UNIVERSITY OF CALIFORNIA
UCMERCED

Syllabus for EECS270-01: Robot Algorithms

Fall 2017
Instructor: Stefano Carpin

Designation:	EECS 270 Robot Algorithms
Catalog Description:	In depth study of algorithmic techniques to solve fundamental robotic problems, with a particular emphasis on probabilistic aspects. Sensor fusion, mission & motion planning, and other selected topics are covered as well. Theory is complemented by programming assignments.
Text Books and Other Required Materials:	- S. Thrun, W. Burgard, D. Fox. Introduction to Robotics, MIT Press, 3rd edition - D. Bertsekas. Dynamic programming and optimal control (Vol 1 and Vol 2), Athena Scientific (2017 edition for Vol 1 and 2012 edition for Vol 2). All books are useful but not strictly needed.
Course Objectives/ Student Learning Outcomes:	The course exposes students to various algorithms to solve the fundamental problems faced by robots operating in unstructured environments. The main focus will be estimation, planning and control. Objectives are: 1- To provide a solid background on the pertinent computer science, mathematical, and electrical engineering concepts that make up the foundations of the discipline of electrical engineering and computer science engineering, as well as their closely associated fields 2- To provide our students with the knowledge to correctly apply the laws of nature to the creative formulation and solution of engineering problems through the use of analytical, computational and experimental techniques 3- To expand the research of electrical engineering and computer science to non-traditional areas by continually seeking to incorporate new methodologies and research findings to our graduate curriculum Learning outcomes include: a- Mastery of a broad and working knowledge of the principles of electrical engineering and computer science b- An ability to apply knowledge of computing, mathematics, science and engineering to solve problems in multidisciplinary research c- An ability to analyze a problem, and identify and define the hardware and software requirements appropriate to its solution d- An ability to design and conduct experiments and numerical simulations of complex electrical, electronic and computer systems, to analyze, and interpret general scientific and engineering information
Program Learning Outcomes:	
Prerequisites by Topic:	Basic knowledge of probability theory and linear algebra. Proficient level of programming skills in C/C++ and/or Matlab. Knowledge data

Designation:	EECS 270 Robot Algorithms structures, algorithms, and computational complexity.
Course Policies:	
Academic Dishonesty Statement:	a. Each student in this course is expected to abide by the University of California, Merced's Academic Honesty Policy. Any work submitted by a student in this course for academic credit will be the student's own work. b. You are encouraged to study together and to discuss information and concepts covered in lecture and the sections with other students. You can give "consulting" help to or receive "consulting" help from such students. However, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else, in the form of an e mail, an e mail attachment file, a diskette, or a hard copy. Should copying occur, both the student who copied work from another student and the student who gave material to be copied will both automatically receive a zero for the assignment. Penalty for violation of this Policy can also be extended to include failure of the course and University disciplinary action. c. During examinations, you must do your own work. Talking or discussion is not permitted during the examinations, nor may you compare papers, copy from others, or collaborate in any way. Any collaborative behavior during the examinations will result in failure of the exam, and may lead to failure of the course and University disciplinary action.
Disability Statement:	Accommodations for Students with Disabilities: The University of California Merced is committed to ensuring equal academic opportunities and inclusion for students with disabilities based on the principles of independent living, accessible universal design and diversity. I am available to discuss appropriate academic accommodations that may be required for student with disabilities. Requests for academic accommodations are to be made during the first three weeks of the semester, except for unusual circumstances. Students are encouraged to register with Disability Services Center to verify their eligibility for appropriate accommodations.
Topics:	Topics include: state based systems; Bayesian filters for state estimation (parametric and non-parametric); probabilistic models for motion and perception; localization; mapping; simultaneous localization and mapping; planning and control problems: Markov decision processes, and partially observable Markov decision processes; exploration algorithms; extensions to multirobot systems; selected topics in reinforcement learning for planning, control and navigation.
Class/laboratory Schedule:	See registrar website
Midterm/Final Exam Schedule:	No midterm/no final. See Grading policy.
Course Calendar:	
Professional Component:	
Assessment/Grading Policy:	Homeworks: 40% Lab Assignments: 30% Final Project: 30%
Coordinator:	Stefano Carpin
Contact Information:	
Office Hours:	By appointment.