

ASSISTIVE SYSTEMS AND ROBOTICS ENGINEERING (ASRE)

ASRE 150 Introduction to Robotics (4 crs)

Prerequisite: MATH 109 or concurrent enrollment

Introduction to fundamentals of robotics engineering: programming, motion, sensors, and controls. Foundations of human-robot systems and the application of robotics to improve quality of life. Lab will include hands-on building and operation of robotic systems.

Lecture/Discussion Hours: 3

Lab/Studio Hours: 2

ASRE 300 Sensors and Actuators (4 crs)

Prerequisite: ASRE 150; PHYS 350; PHYS 255 (may be taken concurrently); MATH 312

• *This course requires access to a laptop computer which can be brought to class when required. Please see the Assistive Systems and Robotics Engineering laptop requirement page: <https://www.uwec.edu/physics-and-astronomy/assistive-systems-and-robotics-engineering-laptop-requirements>*

This course introduces the principles, design, and applications of sensors and actuators with a focus on their role in robotic and mechatronic systems. Students will study the physical foundations, operating characteristics, and performance parameters of a wide range of transducers and actuators, from classical devices to modern micro- and nano-scale technologies.

Grading Basis: A-F Grades Only

Lecture/Discussion Hours: 3

Lab/Studio Hours: 2

ASRE 310 Control Theory and Applications (4 crs)

Prerequisite: ASRE 150; MATH 312

• *This course requires access to a laptop computer, which you can bring to class when needed. Please see the Assistive Systems and Robotics Engineering laptop requirement page: <https://www.uwec.edu/physics-and-astronomy/assistive-systems-and-robotics-engineering-laptop-requirements>*

This course introduces the fundamental principles and practical applications of control theory, with an emphasis on assistive systems and robotic platforms. Students will explore classical control methods, such as PID and frequency-domain analysis, as well as modern control topics, including state-space modeling, observer design, and digital control.

Grading Basis: A-F Grades Only

Lecture/Discussion Hours: 3

Lab/Studio Hours: 2

ASRE 400 System Integration in Assistive Robotics (4 crs)

Prerequisite: PHYS 350; PHYS 255; MATH 312; ASRE 300; ASRE 310 (may be taken concurrently)

• *This course requires access to a laptop computer which can be brought to class when required. Please see the Assistive Systems and Robotics Engineering laptop requirement page: <https://www.uwec.edu/physics-and-astronomy/assistive-systems-and-robotics-engineering-laptop-requirements>*

This course explores the principles and practices of integrating sensors, actuators, and control systems into complete robotic platforms. Building on the foundations Sensors and Actuators and applying the concepts as taught in Control Theory and Applications, students will learn how to design, assemble, and validate multi-component robotic systems that operate autonomously and interact safely with humans and their environment.

Grading Basis: A-F Grades Only

Lecture/Discussion Hours: 3

Lab/Studio Hours: 2

ASRE 486 ASRE Capstone I (2 crs)

Prerequisite: MSE 256, MSE 386, PHYS 350, ASRE 300

Consent: Instructor Consent Required

First of a two-course capstone sequence. Hands-on, project-based experiences including engineering design, engineering standards and project management.

Lab/Studio Hours: 0

Seminar Hours: 4

ASRE 487 ASRE Capstone II (2 crs)

Prerequisite: ASRE 486

Second of a two-course capstone sequence. Conclusion of student-designed projects accompanied by preparation of multiple technical documents.

Attributes: LE-11 Integration

Lab/Studio Hours: 0

Seminar Hours: 4
