SPECIAL TOPIC: Mobile Robotics
Spring 2022 Syllabus

EE4395 – CRN 26386 – Undergraduate Level
EE5390 – CRN 26385 – Graduate Level

Tuesday & Thursday 3-4:20pm – Engineering E301

Instructor: Dr. Robert C. Roberts
Engineering A310
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Weekly Office Hours:
W 4:00pm – 5:30pm
R 9:00am – 10:00am
or by appointment
http://teamschat.robertcroberts.com

Course Description: Robotics and automation are rapidly growing technologies inside of engineering to increase the efficiency of existing processes, as well as to provide new capabilities to benefit humanity. Mobile robots are one exciting form of these systems that are able to navigate their environment to perform their mission, whether sterilizing a hospital, delivering packages, or hunting for water on the moon. This hands-on class seeks to provide an introduction to mobile robotic fundamentals including embedded programming, control systems, sensors, motor control, navigation, obstacle avoidance, and wireless communication while solving mobile robotics problems. Graduate level students will further explore advanced topics such as machine vision and simultaneous localization and mapping (SLAM).

Pre-requisites for Course: There are no formal pre-requisites for this course, however familiarity with programming (C/C++), and basic electronics will be invaluable. Experience with programming microcontrollers will be especially helpful. Please contact the instructor if you have questions.

EE5390 – Graduate Level Students: Students enrolled in the graduate section of the course will be expected to complete additional tasks throughout the semester for the class competitions to show mastery at a higher level.

Course Website: Blackboard for sharing electronic copies of presentations, course details, and handouts.

Textbook: None. This is a hands-on laboratory course. Handouts and tutorials will be posted onto the course Blackboard site, as well as supplementary materials to help guide students through concepts and procedures. The following textbook may serve as useful references for students in addition to the online content:

Hardware Kit: The course is built around the Pololu Romi robot platform. This kit is further supplemented with multiple accessory modules and sensors which will be used throughout the semester to learn about important robot sub-systems and be utilized in solving the challenges in the course. In order to minimize student costs, these kits will be loaned to students for the duration of the semester.

> **Care –** It is expected that students will care for the robotics kit throughout the semester and keep all components together and in good working order. It is understood that hardware fails, and these issues should be promptly reported to the instructor for recordkeeping and to resolve/repair the issue.
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> **Return –** Students are expected to return the complete hardware kit to UTEP to the instructor or Patricia Mendoza, ECE Laboratory Coordinator**,** at the end of the semester by the end of the final exam period in good working order, unless other arrangements have been made with the instructor in advance. ***Failure to return the kit will result in putting a hold on your UTEP account until the equipment is returned or its replacement cost paid.***

Attendance: In order to be successful in the course, attendance is highly recommended every scheduled day, in order to keep up with the work. This means that the student should attend all lectures, watch all videos, and complete all lab activities prior to the next class period. Should a situation arise when a student begins to get behind, they should communicate with the instructor promptly to ensure they do not miss any important information and can get back on track.

Laboratory Notebook: Students in the class are required to carefully document their robots design in a laboratory notebook throughout the semester. These notebooks should be treated like a diary, and document all hardware and software in the system, as well as record ideas, thoughts, problems, solutions, etc. Notebooks can be found in the bookstore. Students should take photos and include them in their notebook for documentation. They can also paste in source code as needed to allow for documentation. The purpose of this exercise is to simulate an Inventor's Notebook (https://www.shaverswanson.com/resources/how-to-keep-an-inventors-notebook) used by many companies to track ideas for patents. Anyone reading the notebook should be able to understand and reverse engineer your ideas and designs, and be able to replicate your work.

During the first half of the semester, students will turn in their laboratory notebooks for feedback periodically. After the mid-term competition, students should

carefully detail the design, fabrication, coding, and testing of their final competition robots. The notebooks will be turned in at the end of the semester for final grading.

Course Grading: Students will be evaluated in the following manner:

Bi-Weekly Lab Notebook Checks (1st half)	30%
Midterm Competition	5%
Final Lab Notebook Check	30%
Final Competition	20%
Extra Objectives **(EE5390 students only)**	**15%**
TOTAL	100% **(85% for EE4395 students)**

Course Drop Deadline: April 1st

Final Exam Period: The final exam period for this course is Thursday, May 12th from 4-6:45pm. Students should reserve this day and time for the course.

Drop Policy: Students can drop the course before April 1st with a grade of "W". Students who drop the course after April 1st will be assigned the grade earned in the course.

Scholastic Integrity: As an entity of The University of Texas at El Paso, the Department of Electrical and Computer Engineering is committed to the development of its students and to the promotion of personal integrity and self-responsibility. The assumption that a student's work is a fair representation of the student's ability to perform forms the basis for departmental and institutional quality. All students within the Department are expected to observe appropriate standards of conduct. Acts of scholastic dishonesty such as cheating, plagiarism, collusion, the submission for credit of any work or material that are attributable in the whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student, or the attempt to commit such acts will not be tolerated. Any case involving academic dishonesty will be referred to the Engineering Dean's Office and the Office of the Dean of Students. The Dean of Students will assign a Student Judicial Affairs Coordinator who will investigate the charge and alert the student as to its disposition. Consequences of academic dishonesty may be as severe as dismissal from the University. See the Office of the Dean of Students' home page at www.utep.edu/dos/acadintg.htm for more information.

Policy relating to Disability / CASS: In Section 504 of the Vocational Rehabilitation Act of 1973 and the Americans with Disabilities Act (ADA) of 1990, if a student needs an accommodation then the Office of Disabled Student Services located

at UTEP need to be contacted. If you have a condition, which may affect your ability to perform successfully in this course, you are encouraged to discuss this in confidence with the instructor and/or the director of the Disabled Student Services. Written guidelines r/t accommodations from CASS must be submitted to the course manager PRIOR to the start of the course. If you have a disability and need classroom accommodations, please contact CASS at 747-5148, or by email to cass@utep.edu, or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at www.sa.utep.edu/cass. *CASS' Staff are the only individuals who can validate and if need be, authorize accommodations for students with disabilities.*