Syllabus/Course Information

Course Description:

ECE 497 Introduction to Human-Robot Interaction*

3R-3L-4C W

Prerequisites: CSSE220- Object-Oriented Software Development

This will be a survey course in the field of human-robot interaction (HRI). The goal of HRI is to allow robots to successfully interact with humans. There should be computation models of social intelligence for a robot to enable them to naturally and intuitively interact with a human.

This course will cover a variety of topics but will have a special emphasis on HRI design. Students will complete weekly readings, quizzes, labs, and projects on how to design a human-robot interaction system.

Since HRI is interdisciplinary, there may be readings from robotics, artificial intelligence, psychology, human-computer interaction, human factors, interaction design, education, drama, cognitive science, design, ethics and other relevant disciplines. This course will include a lecture and lab component in order to explore the concepts presented on an actual robot platform.

Instructor:

Dr. Carlotta A. Berry, Professor, Electrical and Computer Engineering

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Required Text:

There is no single textbook on Human-Robot Interaction so in this course there will be weekly readings.

Course Outcomes:

Upon completion of this course, students should be able to

- Explain and discuss basic HRI theory, terms, and principles
- Apply HRI principles to design a robotic system
- Use practical knowledge of HRI to complete a research project and present it to an interdisciplinary audience

Grading:

Grades will be assigned at the end of the quarter based on the grade weights and grading scale shown below:

Participation	10%	A	90 – 100
Quizzes	30%	B+	87 - 89
Labs and Memos	30%	B	80 – 86
Final Project	30%	C+	77 – 79
		C	70 – 76
		D+	67 – 69
		D	60 – 66
		F	Below 60

Participation:

Classroom participation actually counts toward your grade in this class. Not participating in classroom activities or excessive absences will have a measurable detrimental effect on your grade. You are expected to be attentive and engaged in the lecture (i.e. not sleeping, reading the newspaper, surfing the web, doing homework for other courses, disturbing others with electronics). As a rule of thumb, you should expect to put in **eight hours** per week outside of class reading the text, preparing for quizzes, completing the laboratory assignments and final project.

Quizzes:

There are no exams in this course by design; however, there will be weekly quizzes over the required reading and lectures. These quizzes will represent **30%** of your grade, equivalent to two exam grades. The purpose of the quizzes is to assess the student's understanding of the concepts presented in the course and robotics state of the art. The required reading includes not only the textbook but literature that will be posted to the Moodle course website. Reviewing literature in the field is important because robotics is a very theoretical and application-based field; therefore there is minimal benefit to working with the robot in lab and not being informed about robotic history, theory and application. Thus, it is *very important* that you complete all of the required reading and be conscientious about preparing for these quizzes.

Laboratory Assignments and Memos:

There are no exams or homework in this course by design because it is expected that the labs will require a significant time commitment. The purpose of the laboratory assignments is to develop a human-robot interaction behavior on the Blossom robot.

Final Project:

The final project report and demonstration will be due during the last couple of weeks of class. The final project demonstration typically involves a team exhibition and class competition. The final report must follow the format described in the assignment. **No incomplete will be given on the final project.**

Course Policies:

- Students are encouraged to check their RHIT email account daily for information regarding the class. You are responsible for all information sent to your account from the professor, whether read or not. Students should also regularly check your grades on Moodle to make sure there is not a recording error.

- All students are expected to join in class discussion and all activities with a positive attitude. All students are expected to exhibit an attitude that is appropriate to one studying a profession and such that everyone has an engaging, fulfilling and successful experience. Please also leave the classroom neater than you found it.
- Operating your computer in class for anything other than an approved course activity is not permitted. Students must not hinder the learning environment of their fellow classmates with any other distracting behavior such as talking, sleeping, doing homework, playing on mobile phone or reading the newspaper. Continued disruptive conduct will lead to the student being asked to leave class and marked absent for that class period. The student will remain responsible for all class assignments.

Late Policy

- Each week, the laboratory assignment grade will include a pre-lab of a software design plan, demonstration and submission of the well-documented code and lab memo (technical report). The code and memo should be zipped in a file and uploaded to GradeScope by **midnight on the Sunday** after the demonstration. Laboratory memos must follow the format provided by the instructor. One laboratory memo should be submitted per team and should be a product of the joint effort between the members. The team member roles should alternate on a weekly basis between programmer, technician and reporter.
- If there is a pre-lab associated with a laboratory assignment, it will be due at to GradeScope the midnight before the start of the laboratory session. The pre-labs, demonstration and reports will receive a **20% late penalty** per day if not submitted on time. A missed laboratory assignment **must** be made up but the students may not receive full or any credit for the lab. Since this is a hands-on course, **always** bring your laptop computer and the robot to class everyday.

