California State University Stanislaus
Department of Computer Science
Syllabus

Instructor: Dr. Xuejun Liang
My Office: DBH 282
Office Hours: MWF 9:00A-10:30A
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Class Information:
Class Room: DBH 104
Class Date & Time: MWF 11:00A-11:50A
Class Website: https://www.cs.csustan.edu/~xliang/Courses/CS4950-20S

Course Description:
CS4950 Robotics. (3 Hours) Pre-requisites: CS 3100 and MATH 2300. This course will introduce robotics and the key artificial intelligence issues involved in the development of intelligent robots. The course will examine algorithms for the control of autonomous mobile robots and explore issues that include software control architectures, localization, navigation, sensing, planning, and uncertainty. Provides a variety of hands-on robot programming and simulation projects.

Required Textbook:
1. Introduction to AI Robotics, Second Edition, by Robin R. Murphy, The MIT Press, 2019

Reference Books:
1. The Robotics Primer, by Maja J Mataric, The MIT Press, 2007
2. Introduction to Autonomous Mobile Robots, Second Edition, by Roland Siegwart, IIIah Reza Nourbakhsh and Davide Scaramuzza, The MIT Press, 2011

Course Outcomes
Students who successfully complete the course must be able to
1. Explain issues and challenges in autonomous robotics and biological foundations for robot control and the reactive paradigm.
2. Utilize the hierarchical paradigm, hybrid deliberative/reactive paradigm, and sensing techniques for reactive robots, and the STRIPS algorithm.
3. Apply algorithms and methodologies in robot path planning, localization, and map making.
4. Write software programs to control a real or simulated mobile robot.

Course Outline (Major Topics)

Week	Topics Covered
Week 1: 1/27, 1/29, 1/31	Overview of intelligent mobile robots.
Week 2: 2/3, 2/5, 2/7	Historical precursors to today's intelligent robots.
Week 3: 2/10, 2/12, 2/14	Automation and autonomy. The first project.

Week 4: 2/17, 2/19, 2/21	Software organization of autonomy.
Week 5: 2/24, 2/26, 2/28	Telesystems. The second project
Week 6: 3/2, 3/4, 3/6	Biological foundations for robot control and schema theory.
Week 7: 3/9, 3/11, 3/13	Perception and behaviors.
Week 8: 3/16, 3/18, 3/20	Behavioral coordination. Midterm Exam.
3/23-27	Spring break
Week 9: 3/30, 4/1, 4/3	Locomotion. The third project.
Week 10: 4/6, 4/8, 4/10	Sensing Techniques for Reactive Robots I
Week 11: 4/13, 4/15, 4/17	Sensing Techniques for Reactive Robots II
Week 12: 4/20, 4/22, 4/24	Navigation. Topological path planning. The fourth project
Week 13: 4/27, 4/29, 5/1	Metric Path Planning.
Week 14: 5/4, 5/6, 5/8	Localization, Mapping, and Exploration
Week 15: 5/11, 5/13, 5/15	Learning
Week 16	Final Exam. Monday 5/18/2020 11:15a.m.-1:15p.m.

*The content may change, and you will be notified beforehand.

Grading Scale will be assigned on a standard scale as below

A	B	C	D	F
90-100	75-89	60-74	40-59	<40

Clustering of grades may cause the grading scale to be lowered (to your benefit), but it will not be raised

Evaluation:

The overall course grade will be the weighted sum of the points earned in the following categories:

Homework	Projects	Midterm Exam	Final Exam
20%	30%	20%	30%

Other Polices:

1. The point of late homework assignments and projects will deduct 20% per day.
2. There will be no makeup exams except in a verified emergency with immediate notification.
3. Penalty on cheating will be extremely severe. Standard academic honesty procedure will be followed.