

ROBOTICS ENGINEERING MINOR

Description

This interdisciplinary minor prepares students to understand, design, develop, and implement robotic systems. Robotic systems are composed of embedded systems, motors, sensors, actuators, and interfaces requiring an understanding of dynamics, control, sensing, artificial intelligence, human-robot interaction, and embedded computing and programming. Students will prepare for careers in robotic systems and related automated vehicle design, and for related graduate studies.

This minor is available to all majors. Consult with your advisor before declaring this minor.

The robotics engineering minor is jointly administered by the:

- Electrical and Computer Engineering Department (ECE)
- School of Computing
- Mechanical and Materials Engineering Department (MME)

Note that the College Entrance Requirements shown below apply only to students in the College of Engineering.

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 from colleges outside of the NU system. Although the University of Nebraska–Lincoln and the College of Engineering in general accepts C- and 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.

Requirements for Minor Offered by Department

The robotics engineering minor consists of three core courses and three elective courses. When selecting electives, the student must take two courses outside of their major area of study. For example, a student in mechanical engineering might take an elective from the School of Computing and one from the Department of Electrical Engineering.

Core Requirements

Select one course from each of the three following topic areas:

Topic Area: Core Programming ¹ 3-4

CSCE 155A	Computer Science I
CSCE 155E	Computer Science I: Systems Engineering Focus
CSCE 155H	Honors: Computer Science I
CSCE 155N	Computer Science I: Engineering and Science Focus
CSCE 155T	Computer Science I: Informatics Focus
CSCE 156	Computer Science II
CIST 1400	UNO course

Topic Area: Controls 3-4

ECEN 220	Introduction to Embedded Systems
ECEN 444	Linear Control Systems
ECEN 491	Special Topics in Electrical and Computer Engineering IV
MECH 350	Introduction to Dynamics and Control of Engineering Systems

Topic Area: Embedded Systems 3-4

ECEN 106	Microprocessor Applications
CSCE 336	Embedded Systems
MECH 457	Mechatronic Systems Design

Credit Hours Subtotal: 9-12

Elective Requirements

Three courses from the following list of electives are required; two must be outside your department. 7-10

CSCE 436	Advanced Embedded Systems
CSCE 439	Robotics: Algorithms and Applications

CSCE 473	Computer Vision
CSCE 476	Introduction to Artificial Intelligence ²
CSCE 4XX	special topics courses on Robotics
ECEN 345	Mobile Robotics I
ECEN 428	Power Electronics
ECEN 433	Microprocessor System Design
ECEN 435	Embedded Microcontroller Design
ECEN 444	Linear Control Systems
ECEN 460	Labview Programming
ECEN 462	Communication Systems
ECEN 498	Research in Electrical Engineering IV
MECH 342	Kinematics and Dynamics of Machinery
MECH 450	Mechanical Engineering Control Systems Design
MECH 442	Intermediate Kinematics
MECH 444	Intermediate Dynamics of Machinery
MECH 449	Advanced Dynamics
MECH 453	Robotics: Kinematics and Design
MECH 458	Digital Control of Mechanical Systems
MECH 488	Kinematics and Machine Design Laboratory
Credit Hours Subtotal:	7-10
Total Credit Hours	16-22

¹ AP or transfer credit equating to CSCE 155 may also apply.

² On the Omaha Campus—similar courses being offered by CIST could be substitutions.

Grade Rules

Pass/No Pass

No course taken Pass/No Pass will be counted toward the minor.