Attendance:

- Regardless of whether formal attendance is recorded, attendance at each class is expected. Experience has shown that regular attendance and engagement improves learning and consequently improves quiz and assignment performance. According to the Academic Rules and Procedures, "A student whose total absences in a course, excused or unexcused, exceed two per credit is liable to fail the course." For the purposes of this class, that limit will be set at **no more than 8 absences per quarter**.
- If you must be absent from class for any reason including a sports participation, job interview or illness, you must let the instructor know as far in advance as possible.
- Students are responsible for all information presented in class whether present or not.

Honor Policy:

Rose-Hulman Institute of Technology does not tolerate plagiarism or cheating in any form. The penalties for these and other forms of academic misconduct range from a lowered course grade, through failure in the course, up to and including suspension from the Institute.

Institute Policies:

Excused Absence (RHIT Academic Policies):

Instructors will normally permit make-up work to be done when a student has legitimate conflicting obligations, such as illness or emergency, Institute-sponsored activities, plant trips or interviews. These

conflicts do not excuse the student from course responsibilities. The student is responsible for informing the instructor of any legitimate excuses and making arrangements for make-up work, if permitted, as soon as possible. Whenever possible, the student must discuss unavoidable absences with instructors in advance.

Students with Accessibility Needs:

Rose-Hulman is committed to working with students who have special needs or disabilities. Visit the Accessibility Services website for more information. Requests for academic accommodations must be documented with and approved by the Accessibility Services office before they can be implemented in this course.

Student Well-Being and Academic Success:

Rose-Hulman cares about the well-being of every student. Stress is a normal part of the college experience and is often compounded both by classwork and unexpected challenges outside the classroom. I encourage you to reflect on how you take care of yourself throughout the term, especially before the demands of exams and projects reach their peak. You can reach out to the Learning Center, Student Academic Success or the Student Counseling Center (which offers both online and in-person resources) if you would like assistance. Additional resources to help maintain your work-life balance can be found on the Campus Life web page and within the Student Success Guide. If you, or someone you know, is struggling, you can let us know through the Rose Cares system, and someone will reach out.

Academic Integrity:

The Student Handbook and Rose-Hulman's Academic Rules and Procedures describe penalties and processes invoked as a consequence if academic misconduct (such as cheating, plagiarizing, or interfering with the academic progress of other students) takes place. It is the responsibility of each student to know and follow Rose-Hulman's rules about academic integrity.

It is expected that any work submitted for assessment represents the intellectual work of the individual(s) submitting the work. Any attempt to pass off the intellectual work of another (including the work generated by Large Language Models like ChatGPT) as their own or without proper attribution is an example of academic misconduct and is subject to the penalties described in the Rose-Hulman Academic Rules and Procedures and Student Handbook documents.

Diversity Statement:

Rose-Hulman Institute of Technology is committed to being an inclusive community in which the multiplicity of values, beliefs, intellectual viewpoints, and cultural perspectives enrich learning and inform scholarship.

Online Access Requirements:

Rose-Hulman welcomes students from around the world, and encourages faculty, staff and students to travel around the world. However, geopolitical conditions and compliance with export law and regulations prevent us from delivering certain kinds of educational experiences and/or using certain kinds of Institute technologies in some locations. For example, students in locations with limited access to the internet in general, or with restricted access to portions of the internet, or which are embargoed

by the U.S. Directorate of Defense Trade, may not be able to successfully complete Rose-Hulman courses.

Emergency Information:

To receive email or text messages regarding emergency situations that may impact campus and, possibly, the delivery of classes, register for RAVE alerts and/or follow @Rose-HulmanAlert on Twitter. Any announcements about the Institute's ability to offer classes will be shared on Rose-Hulman's website.

WEEKLY OVERVIEW*

Week 1 – Introduction to Robotics & HRI	Week 6 – Enhancing HRI Interfaces
Week 2 – Classifying HRI	Week 7 – Robot Teams
Week 3 – Evaluating HRI	Week 8 – Museum Robots/Urban Search & Rescue
Week 4 – Autonomy and Perception	Week 9 – Final Project Overview
Week 5 – HRI Interfaces	Week 10 – Final Project

*This is a new course so the syllabus, calendar and readings may change as deemed necessary by the instructor. Please be flexible and patient about these changes as we explore this topic together.

*Disclaimer:

Robotics is not like a traditional engineering class with well-defined static content and assignments, it is in continuous update and development. Therefore, the instructor requests flexibility and patience as the course materials, format, robot hardware, quizzes laboratory assignments are evaluated and modified as deemed necessary. In addition, although a robotic platform is a great learning resource, it is ***not perfect***. However, this platform does provide you with exposure to real-world open research areas and problems in robotics (i.e. memory constraints, odometry, sensor and bandwidth error) and you are expected to work around these deficiencies to complete all assignments.