CS 639 Syllabus –
Introduction to Robotic Systems

1: Key Course Offering Information

General Identifying Information

Institution Name: University of Wisconsin–Madison
Course Subject, Number and Title: CS639, Introduction to Robotic Systems
Credits: 3 Credits.
Course Description: Selected topics in computing. Each offering of the course will cover a topic selected by the instructor. Offerings of this course will provide sufficient depth into their subject to count as electives to meet CS Major requirements.
Requisites: (COMP SCI 400 or 320) and (MATH 320, 340, 341, 345 or 375) and (STAT 311, 324, 333, 340, 371, STAT/MATH 309, 431, MATH 331 or 531), and Undergraduates only
Meeting Time and Location: Morgridge Hall, TR 11:00am-12:15pm
Instructional Modality: In-person.
Instructor Contact Info:

Prof. Mike Hagenow, Morgridge Hall 6584, hagenow@cs.wisc.edu
Office hours: T/R 12:15pm-1:15pm in MH 6584
(anything but class [e.g., research, robotics] 9:30am-10:00am)

Course Learning Outcomes

By the end of this course, you will be able to…

- Recognize and describe common elements of robot systems.
- Implement classical approaches to robot configurations, kinematics, control, perception, and planning
- Compare and contrast approaches to inverse kinematics, path planning, and robot control
- Test different robot system designs for a target application

How Credit Hours are Met by the Course

This class meets for two, 75-minute class periods each week over the fall/spring semester and carries the expectation that students will work on course learning activities (reading, writing, problem sets, studying, etc) for about 3 hours out of the classroom for every class period. The syllabus includes more information about meeting times and expectations for student work.

2: Instructor-to-Student Communication

Course Overview

Robots are intelligent systems that plan, sense, and act on the physical world. The course offers an introduction to the different modeling and algorithmic approaches used broadly in robotics. By the end of this course, students should have a fundamental understanding of essential topics for building robot systems; including representations, kinematics, motion planning, perception, and control. This course emphasizes two classes of robot systems: manipulator arms and wheeled mobile platforms. Learning will take place through lectures, interactive discussions, hands-on programming assignments using simulated robots, and a final capstone project.

Course Website and Digital Instructional Tools

- Course webpage: https://wisc-rt2.github.io/cs639_fall25/.
- Canvas will be used for homework submissions and grading: https://canvas.wisc.edu/courses/479613
- Piazza will be used for questions regarding homework or the final project: https://piazza.com/wisc/fall2025/cs639003/home

Required Textbook, Software and Other Course Materials

The following textbooks are recommended, but not required. Both textbooks are available for free online in pdf format via the provided links.

- **Modern Robotics**
  Lynch & Park
  https://hades.mech.northwestern.edu/index.php/Modern_Robotics
- **Introduction to Autonomous Robots**
  Correll, Hayes, Heckman, Roncone
  https://github.com/Introduction-to-Autonomous-Robots/Introduction-to-Autonomous-Robots/releases

Homework and Other Assignments

- Homework assignments are submitted via Canvas and due at 5pm on the date specified in the schedule/assignment.
- Homework will consist of written problems and programming exercises (using python). The work you submit should be your own individual work. You are welcome to use GenAI in completing assignments, but just know that it will commonly make mistakes on several of the problems and that you are ultimately responsible for what you submit. Furthermore, you will be unable to use GenAI on exams so please make sure for your own learning that you are taking the time to engage with and understand the course material.

Exams, Quizzes, Papers and Other Major Graded Work

- In addition to homework assignments, we will have one exam and a final project.
- The exam will be held during class on 11/13. The exam will consist of multiple choice questions and some short written problems.
- The final project will involve completing a robot system implementation in the Webot simulator. You will define your task, appropriate methods, and implement the final solution. In addition to submitting your final simulation, you will also give a lightning (~3 min) presentation during the final class period and submit a short final report on your work. More details will come later in the semester (including a rubric) and you will have a chance to receive feedback from a project proposal.

- For homework, you will receive 5 late days that can be used (more details below under grading). The exam will occur during the designated class period and the final project deliverables will be due on the dates listed without exception.

General Guidelines for Exam Proctoring

Exams will be in person. If exceptional cases require a remote exam, procedures for that will be negotiated between the instructor and the student.

Course Schedule/Calendar

The course schedule is available here: https://wisc-rt2.github.io/cs639_fall25/docs/schedule/

Grading

- Grades are based on your performance on the homeworks, midterm exam, final project as well as your participation in the classroom.
- Grading Weights:
    - Participation (e.g., polls, responses, feedback): 5%
    - Written/Coding Assignments: 40%
    - Midterm Exam: 30%
    - Final Project: 25%
- Grading Scale:
    - A: > 93%
    - AB: 88% - 93%
    - B: 83% - 88%
    - BC: 78% - 83%
    - C: 68% - 78%
    - D: 55% - 68%
    - F: <55%
- Late Policy: Each student will automatically receive 5 days of extension (24 hours each) to be used across all homeworks. There is no need to let the instructor know a priori. After the five days have been used, submissions will no longer be accepted after the initial due date. Additional extensions may be granted under extenuating circumstances (e.g., a serious emergency), and in such cases, the student should reach out as soon as possible to the instruction. Such cases are left to the discretion of the instructor.
- Grading disputes: any questions or concerns about grading need to be raised within 48 hours of the return of a homework/project to be considered.
- The instructor reserves the right to increase scores on particular assignments, midterm exam, or project at his discretion. The instructor reserves the right to lower the grading scale cut-offs (i.e., to grade more generously) at his discretion.

3: Academic Policies and Statements

- Academic Calendar and Religious Observances
- Academic Integrity
- Accommodations for Students with Disabilities
- Course Evaluations

- Diversity and Inclusion
- Mental Health and Well-Being
- Privacy of Student Records and the Use of Audio Recorded Lectures
- Students' Rules, Rights and Responsibilities
- Teaching & Learning Data Transparency