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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Robotics and Autonomous Systems (RAS) Minor Prerequisites
MATH246 | Differential Equations for Scientists and Engineers or ENES221 Dynamics | 4
One of the following:
CMSC131 | Object-Oriented Programming I | 4
ENME202 | Computing Fundamentals for Engineers | 4
ENAE202 | Computing Fundamentals for Engineers | 4
ENEE150 | Intermediate Programming Concepts for Engineers | 4

Electives (select two courses): 6
- ENME400 Machine Design
- ENME410 Design Optimization
- ENME461 Control Systems Laboratory
- ENME489 Special Topics in Mechanical Engineering (ENME489L Bioinspired Robotics, ENME489B Mechatronics and the Internet of Things)
- ENME467 Engineering for Social Change
- ENME444 Assistive Robotics
- ENME476 Micromechanical Systems (MEMS) I
- ENEE440 Microprocessors
- ENEE460 Control Systems
- ENEE461 Control Systems Laboratory
- ENEE425 Digital Signal Processing
- ENEE426 Communication Networks
- ENEE408 Capstone Design Project (ENEE408I Capstone Autonomous Robotics)
- ENAE380 Flight Software Systems
- ENAE441 Space Navigation and Guidance
- ENAE403 Aircraft Flight Dynamics
- ENAE432 Control of Aerospace Systems
- CMSC421 Introduction to Artificial Intelligence
- CMSC422 Introduction to Machine Learning
- CMSC426 Computer Vision
- CMSC427 Computer Graphics
- CMSC451 Design and Analysis of Computer Algorithms

Total Credits 21-22

Supporting Math Course (Required. Select one course. Must be completed prior to enrollment in CMSC477) 3-4
- MATH240 Introduction to Linear Algebra
- MATH461 Linear Algebra for Scientists and Engineers

Electives (select two courses): 6
- ENME400 Machine Design
- ENME410 Design Optimization
- ENME461 Control Systems Laboratory
- ENME489 Special Topics in Mechanical Engineering (ENME489L Bioinspired Robotics, ENME489B Mechatronics and the Internet of Things)
- ENME467 Engineering for Social Change
- ENME444 Assistive Robotics
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Total Credits 21-22

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
- ENAE450 Robotics Programming
- ENEE467 Robotics Project Laboratory
- CMSC477 Robotics Perception and Planning