MARIST

Special Topics in Robotics
Summer Pre-College 2025 CMPT 194N
HC (Hancock Center) 0004
Session 2 – July 13-July 26
Monday - Friday 9:00 a.m. - 5:00 p.m.
Saturday 9:00 a.m. – 12 noon

Program Director

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Faculty

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Name: Brian Gormanly
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Teaching Assistant

Name: TBA
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General Information

Course Description: This is a hands-on course where the student will learn about robots and about several aspects related to robot design and programming. The course covers material related to mechanical design, issues related to planning and reasoning under uncertainties, and sensors and control. Students will apply the techniques learned in a real robot system, using a commercial robotics kit and programming environment.

Textbook or other materials:
Required Textbooks: (PROVIDED BY MARIST)
Mataric, Maja J, "The Robotics Primer", MIT Press, 2007.
ISBN-13: 978-0262633543
ISBN-10: 026263354X

Credits Allocated: 3

Student Learning Outcomes/Goals

Course Objectives:
At the completion of this course, students will be able to demonstrate the learning outcomes listed below.

- Evaluate and compare several historical and modern techniques or approaches to robotics.
- Discuss various aspects of the field and practice of robotics using appropriate terminology.

- Build a robotics programming environment to create and run simple algorithms for common robotics problems.
- Assemble several different kinds of robot including mobile agents.
- Apply different sensors to collect information from a robots environment including touch sensors, wheel encoders, gyroscopes, accelerometers, and ultrasonic range finders.
- Learn how to apply sensor fusion incorporating information from multiple sensors.
- Work in teams to design and implement a cooperative robot system for accomplishing specific tasks
- Apply common algorithmic solutions such as PID to solving challenges such as wall following and balancing on two wheels.

Course Policies

Attendance Policy: Attendance is mandatory for all classes and academic activities. Students are expected to arrive at class on time and participate fully in all class discussions and activities. Failure to adhere to these expectations may result in removal from Summer Pre-College.

Use of Cell Phone and other technology: The use of cell phones and other technology in class should not be used to record other students, faculty and staff, unless requested by the Program Director/Faculty for educational purposes. Students should not be using their phones or other technology during class unless there is a sanctioned academic reason.

Assessments & Grading

Grade Distribution:

You will be graded on 1000 points that you can earn throughout the semester, the following shows how the points are distributed across your work:

Professionalism	50 points	5%
Pre-class assignment	75 points	7.5%
Labs	375 points (1@75, 3@100)	37.5%
Project	150 points	15%
Mid-Term	150 points	15%
Final	200 points	20%

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Grade Scale:

Grade	Minimum %
A	95
A-	90
B+	87
B	83
B-	80
C+	77
C	73
C-	70
D+	65
D	60
F	0

Tests:
Tests will cover material up to the previous classes lecture / reading material, the Final is not cumulative in this course and will be on all material in lectures and readings after the mid-term. No makeup tests will be permitted after a test has been given. If you anticipate not being able to make a scheduled test please see me well in advance of the test so we can schedule something before the test date.

Labs:
The labs in this course are the building blocks you will need to be prepared for the course project. They will reinforce the lecture material and ensure that you have a practical understanding of the tools and theory needed to build a software project. Your grade on your project will be significantly impacted by how much effort you put into the course labs.

Projects:
Project requirements will be provided during the semester. Projects help you gain hands-on experience and confidence that will allow you to leverage technology to give you every advantage in your career and personal life. They will be graded against the criteria set in the project requirements. This course is project based and is intended to build both your skills working with other software engineers as a team as well as your individual skills.

