

Robotics, Additional Major

Additional Major in Robotics

Overview

Robotics at Carnegie Mellon University focuses on the theme that robotics is both multidisciplinary and interdisciplinary. This means that it draws from many fields, such as mechanical engineering, computer science and electrical engineering, and it also integrates these fields in a novel manner. The foundation of this program lies in motion and control. Upon this base, sensing, cognition, and action are layered. Since robotics involves building artifacts that embody these fundamentals, foci, and systems thinking, there is a "hands-on" course requirement. These foci are brought together by a unique systems perspective special to robotics. Students will complete a capstone course that will tie together previously learned skills and knowledge. A 3.0 QPA in the Additional Major curriculum is required for graduation. Courses that are taken Pass/Fail or audited cannot be counted for the Additional Major.

Double-Counting Restriction

Students are permitted to double count a maximum of six courses from their Primary Major towards the Additional Major in Robotics. CS Majors are permitted to double count a maximum of five courses from their Primary Major towards the Additional Major in Robotics.

Applications open at the beginning of the Fall and Spring semesters and close after mid-term grades are posted. Please use this link (<https://www.ri.cmu.edu/education/academic-programs/additional-major-in-robotics/>) if you're interested in applying or learning more.

Prerequisites: Successful candidates for the Robotics Additional major will have prerequisite knowledge of C language, basic programming skills, and familiarity with basic algorithms. Students can gain this knowledge by taking 15-122 Principles of Imperative Computation.

Curriculum Requirements

Required Courses

There are 10 requirements below in total (one from each category plus two electives):

Overview (one of the following):		Units
16-280	Intelligent Robot Systems	12
16-281	General Robotics (formerly 16-311)	12
Controls (choose one of the following):		Units
06-464	Chemical Engineering Process Control	9
16-299	Introduction to Feedback Control Systems	12
18-370	Fundamentals of Control	12
24-451	Feedback Control Systems	12
24-773	Multivariable Linear Control	12
Mechanisms and Manipulation (one of the following options)		Units
16-384	Robot Kinematics and Dynamics	12
OR take both of the following courses		
15-362	Computer Graphics	12
33-141	Physics I for Engineering Students	12
Sensing and Perception (one of the following)		
15-387	Computational Perception	9
15-463	Computational Photography	12
16-322	Modern Sensors for Intelligent Systems	12
16-385	Computer Vision	12
16-886	Embodied Artificial Intelligence Safety	12
85-370	Cognitive Neuropsychology Research Methods	9
16-xxx	Upper-level RI course with instructor and Program Director's permission	9-12
Ethics (one of the following)		Units
16-161	Artificial Intelligence and Humanity	12
16-735	Ethics and Robotics	12

Robot Building Practices (choose one of the following)

16-220	Robot Building Practices	12
16-362	Mobile Robot Algorithms Laboratory	12
18-349	Introduction to Embedded Systems	12
18-578	Mechatronic Design	12
18-500	ECE Design Experience	12
24-671	Electromechanical Systems Design	12

Capstone Sequence

Units

To be taken during senior fall

16-450	Robotics Systems Engineering	12
Can be taken concurrently with the Controls requirement.		

To be taken during senior spring (one of the following)

16-474	Robotics Capstone	12
All other students		
24-441	Product Design	12
for MechE students only		

Two general robotics electives

Units

16-3xx and 16-4xx are pre-approved.

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Students may count up to 12 units

of either 16-597 Undergraduate

Reading and Research or 99-270

Summer Undergraduate Research

Apprenticeship towards the major

requirements. Graduate-level

Robotics courses and electives

outside the Robotics Institute may be

used to fulfill elective requirements

with prior approval from the RI

Undergraduate Program Director.