



Course Information Sheet

CSCI 4530

Robotics

Brief Course Description (50-words or less)

This is an introduction to robotics with a focus on autonomous mobile robots. The two significant topics dealt with are (1) robotic perception and (2) motion planning. Perception addresses problem-solving using sensory inputs and desired goals. Motion planning deals with aspects of the movement of autonomous rovers in unknown environments, integrating mobile robot localization and mapping algorithms.

Extended Course Description / Comments

This course is cross-listed with ARTI 4530

Pre-Requisites and/or Co-Requisites

CSCI 2720: Data Structures

And Permission of Department

Required, Elective or Selected Elective

Selected Elective Course

Approved Textbooks (if more than one listed, the textbook used is up to the instructor's discretion)

Author(s): Siegwart, Nourbakhsh, and Scaramuzza
Title: *Introduction to Autonomous Mobile Robots*
Edition: MIT Press, 2nd Edition (2011)
ISBN-13: 978-0-01535-6

Specific Learning Outcomes (Performance Indicators)

1. Familiar with robot control architectures.
2. Familiar with the robot perception and planning algorithms that provide meaningful outcomes for autonomous mobile robots.
3. Design and analyze the complexities of designing and constructing small autonomous mobile robots that achieve specific goals.
4. Utilize robot simulators and software development frameworks for programming mobile robots that achieve specific goals.
5. Design, analyze, and implement mobile robot algorithms using simulated and real-world sensor data.
6. Familiar with the state-of-the-art of autonomous mobile robotics.

ABET Learning Outcomes

- A. Graduates of the program will have an ability to: Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
- B. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
- C. Communicate effectively in a variety of professional contexts.
- D. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
- E. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
- F. Apply computer science theory and software development fundamentals to

produce computing-based solutions.

NOTE: In the construction of the student learning outcomes for this course, the instructors interpreted “computing requirements” in (B) as the functional requirements for a software solution and not as specific hardware requirements for the target platform; likewise, the phrase “[a]pply computer science theory” in (F) was interpreted as using computer science principles.

Relationship Between Student Outcomes and Learning Outcomes

		ABET Learning Outcomes					
		A	B	C	D	E	F
Student Learning Outcomes	1.	●	●	●			●
	2.	●	●	●			●
	3.	●	●				●
	4.	●	●				●
	5.	●	●			●	●
	6.	●	●	●			●

Major Topics Covered
(Approximate Course Hours)

3 credit hours = 37.5 contact hours

4 credit hours = 50 contact hours

Note: Exams count as a major topic covered

1. Introduction and History of Robotics (4 Hours)
2. Robot Kinematics and Control (7 Hours)
3. Robot Perception Algorithms (7 Hours)
4. Robot Probabilistic Methods for Robotics (3 Hours)
5. Localization and Mapping Algorithms (10 Hours)
6. Robot Motion Planning Methods (10 Hours)
7. Robot Behavior Architectures (5 Hours)
8. Robot Applications and Advanced Topics (4 Hours)

Course Master

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Modified

3/18/2024 by Dr. Ramvijas Parasuraman