ROBOTICS ENGINEERING MINOR

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

The robotics engineering minor is jointly administered by the Departments of:

- Electrical and Computer Engineering (ECE)
- Computer Science and Engineering (CSE)
- Mechanical and Materials Engineering (MME)

College Requirements
College Admission
College 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 (chemical requirement waived for students in construction management)
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.
7. Students having an ACT score of 19 or less in English (or equivalent SAT score) must take ENGL 150 Writing and Inquiry or ENGL 151 Writing and Argument.

A total of 16 units is required for admission.

Students must have an ACT (enhanced) score of 24 or greater (or equivalent SAT). Students who lack entrance requirements may be admitted based on ACT scores, high school rank and credits, or may be admitted to pre-engineering status in the Exploratory and Pre-Professional Advising Center. Pre-engineering students are advised within the Exploratory and Pre-Professional Advising Center.

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

Students who lack entrance requirements 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 Exploratory and Pre-Professional Advising Center or other Colleges at Nebraska.

Students should consult their advisor, their department chair, or Engineering Student Services 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 freshman entrance requirements and 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 at Kearney and at 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.

All transfer students must adopt the curricular requirements of the undergraduate catalog current at the time of transfer to the COE—not that in use when they entered the University of Nebraska–Lincoln. Upon admission to Nebraska, students wishing to pursue degree programs in the COE will be classified and subject to the policies defined in the subsequent section.

Students who were previously admitted to COE and are returning to the College of Engineering must demonstrate a cumulative GPA of 2.5 in order 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 his/her instructor and appropriate department chair or school director (in that order). If a satisfactory solution is not achieved, the student may appeal his/her case through the College Academic Appeals Committee on his/her campus.

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 graduation.

Requirements for Minor Offered by Department
This minor is available to all majors. Consult with your advisor before declaring this minor.

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 Department of Computer Science and Engineering and one from the Department of Electrical Engineering.
Core Requirements
Select one course from each of the three following topic areas:

<table>
<thead>
<tr>
<th>Topic Area: Core Programming</th>
<th>3-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCE 155A</td>
<td>Computer Science I</td>
</tr>
<tr>
<td>CSCE 155E</td>
<td>Computer Science I: Systems Engineering Focus</td>
</tr>
<tr>
<td>CSCE 156</td>
<td>Computer Science II</td>
</tr>
<tr>
<td>CIST 1400</td>
<td>UNO course</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Topic Area: Controls</th>
<th>3-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECEN 220</td>
<td>Introduction to Embedded Systems</td>
</tr>
<tr>
<td>ECEN 444</td>
<td>Linear Control Systems</td>
</tr>
<tr>
<td>ECEN 491</td>
<td>Special Topics in Electrical and Computer Engineering IV</td>
</tr>
<tr>
<td>MECH 350</td>
<td>Introduction to Dynamics and Control of Engineering Systems</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Topic Area: Embedded Systems</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECEN 106</td>
<td>Microprocessor Applications</td>
</tr>
<tr>
<td>CSCE 336</td>
<td>Embedded Systems</td>
</tr>
<tr>
<td>MECH 457</td>
<td>Mechatronic Systems Design</td>
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</tbody>
</table>

Credit Hours Subtotal: 9-10

Elective Requirements
Three courses from the following list of electives are required; two must be outside your department.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
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</thead>
<tbody>
<tr>
<td>CSCE 436</td>
<td>Advanced Embedded Systems</td>
</tr>
<tr>
<td>CSCE 439</td>
<td>Robotics: Algorithms and Applications</td>
</tr>
<tr>
<td>CSCE 473</td>
<td>Computer Vision</td>
</tr>
<tr>
<td>CSCE 476</td>
<td>Introduction to Artificial Intelligence</td>
</tr>
<tr>
<td>CSCE 4XX</td>
<td>special topics courses on Robotics</td>
</tr>
<tr>
<td>ECEN 345</td>
<td>Mobile Robotics I</td>
</tr>
<tr>
<td>ECEN 400</td>
<td>Electronic Instrumentation</td>
</tr>
<tr>
<td>ECEN 428</td>
<td>Power Electronics</td>
</tr>
<tr>
<td>ECEN 433</td>
<td>Microprocessor System Design</td>
</tr>
<tr>
<td>ECEN 435</td>
<td>Embedded Microcontroller Design</td>
</tr>
<tr>
<td>ECEN 444</td>
<td>Linear Control Systems</td>
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<tr>
<td>ECEN 460</td>
<td>Labview Programming</td>
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<tr>
<td>ECEN 462</td>
<td>Communication Systems</td>
</tr>
<tr>
<td>ECEN 498</td>
<td>Special Topics in Electrical Engineering IV</td>
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<tr>
<td>MECH 342</td>
<td>Kinematics and Dynamics of Machinery</td>
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<tr>
<td>MECH 450</td>
<td>Mechanical Engineering Control Systems Design</td>
</tr>
<tr>
<td>MECH 442</td>
<td>Intermediate Kinematics</td>
</tr>
<tr>
<td>MECH 444</td>
<td>Intermediate Dynamics of Machinery</td>
</tr>
<tr>
<td>MECH 449</td>
<td>Advanced Dynamics</td>
</tr>
<tr>
<td>MECH 453</td>
<td>Robotics: Kinematics and Design</td>
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<tr>
<td>MECH 458</td>
<td>Digital Control of Mechanical Systems</td>
</tr>
<tr>
<td>MECH 488</td>
<td>Kinematics and Machine Design Laboratory</td>
</tr>
</tbody>
</table>

Credit Hours Subtotal: 7-10

Total Credit Hours 16-20

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.