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Schedule

day	Location	Professor	Topic	Reading	Laboratory
1 (Sun 1:45 pm - 3:34 pm)	HC 0004	Gormanly / Johnson	Course Introduction	Chapter 1	
2 (Mon 9 - 5)	HC 0004	Johnson	Robotics History and Components	Chapters 2, 3	Robot distribution / Setup Development Environment
3 (Tue 9 - 5)	HC 0004	Johnson	Effectors and Actuators	Chapters 4	Motion and Dynamic Control
4 (Wed 9 -5)	HC 0004	Johnson	Locomotion and Manipulation *Admission Committee (4:00pm)	Chapters 5, 6	Motion and Dynamic Control
5 (Thur 9 -5)	HC 0004	Johnson	Sensors and Perception	Chapters 7, 8	Ultrasonic Sensor
6 (Fri 9 - 5)	HC 0004	Johnson	Advanced Sensors / Review	Chapter 9	Ultrasonic Sensor
7 (Sat 9 - 12)	HC 0004	TBA	Midterm		
8 (Mon 9 - 5)	HC 0004	Gormanly	Robot Control	Chapter 10	Servo Control and Timing
9 (Tue 9 -5)	HC 0004	Gormanly	PID Controller Theory *Writing Your College Essay (4:00pm)	Chapter 10	Servo Control and Timing
10 (Wed 9- 5)	HC 0004	Gormanly	Control Architectures - Reactive / Deliberative	Chapter 11	FP: PID / Wall Follower
11 (Thur 9 -5)	HC 0004	Gormanly	Practical sessions and testing *SFS Workshop on Financial Literacy (4:00pm)		FP: PID / Wall Follower
12 (Fri 9 - 5)	HC 0004	Gormanly	Final Exam Practical sessions		FP: PID / Wall Follower
Event (Sat 9:30 - 11:00 am)	Dyson 1016	Gormanly	Final Presentation		

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Academic Statements

Statement on Academic Honesty

Marist College is a learning community dedicated to helping students develop the intellect, character, and skills required for enlightened, ethical, and productive lives in the global community of the 21st century. Students are expected to pursue excellence in their education while being honest about their work and fair to other members of the learning community. All work presented to instructors for evaluation must reflect their own ideas and effort and must properly acknowledge any contributions of others. Students should expect this honesty and fairness in others as well. As members of the Marist learning community, all students should adhere to the principles of academic integrity as set forth in the Marist Academic Integrity Policy.

Statement for compliance with the Teach Act (Public Law 107-273 Â§ 13301)

Materials in this course may be subject to copyright protection.

Statement on Accommodations and Accessibility

Students with disabilities who believe they may need accommodations in this class are encouraged to contact the Office of Accommodations and Accessibility at (845) 575-3274, Donnelly Hall 226 or via email at accommodations@marist.edu as soon as possible to better ensure that such accommodations are implemented in a timely manner. Marist's guidelines for instructors to comply with the Americans with Disability Act (ADA) are located here: https://www.marist.edu/student-life/community/accommodations-accessibility/guidelines-instructors

Statement on Diversity and Inclusion

The College's academic mission is immeasurably enriched by students with diverse experiences. Our finest efforts as intellectual beings heavily rely on the exchange of ideas. Interactions in our classrooms among persons and groups with diverse backgrounds, ideologies, and experiences facilitate these efforts by allowing us all to be more reflective about the varied historical and social contexts in which we work and learn. For faculty and students to continue being leaders inside and beyond academia, we must ensure that we consider the diversity of all who comprise our communities and foster a climate in which those diverse influences are respected and valued. In this course, we will challenge each other's thinking while working collaboratively to ensure that the classroom is a space of safety and bravery. Our classroom offers an environment where individuals of varying opinions, experiences, and backgrounds are able to be free to learn without fear of being silenced. Evidence of these efforts will manifest in readings, lectures/class discussion, seminars, and group projects. Aspects of diversity include, but are not limited to, race, ethnicity, color, nationality, sex, gender, gender identity, gender expression, class, sexual

orientation, religion, age, ability, and veteran status. Students who would like to be identified in a manner other than what is indicated on the course roster can contact me privately via phone, email, web conference or face-to-face meeting to indicate name, pronoun, and any other preferences they may have.

Statement on Title IX

Marist College is committed to providing a safe learning environment for all students. If you or someone you know has experienced sexual harassment, including sexual assault, dating or domestic violence, or stalking, support is available. Please contact the Title IX Office at titleix@marist.edu or (845) 575 - 3799 or visit www.marist.edu/title-ix to file a report. Please be aware that faculty and staff are required to disclose incidents of sexual harassment or other potential violations of the Marist College Discrimination, Harassment, and Sexual Misconduct Policy to the Title IX Office. To speak to a confidential resource who does not have this reporting responsibility, contact Counseling Services at (845) 575 - 3314, Health Services at (845) 575 - 3270, or Spiritual Life and Services at (845) 575 - 3000 (x2275).

For more information about reporting options and resources at Marist College, please visit https://www.marist.edu/title-ix.

