

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 2900	Introduction to Electronic Circuitry	4
CS 2901	Introduction to Materials, Design and Fabrication Technology	4
CS 2905	Introduction to Microcontrollers	4
CS 2010	Computing Fundamentals (TECO)	3
CS 2370	Introduction to Programming	4
CS 2470	Systems Programming in C/C++	2
CS 3420	Introduction to Cybersecurity	3
CS 3890	Engineering Design	3
CS 4520	CyberEthics (DICO,WRCO)	3
CS 4790	Robotics Capstone	4
MA 2300	Statistics I (QRCO)	3
MA 2450	Mathematical Reasoning	4
MA 2550	Calculus I (QRCO)	4
Major Electives		
Complete five courses at the 3000 or 4000 level in BI, BU, BUA, BUS, 17-20 CH, CS, DAT, EC, ECN, ENT, FIN, GE, LAW, MGM, MKT, MT, PH, TH; including at least two of these:		
CS 3901	Industrial Robotics	
CS 3902	Robots in Science and Scientific Inquiry	
CS 3905	Robotics in Aviation and Spaceflight	
CS 3970	Current Events, Topics and Issues in Robotics	
World Language Requirement		
Complete at least three GACO credits in any world language other than English and other than the student's native language (GACO)		3-4
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
INCP (https://coursecatalog.plymouth.edu/general-education/#INCP)	Integrated Capstone	4
Electives		15-20
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	Introduction to Electronic Circuitry	4
CS 2901	Introduction to Materials, Design and Fabrication Technology	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	Introduction to Microcontrollers	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.plymouth.edu/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.plymouth.edu/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/)		
DICO (https://coursecatalog.plymouth.edu/general-education/#DICO)	Diversity Connection	3-4
WECO (https://coursecatalog.plymouth.edu/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