

1 General Information

Instructor	Jayam Patel	jupatel@wpi.edu
TA	John Doe	doeJohn@unknown.abc
Lectures	MW 1pm-2.20pm in SH306	
Office hours	W 2.30pm-3.30pm in AK122 M 2.30pm-3.30pm in AL122	(Instructor) (TA)
Website	https://community.worcester.edu	

2 Course Description and Philosophy

Robotics is the youngest child of science born from the union of various scientific fields. Along with individual practical knowledge, a team effort is essential to fully explore and understand the field. The course introduces a student to all the parent fields; Electronics, Computer Sciences and Mechanical Sciences. The course is project-based, in a team of 3 students, 3 interim projects, and 1 final project. 3 interim projects will be a reflection of the student's understanding of the three parent fields. The final project will be to integrate the interim projects to form one working robot. A detailed project report will be mandatory along with the final project submission.

3 Course Objectives

3.1 Knowledge-Based Outcomes

- Differentiating components that comprise of an electronic circuit
- Understanding the way a machine works and processes
- Writing a program to control computer and its hardware
- Understanding of robotic designs and processes

3.2 Skill-Based Outcomes

- Hands on expertise and training in all the parent fields

- Design and Implement basic and intermediate electronic circuits
- Write and compile code in Embedded C
- Experience in system analysis and troubleshooting

4 Expected and Recommended Background

- Familiarity with Linux or MacOSX
- Basic linear algebra: vector, matrices, determinants
- Concepts of statistics: expected value, variance, random variable, Gaussian distributions
- Basic calculus (e.g., limit, derivative, integral)

5 Reference Material

- Craig, J. J. (2005). Introduction to robotics: mechanics and control (Vol. 3, pp. 48-70). Upper Saddle River, NJ, USA:: Pearson/Prentice Hall.
- Siciliano, B., & Khatib, O. (Eds.). (2016). Springer handbook of robotics. Springer.
- Khatib, O. (1999). Mobile manipulation: The robotic assistant. Robotics and Autonomous Systems, 26(2-3), 175-183.
- Siciliano, B., Sciavicco, L., Villani, L., & Oriolo, G. (2010). Robotics: modelling, planning and control. Springer Science & Business Media.

6 Assignments and Grading

Assignment	Percentage
Labs	20%
Project I Demo	15%
Project II Demo	15%
Project III Demo	15%
Final Project Demo	25%
Final Project Report	10%
Total	100%

Letter Grade	Percentage Range
A	90% or more
B	75% – 89.99%
C	60% – 74.99%
fail or NR	less than 60%

6.1 Individual Work

Labs: 4 Lab assignments, each worth 5 points. You can use the lab equipment and facility to generate results.

6.2 Group Work

3-people groups will be formed at the beginning of the course. These groups will perform the following activities:

Project: Every group will develop 3 intermediate projects and a final project. Each project is worth 100 points and they will be demoed at multiple dates.

Project Report: A research paper describing the group project. The paper is worth 100 points and all the group members are awarded the same grade.

7 Communication with Course Staff and Peers

We will be using Blackboard Website to coordinate communication between students and course staff.

8 Course Policies

The instructor reserves the right to modify the course outline and policies mentioned in this syllabus at any time during the term.

Late Policy: Every day of delay in submitting an assignment will entail a penalty of 1% on the assignment grade.

Student Disability Services: If you need course adaptations or accommodations because of a disability, or if you have medical information to share with the instructor, please make an appointment with your instructor within the first week of classes. If you have not already done so, students with disabilities, who believe that they may need accommodations in this class, are encouraged to contact the Disability Services Office (DSO), as soon as possible to ensure that such accommodations are implemented in a timely fashion. The DSO is located in Daniels Hall, (508) 831-5235.

Academic Honesty: Any work you present as your own should represent your own understanding of the material. When external sources were used as significant points of information (sample code, etc.), the source must be referenced in your submission. Review the Academic Honesty Policies at <http://www.wpi.edu/Pubs/Policies/Honesty/policy.html>.

9 Course Calendar

Day	Date	#	Section	Description	Talk	Due
Mon	8/27	1	<i>Introduction</i>	Class Organization and Introduction		
Wed	8/29	2	<i>Electronics</i>	Electronic Circuits		
Mon	9/03			Labor Day		
Wed	9/05	3	<i>Electronics</i>	Series and Parallel Circuits		
Mon	9/10	4	<i>Electronics</i>	Electronic Components I		
Wed	9/12	5	<i>Electronics</i>	Electronic Components II		Lab1
Mon	9/17	6	<i>Electronics</i>	Case Study: Qualcomm	Guest Talk	
Wed	9/19	7	<i>Demo Day</i>	Project I Demo		
Mon	9/24	8	<i>Mechanical</i>	Kinematics		
Wed	9/26	9	<i>Mechanical</i>	Free Body Diagram		
Mon	10/01	10	<i>Mechanical</i>	Motors, Gears and Pulleys		
Wed	10/03	11	<i>Mechanical</i>	Steering Mechanisms		Lab2
Mon	10/08	12	<i>Mechanical</i>	Case Study: General Motors	Guest Talk	
Wed	10/10	13	<i>Demo Day</i>	Project II Demo		
Mon	10/15			Fall Break		
Wed	10/17			Fall Break		
Mon	10/22	14	<i>Programming</i>	Programming Languages and Compilers		
Wed	10/24	15	<i>Programming</i>	Condition Statement and Loops		
Mon	10/29	16	<i>Programming</i>	Embedded Programming		
Wed	10/31	17	<i>Programming</i>	Example Codes and Practise		Lab3
Mon	11/05	18	<i>Programming</i>	Case Study: Apple Inc.	Guest Talk	
Wed	11/07	19	<i>Demo Day</i>	Project III Demo		
Mon	11/12	20	<i>Robotics</i>	Robotic Assemblies and Intelligence		
Wed	11/14	21	<i>Robotics</i>	Link Arms		
Mon	11/19	22	<i>Robotics</i>	Mobile Robots		
Wed	11/21			Thanksgiving Break		
Mon	11/26	23	<i>Robotics</i>	Open Discussion on Robots		Lab4
Wed	11/28	24	<i>Robotics</i>	Case Study: Amazon Robotics	Guest Talk	
Mon	12/03	25	<i>Preparation Day</i>	Prepare for final project demo		
Wed	12/05	26	<i>Preparation Day</i>	Prepare for final project demo		
Mon	12/10	27	<i>Demo Day</i>	Project Demos		
Wed	12/12	28				Project Paper