

ROBOTICS AND AUTOMATION ENGINEERING (APB)

Exploration and Discovery

Overview

The Robotics and Automation Engineering Applied Bachelor's degree at Plymouth State University emphasizes two primary areas:

The first area is Automation Engineering. Automation engineers design, develop and implement custom tools and programs to automate technical operations. Solutions can range from simple data acquisition protocols through design and programming of industrial robots and systems for manufacturing using Human Machine Interface/Supervisory Control and Data Acquisition (HMI/SCADA) interfaces, and Programmable Logic Controller (PLC) Programming.

The second area, Mobile Robotics, focuses on the application of sensory data acquisition, navigation, and mobility. This includes the operation of Autonomous Mobile Robots (AMRs), which utilize cameras, machine learning and vision, and sensors to navigate and function autonomously or with assistance. The integration of these technologies highlights the importance of robotics in enhancing operational efficiency and automation in various industries.

Our students work hands-on in a multidisciplinary field that combines computer science, engineering, and artificial intelligence to design, build, and utilize robots for various applications, including industrial automation, manufacturing and research processes, and includes autonomy and teleoperative capabilities.

Degree Requirements

Course	Title	Credits
CS 2010	Computing Fundamentals (TECO)	3
CS 2220	Computer Hardware	3
CS 2370	Introduction to Programming	4
CS 2900	Digital and Analog Circuits	4
CS 2901	Materials, Design and Fabrication	4
CS 2905	PLC Programming	4
CS 3690	Applied Robotics	4
CS 3901	Industrial Robotics	4
CS 3902	Adaptive Control Systems	4
CS 4520	CyberEthics (DICO,WRCO)	3
CS 4790	Robotics Capstone	4
or CS 4920	Computer Science Internship	
MA 2130	Precalculus (QRCO)	4
MA 2550	Calculus I (QRCO)	4
MA 2300	Statistics I (QRCO)	3
or MA 3500	Probability and Statistics for Scientists	
PH 2510	University Physics I	4
PH 2520	University Physics II	4
General Education (https://coursecatalog.plymouth.edu/general-education/)		
IS 1115	Tackling a Wicked Problem	4
EN 1400	Composition	4

CTDI (https://coursecatalog.plymouth.edu/general-education/#CTDI)	Creative Thought Direction	3-4
PPDI (https://coursecatalog.plymouth.edu/general-education/#PPDI)	Past and Present Direction	3-4
SIDI (https://coursecatalog.plymouth.edu/general-education/#SIDI)	Scientific Inquiry Direction	3-4
SSDI (https://coursecatalog.plymouth.edu/general-education/#SSDI)	Self and Society Direction	3-4
GACO (https://coursecatalog.plymouth.edu/general-education/#GACO)	Global Awareness Connection	3-4
IS 4220	Signature Project (INCO,INCP)	4
Electives ¹		4-9
Total Credits		96

¹ Students interested in pursuing advanced degrees in Robotics or Engineering could consider using their elective credits to complete the Technical Math Minor by adding MA 2560 Calculus II and MA 3600 Differential Equations and Linear Algebra to their list of courses.

Recommended Course Sequence

Course	Title	Credits
Year One		
Fall		
CS 2010	Computing Fundamentals (TECO)	3
CS 2901	Materials, Design and Fabrication	4
IS 1115	Tackling a Wicked Problem	4
EN 1400	Composition	4
Credits		15
Spring		
CS 2370	Introduction to Programming	4
CS 2900	Digital and Analog Circuits	4
MA 2550	Calculus I (QRCO)	4
or MA 2130	or Precalculus (QRCO)	
Directions (choose from CTDI, PPDI, SIDI, SSDI) (https://coursecatalog.plymouth.edu/general-education/)		3-4
Credits		15-16
Year Two		
Fall		
CS 3690	Applied Robotics	4
CS 2220	Computer Hardware	3
MA 2550	Calculus I (QRCO)	3
or MA 2560	or Calculus II (QRCO)	

PH 2510	University Physics I	4	• Robotics programmer
Credits		14	• Industrial automation developer
Spring			
CS 2905	PLC Programming	4	• Robotics and automation specialist
MA 2300 or MA 3500	Statistics I (QRCO) or Probability and Statistics for Scientists	4	• Automation platform architect
PH 2520	University Physics II	4	• Field Operations Engineer
Directions (choose from CTDI, PPDl, SIDI, SSDI) (https:// coursecatalog.plymouth.edu/general-education/)		3-4	• Control system designer / technician
Elective		3-4	• Robotics engineer / technician
Credits		18-20	• Mechatronics technician
Year Three			
Fall			
CS 3901	Industrial Robotics	4	
CS 4520	CyberEthics (DICO,WRCO)	3	
Directions (choose from CTDI, PPDl, SIDI, SSDI) (https:// coursecatalog.plymouth.edu/general-education/)		4	
Elective		4	
GACO (https:// coursecatalog.plymouth.edu/ general-education/ #GACO)	Global Awareness Connection	3-4	
Credits		18-19	
Spring			
CS 3902	Adaptive Control Systems	4	
CS 4790	Robotics Capstone	4	
IS 4220	Signature Project (INCO,INCP)	4	
Directions (choose from CTDI, PPDl, SIDI, SSDI) (https:// coursecatalog.plymouth.edu/general-education/)		3-4	
Credits		15-16	
Total Credits		96	

Learning Outcomes

Students who complete the Applied Robotics program at PSU will graduate with:

- A solid foundation in core robotics and automation concepts reinforced by studies in mathematics, physics, and computer science.
- An understanding of the basic dynamics of, and demonstrable familiarity with, numerous state-of-the-art automation technologies used within process and manufacturing industries. PLYMOUTH STATE UNIVERSITY | 2024 Pilot 96-Credit, Three-Year Programs
- The knowledge needed to design, analyze, model and simulate robotic and automation problems and develop solutions which increase productivity, well-being, improve resource utilization, and eliminate waste.
- An ability to apply current robotics and automation engineering concepts and theories to contemporary, real-world problems in manners which demonstrate comprehension of the tradeoffs involved in design choices.
- Proven professional and social skills needed to work both self-directed or in teams to succeed in careers in Automation Engineering or adjacent fields.

Career Pathways

- Automation Engineer