ROBOTICS (BS)

Exploration and Discovery

Students will learn to understand, design, program, build and control a wide range of robots and other autonomous systems. This integrated program provides a holistic introduction to the world of Robotics, beginning with the underlying electromechanical principles, manufacturing fundamentals and introductory programming. Students will continue to master a variety of control units and learn to design and build custom solutions from scratch. During the buffet-style program core, students choose which robotic applications they wish to explore in depth. Finally a real-world capstone project facilitates the transition to gainful employment in industry.

Degree Requirements

Course	Title	Credits
Major Requirements		
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 3500	Introduction to Artificial Intelligence	3
CS 3690	Applied Robotics	4
CS 3890	Engineering Design	3
CS 3901	Industrial Robotics	4
CS 3902	Adaptive Control Systems	4
CS 3905	Mobility, Autonomy, and Teleoperation	4
CS 4520	CyberEthics (DICO,WRCO)	3
CS 4790	Robotics Capstone	4
or CS 4920	Computer Science Internship	
MA 2130	Precalculus (QRCO)	4
MA 2300	Statistics I (QRCO)	3
or MA 3500	Probability and Statistics for Scientists	
MA 2550	Calculus I (QRCO)	4
PH 2510	University Physics I	4
PH 2520	University Physics II	4
General Education (https://coursecatalog.plymouth.edu/general-education/)		
EN 1400	Composition	4
IS 1115	Tackling a Wicked Problem	4
CTDI (https://coursecatalog.plymouth.edu/general-education/#CTDI)	Creative Thought	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
Directions (choose from CTDI, PPDI, SIDI, SSDI) (https://coursecatalog.plymouth.edu/general-education/)		4-8
WECO (https://coursecatalog.plymouth.edu/general-education/#WECO)	Wellness Connection	3-4
GACO Global Awareness Connection		3-4
INCP (https://coursecatalog.plymouth.edu/general-education/#INCP)	Integrated Capstone	4
Electives		16-6
Total Credits		**120**

[1] Directions should total 20 credits (unless the major has a waiver for a specific Direction).

Recommended Course Sequence

Check all course descriptions for prerequisites before planning course schedule. Course sequence is suggested but not required.

To complete the bachelor's degree in 4 years, you must successfully complete a minimum of 15 credits each semester or have a plan to make up credits over the course of the 4 years. For example, if you take 14 credits one semester, you need to take 16 credits in another semester. Credits completed must count toward your program requirements (major, option, minor, certificate, general education or free electives).

Course	Title	Credits
Year One		
EN 1400	Composition	4
IS 1115	Tackling a Wicked Problem	4
CS 2010	Computing Fundamentals (TECO)	3
CS 2370	Introduction to Programming	4
CS 2900	Digital and Analog Circuits	4
CS 2901	Materials, Design and Fabrication	4
MA 2130	Precalculus (QRCO)	4
CTDI (https://coursecatalog.plymouth.edu/general-education/#CTDI)	Creative Thought Direction	3-4
	Credits	**30-31**
Year Two		
CS 2470	Systems Programming in C/C++	2
CS 2905	PLC Programming	4

CS 3240	Data Communication and Computer Networks	3
Major Elective		3-4
Electives		3-4
MA 2300	Statistics I (QRCO)	3
MA 2550	Calculus I (QRCO)	4
SIDI (https://coursecatalog.plymouth.edu/general-education/#SIDI)	Scientific Inquiry Direction	3-4
PPDI (https://coursecatalog.plymou general-education/#PPDI)	Past and Present Direction	3-4
	Credits	**28-32**
Year Three		
CS 3420	Introduction to Cybersecurity	3
CS 3890	Engineering Design	3
CS 4520	CyberEthics (DICO,WRCO)	3
Major Electives		6-8
Electives		6-9
World Language Requirement		
GACO (https://coursecatalog.plymou general-education/#GACO)	Global Awareness Connection	3-4
SSDI (https://coursecatalog.plymouth.edu/general-education/#SSDI)	Self and Society Direction	3-4
	Credits	**27-34**
Year Four		
CS 4790	Robotics Capstone	4
Major Electives		6-8
Electives		6-8
Directions (choose from CTDI, PPDI, SIDI, SSDI) (https://coursecatalog.plymouth.edu/general-education/)		3-4
DICO (https://coursecatalog.plymouth.edu/general-education/#DICO)	Diversity Connection	3-4
WECO (https://coursecatalog.plymou general-education/#WECO)	Wellness Connection	3-4
INCP (https://coursecatalog.plymouth.edu/general-education/#INCP)	Integrated Capstone	4
	Credits	**29-36**
	Total Credits	**120**

[1] Directions should total 20 credits (unless the major has a waiver for a specific Direction).

Learning Outcomes

- Systematically interpret, analyze, and evaluate real-world problems with stakeholders.
- Translate real world problems into the technical scope, create problem definitions and systems proposals that specify the system to be implemented.
- The ability to select the appropriate tools, methods, machines, languages, and general approaches to a given problem solution.
- Design, build, and assemble robots and other hardware in a safe fashion.
- Develop software to control such hardware using common software design principles in a variety of languages.
- Properly test machinery using standard protocols to assure functionality, usability, and safety.

Career Pathways

Computers are used in virtually every industry which requires employees who specialize in computer science. Computer science is not simply a study of how to use computers and various software. Although all computer scientists are proficient in using computers with various operating systems and a variety of software, they have a larger goal: they design and construct or configure computer hardware and software to be used by others. With the need for computers in virtually every industry, the need for employees who specialize in computer science and can incorporate new technologies is ever increasing.

For more information, visit the Career Services site.

Here is a link to A guide for women in STEM created by DDS (Discover Data Science), including STEM scholarship opportunities for women.

Sample Job Titles:

- Computer Programmer
- Computer Systems Manager
- Control Engineer
- Database Administrator
- Manager, Management Information Systems
- Network Administrator
- Quality Assurance Specialist
- Robot Software Engineer
- Robot System Engineer
- Software Designer
- Software Developer
- Software Engineer
- System Analyst
- Web Application Developer
- Technical Writer
- Web Designer

Useful Skills for Jobs in Computing Disciplines:

- Ability to analyze cause and effects
- Ability to think logically and critically
- Strong communication skills
- Mathematical background