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## CSE 481C Capstone Software Design: Robotics

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### **Credits**

5.0 (3 hrs lecture, 2 hrs+ meeting times)

### **Lead Instructor**

Rajesh Rao

### **Textbook**

None

### **Course Description**

Students work in teams to design and implement a software project involving multiple areas of the CSE curriculum. Emphasis is placed on the development process itself, rather than on the product.

### **Prerequisites**

CSE 331 or CSE 341; CSE 326 or CSE 332; CSE 351 or CSE 378; substantial programming experience such as CSE 451 or CSE 457.

### **CE Major Status**

Selected Elective

### **Course Objectives**

This course will teach students to understand the key concepts underlying autonomous systems interacting with the real world. By implementing and applying different approaches, the students will learn how to model and control real world systems using probabilistic methods. The programming component of this course will enable the students to solve large scale, open-ended problems in a team setting.

## **ABET Outcomes**

- (a) an ability to apply knowledge of mathematics, science, and engineering
- (b) an ability to design and conduct experiments, as well as to analyze and interpret data
- (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- (d) an ability to function on multi-disciplinary teams
- (e) an ability to identify, formulate, and solve engineering problems
- (f) an understanding of professional and ethical responsibility
- (g) an ability to communicate effectively
- (h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- (i) a recognition of the need for, and an ability to engage in life-long learning
- (j) knowledge of contemporary issues
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

## **Course Topics**

- robot control
- probabilistic sensor models
- Bayesian state estimation (Kalman and particle filters)
- robot localization and mapping
- path planning
- multi-robot coordination.