Special Topics in Robotics: Pre-Class Assignment

Course: Special Topics in Robotics (CMPT 194N)
Session Dates: July 14 – July 27
Assignment Due Date: July 12, 2025

Assignment Overview

This pre-class assignment is designed to prepare you for the topics and challenges we will explore in the robotics course. The assignment has two parts:

1. **Part 1: Foundational Reflection Paper** (Submit via Brightspace Assignments)
2. **Part 2: Discussion Forum Post** (Post in Brightspace Forums)

Part 1: Foundational Paper

Submission Format: Word document, PDF, or image files (e.g., sketches or designs).

Objective

To introduce robotics concepts, encourage real-world connections, and spark creativity in robotics design.

Activities

1. **Read and Reflect**: Review the slides from the first two lectures which are available in our Brightspace class online:
    - Introduction to Robotics
    - History and Components
2. Based on these materials, answer the following reflection prompts:
    - **What is a robot?** Provide examples of how robots fulfill the criteria discussed.
    - **Compare and contrast biomimetic robots and AI-inspired robots.** What are their similarities and differences?
    - **What challenges do you think arise in making robots autonomous in the physical world? Are there any new technologies that you think will play an important role in the evolution of Robotics?**
3. **Creative Robotics Design**:
    - Design a simple robot, either physical or conceptual, inspired by the lecture slides. Your design should include:
        - Labeled sensors, actuators, and controllers.

        - A description of the robot's purpose and goals.
        - An analysis of the challenges it might face in its environment, and what goal(s) the robot is designed to complete.
    - You may submit a hand-drawn sketch, a digital rendering, or another creative medium. Include a brief written explanation (150-250 words).

Submission Instructions

- Submit your completed paper (including your reflections and robot design) via the Brightspace Assignments section by **July 12, 2025**.
- Students enrolling within two weeks of the start date should email Professor Brian Gormanly (brian.gormanly@marist.edu) to discuss an extended due date.

Part 2: Brightspace Forum Post

Objective

To familiarize yourself with robotics history and current trends by researching notable examples.

Activities

1. **Historical Research**:
    - Choose a historical robot, such as Grey Walter's Tortoises or Shakey, and write a short summary of its purpose and significance (100-150 words).
2. **Modern Robotics Research**:
    - Identify a modern robot, such as Boston Dynamics' Spot, and explain its purpose. Relate it to the "4 D's" of robotics: Dangerous, Dirty, Dull, and Difficult (100-150 words).
3. **Discussion Forum**:
    - Post your findings in the Brightspace forum titled "Pre-Class Robotics Research" by **July 12, 2025**.
    - Respond to at least one other student's post by **July 14, 2025**.

Recommended Resources

These resources can help you with your reflections, design, and research:

1. Coding Coach - My YouTube channel with helpful videos we will use in class.
2. Braitenberg Vehicles - Thought experiment by the Italian cyberneticist Valentino Braitenberg

3. Braitenberg Vehicles Video - Great introduction to concepts we will use in class including an introduction to Arduino. You do not need to set up or work with a coding environment before class, but this video does a great job of introducing the concepts and work ahead!
4. Boston Dynamics – Explore details about modern robots like Spot.
5. Robohub – News and resources on robotics research and innovations.
6. Pololu Robotics Documentation – For an overview of the 3pi+ robot platform.
7. Introduction to Arduino – Basics of Arduino programming and hardware. You do not need to program or set up your programming environment for this assignment! We will do that together in-class. This link will give you some background as you prepare for the course.
8. YouTube: PID Controller Basics – Introductory videos on PID control systems.
9. MIT OpenCourseWare: Robotics Lectures – Advanced lectures on robotics concepts, for those who want to go deeper.

Grading Criteria 75 points total

- **Part 1: Foundational Paper** (66% of pre-class grade - 50 points):
  - Completeness and clarity of reflections (25%).
  - Creativity and technical detail in robot design (25%).
  - Quality of written explanations (16%).
- **Part 2: Discussion Forum Post** (34% of pre-class grade - 25 points):
  - Depth and accuracy of research (20%).
  - Engagement with peers' posts (14%).

Contact Information For questions, email Professor Brian Gormanly at brian.gormanly@marist.edu.

We look forward to seeing your ideas and designs as we prepare to explore the exciting field of robotics together!