - San Francisco, CA
- Design Engineer, Hexagon Lincoln - Lincoln, NE
- Assistant Engineer, Olsson Associates - Lincoln, NE
- Subtransmission and Distributions Asset Planning Engineer, NPPD - Norfolk, NE
- Assistant Electrical Engineer, Aviation & Federal, Burns & McDonnell - Kansas City, MO

Internships

- Electrical Engineering Intern, Burns and McDonnell - Kansas City, MO
- Summer IT Intern, Union Pacific - Omaha, NE
- Software Design Engineer Intern, LI-COR Biosciences - Lincoln, NE
- Electrical Project Engineer Intern, Nebraska Public Power District - Lincoln, NE
- NASA Summer Intern, NASA - Johnson Space Center - Houston, TX
- Electrical Engineering Co-op, OPPD - Omaha, NE
- Software Engineer, Avionics Interface Technologies - Elkhorn, NE
- Electronics Modules Engineer, Textron Aviation - Wichita, KS
- Electrical Engineering Co-op, Lincoln Electric System - Lincoln, NE
- Electrical Engineering Co-op, National Renewable Energy Lab - Golden, CO
- Electrical Engineering Intern, Becton Dickinson - Broken Bow, NE
- Energy Sciences Research Summer Internship, Nebraska Center for Energy Sciences Research - Lincoln, NE
- Electrical Intern, Davis Design - Lincoln, NE
- Electrical Engineering Co-op, Altec Industries - St. Joseph, MO
- Electrical Engineer Intern, Black & Veatch Corporation - Overland Park, KS
- Research & Development Intern, J.A. Woollam Company - Lincoln, NE
- Electrical Engineering Intern, Textron Aviation-Cessna Brand - Wichita, KS
- Electrical Engineering Co-op, General Electric - Atlanta, GA
- Intern, ARUP - New York, NY
- Intern, Sandhills Publishing - Lincoln, NE
- Student Technician/Power Electrical Team, Olsson Associates - Lincoln, NE
- Electrical Engineering Co-op, NASA - Marshall Space Flight Center - Huntsville, AL
- Quality Engineering Intern, Schneider Electric - Lincoln, NE
- Electrical Engineering Co-op, Communication Systems Solutions - Lincoln, NE
- Research and Development Intern, Vishay - Columbus, NE

Graduate & Professional Schools

- Ph.D., Electrical Engineering, University of Nebraska-Lincoln - Lincoln, NE
- Juris Doctor, University of Nebraska- Lincoln - Lincoln, NE
- Ph.D., Electrical Engineering, Stanford University - Palo Alto, CA
- Master's in Robotics Engineering, Northwestern - Evanston, IL
- Master's in Electrical Engineering, Rice University - Houston, TX
- Ph.D., Biomedical Engineering, University of Nebraska-Lincoln - Lincoln, NE
- Ph.D., Electrical Engineering Systems, University of Michigan - Ann Arbor, MI
- Master's in Electrical Engineering, University of Southern California - Los Angeles, CA
- Ph.D., Computer Science, University of Colorado - Boulder, CO
- Master's in Business Administration, University of Nebraska-Lincoln - Lincoln, NE
- Master's in Energy Systems, Northeastern University - Boston, MA
- Master's in Electrical Engineering, University of Kansas - Lawrence, KS
- Master's in Business Administration, University of Nebraska Omaha - Omaha, NE
- Master's in Agricultural and Biological Systems Engineering, University of Nebraska-Lincoln - Lincoln, NE
- Master's in Electrical Engineering, Purdue University - West Lafayette, IN
- Ph.D., Electrical Engineering, Syracuse University - Syracuse, NY