Robotics: AI Techniques

Last Updated: Fri, 01/09/2026

Course prefix: CS

Course number: 7638

Section: O01

CRN (you may add up to five):
26532 29949

Instructor First Name: Jay

Instructor Last Name: Summet

Semester: Spring

Academic year: 2026

Course description:

In this course, you will learn how to program all the major systems of a robotic car based on lectures
from the former leader of Google's and Stanford's autonomous driving teams, Sebastian Thrun. You
will learn some of the basic techniques in artificial intelligence, including probabilistic inference,
planning and search algorithms, localization, tracking, and PID control, all with a focus on robotics.
Extensive programming examples and assignments in Python will apply these methods in the context
of autonomous vehicles.

Course learning outcomes:

Upon successfully completing this course, you will be able to:
•Implement filters (including Kalman and particle filters) in order to localize moving objects whose locations are subject to noise.
•Implement search algorithms (including A*) to plan the shortest path from one point to another
subject to costs on different types of movement.
•Implement PID controls to smoothly correct an autonomous robot's course.
•Implement a SLAM algorithm for a robot moving in at least two dimensions.

Required course materials:

There are no required texts for this course; however, a supplementary reading you may find very
helpful is Probabilistic Robotics by Wolfram Burgard, Dieter Fox, and Sebastian Thrun. The book
provides much of the math and the derivations omitted in Sebastian's lectures.
http://probabilistic-robotics.org/
Canvas is the primary website you will be using for this course (
https://gatech.instructure.com/).
Lectures and problem sets will be accessed via Canvas in the Modules and Assignments pages,
respectively.

Grading policy:

Your overall course grade will be calculated from your weighted scores on the following deliverable
items:
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6 problem sets and a Syllabus Quiz (18% total)
(Problem set 0 is ungraded and for practice only.)
•PID Mini-Project (7%)
•Kalman Filter, Particle Filter, Path Search, Policy Search & SLAM Projects (11% each)
•Midterm & Final Exam (20%)
•Extra Credit Opportunities: Worried you might end up right below a grade cutoff line? You can earn a small amount of extra credit in several ways, including:
◦ Participating in optional hardware & research challenge assignments.
◦ Exceptional participation and helpfulness on Ed Discussion throughout the semester.
Extra credit will be taken into consideration at the end of the semester if you are within two points of the threshold for the next higher letter grade. The maximum possible bump is 2% of
your total course grade. Note that to achieve the maximum possible (2%) bump, you will need
to do either all the hardware challenges OR all of the research challenges, as well as some Ed
Discussion Participation. Alternatively, you can do ½ of the hardware challenges AND ½ of the
research challenges as well as some Ed Discussion Participation to receive the full credit.
Assignments and Problem Sets are posted in Canvas using the Assignments tool, but you will submit
all work using the Gradescope online-autograder tool (linked from Canvas). See the course guidelines
document for more details. Note that you will receive no credit or grade for any work submitted to the
free Udacity course.

We will post grades using the Grades tool in Canvas. We will do our best to return grades to you as
quickly as possible. We ask that if you have a concern about a grade received to please notify us via a
private post on Ed Discussion within one week of receipt.

The minimum required percentage scores (we do NOT round up) for course letter grades are:
•A: 90.00%
•B: 80.00%
•C: 70.00%
•D: 60.00%
If circumstances warrant, the instructor may lower these grade cutoffs (that is, make them more
favorable to your grade) at the end of the semester, although we typically do not need to do this.

Attendance policy:

None.

Academic honesty/integrity statement:

Students are expected to maintain the highest standards of academic integrity. All work submitted must be original and properly cited. Plagiarism, cheating, or any form of academic dishonesty will result in immediate consequences as outlined in the university's academic integrity policy.

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are
expected to act according to the highest ethical standards. For information on Georgia Tech's Academic
Honor Code, please visit https://catalog.gatech.edu/policies/honor-code/ or https://catalog.gatech.edu/rules/18/.
We will report all incidents of suspected dishonesty to the Office of Student Integrity (OSI). Please
refer to the Course policy guidelines document for further details. We actively scan project submissions
with automated means to detect cases of plagiarism or unauthorized collaboration.