Robotics and Autonomous Systems Minor (CMSC)

For any questions, please contact robotics-minor@umd.edu.

The Robotics and Autonomous Systems (RAS) minor is open to students majoring in Aerospace Engineering, Electrical and Computer Engineering, Mechanical Engineering, and Computer Science. The minor takes a multidisciplinary approach to robotics in which students gain knowledge about the design, control, programming, and integration of robotics and autonomous systems. With an emphasis on hands-on experiences, students will gain practical skills through coursework, group projects, and research. Students will have the opportunity to participate as peer mentors and tutors. The minor program will also include regular interactions with academic, corporate, and/or governmental leaders in robotics, who will serve as both mentors and professional contacts.

Program Learning Outcomes
1. Students will demonstrate the ability to apply advanced technical skills required to approach and resolve problems in the Robotics and Autonomous System (RAS) through upper-level RAS-related coursework in computer science and engineering disciplines.
2. Students will be able to apply the broad interdisciplinary aspects of RAS, such as the design, control, programming, and integration of complex robotic systems.
3. Students will obtain hands-on experience and demonstrate problem-solving skills in robotics through advanced coursework, experiential learning, and research.
4. Students will gain a sophisticated understanding of the range of professional opportunities available in RAS as a result of first-hand interactions with RAS faculty and professionals.

Requirements

Prerequisites

Course | Title | Credits
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MATH246 | Differential Equations for Scientists and Engineers or ENES221 Dynamics | 3-4
One of the following:
CMSC131 | Object-Oriented Programming I | 3-4
ENME202 | Computing Fundamentals for Engineers | 3-4
ENAE202 | Computing Fundamentals for Engineers | 3-4
ENEE150 | Intermediate Programming Concepts for Engineers | 3-4

Supporting Math Course (Required. Select one course. Must be completed prior to enrollment in CMSC477)

Course | Title | Credits
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MATH240 | Introduction to Linear Algebra | 3-4
MATH461 | Linear Algebra for Scientists and Engineers | 3-4

Electives (select two courses):

Course | Title | Credits
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ENME400 | Machine Design | 3-4
ENME410 | Design Optimization | 3-4
ENME461 | Control Systems Laboratory | 3-4
ENME489 | Special Topics in Mechanical Engineering (ENME489L Bioinspired Robotics, ENME489B Mechatronics and the Internet of Things) | 3-4
ENME467 | Engineering for Social Change | 3-4
ENME444 | Assistive Robotics | 3-4
ENME476 | Micromechanical Systems (MEMS) I | 3-4
ENEE440 | Microprocessors | 3-4
ENEE460 | Control Systems | 3-4
ENEE461 | Control Systems Laboratory | 3-4
ENEE425 | Digital Signal Processing | 3-4
ENEE426 | Communication Networks | 3-4
ENEE408 | Capstone Design Project (ENEE408I Capstone Autonomous Robotics) | 3-4
ENAE380 | Flight Software Systems | 3-4
ENAE441 | Space Navigation and Guidance | 3-4
ENAE403 | Aircraft Flight Dynamics | 3-4
ENAE432 | Control of Aerospace Systems | 3-4
CMSC421 | Introduction to Artificial Intelligence | 3-4
CMSC422 | Introduction to Machine Learning | 3-4
CMSC426 | Computer Vision | 3-4
CMSC427 | Computer Graphics | 3-4
CMSC451 | Design and Analysis of Computer Algorithms | 3-4

Total Credits | 21-22

Requirements

A minimum grade of C- or better is required for all minor and all prerequisite courses. A maximum of 2 courses may be used to satisfy the requirements of both a major and a minor.

Course | Title | Credits
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Required Courses | 12
ENME480 | Introduction to Robotics | 3-4
ENAE450 | Robotics Programming | 3-4
ENEE467 | Robotics Project Laboratory | 3-4
CMSC477 | Robotics Perception and Planning | 3-4

Total Credits | 21-22