College of Engineering

Computer Science and Engineering

CSCE 752 Syllabus

Section 600 (58432)
Robotics and Spatial Intelligence
Spring 2026 - College Station

Course Information

Time: Mondays and Wednesdays, 4:10pm-5:25pm
Location: HRBB 113
Credit hours: 3

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Instructor Details

Jason O'Kane
Email: jokane@tamu.edu
Office Location: PETR 318
Phone: jokane@tamu.edu
Office Hours
Tuesdays, 12pm-1pm or by appointment
Preferred Contact Method
Email is the recommended method for contacting me.

Messages in the Canvas messaging system, including comments attached to assignments, are not likely to be received in a timely manner.

Catalog Description

Robotics and Spatial Intelligence. (3-0). Credit 3. The algorithmic foundation of robotics including spatial representations, frame transformation and mapping, forward kinematics, inverse kinematics, mobile robots wheel kinematics, motion planning, sensors, camera calibration, stereo vision, simultaneous localization and mapping and navigation. Prerequisites: Graduate classification or approval of instructor.

Additional Course Details

This is a course about what happens when algorithms interact with the physical world.

Course Prerequisites

The only formal prerequisite is to hold graduate standing.

Students will be expected to exhibit mature mathematical ability, mastery of fundamental algorithms and data structures, and strong programming skills, as appropriate for an upper-level course in computer science.

Students will be expected to describe and evaluate technical concepts correctly using precise written English.

Major projects will require the use of the Robot Operating System (ROS) software system, which is best supported within the Ubuntu Linux operating system. The recommended programming language is Python. Demonstrations and examples will be based on this Ubuntu+ROS+Python environment. You are welcome to identify and utilize other suitable operating systems or languages for your projects, provided that doing so does not trivialize the assignment. However, the instructor and TA will not be able to provide assistance with this. Note that commonly

attempted alternatives to Linux, including Docker, Windows Subsystem for Linux, VirtualBox, and VMWare have proven troublesome to many students in the past.

Course Learning Outcomes

Upon completion of this course, the learner will be able to:

- Create algorithms and software for both mobile robots and manipulators.
- Analyze different sensors for different robot tasks.
- Evaluate and create navigation and motion planning algorithms.
- Apply existing approaches to formulate a comprehensive solution.

Special Course Designation

None

Textbook and/or Resource Materials

This material Is: Recommended
Computational Principles of Mobile Robotics
Authors: Gregory Dudek and Michael Jenkin
Publisher: Cambridge University Press
Publication Date: 2024
Edition: Third

This material Is: Recommended
Principles of Robot Motion: Theory, Algorithms and Implementations
Authors: Howie Choset, Kevin M. Lynch, Seth Hutchinson, George Kantor, Wolfram Burgard, Lydia E. Kavraki, and Sebastian Thrun
Publisher: MIT Press
Publication Date: 2005

This material Is: Recommended
Planning Algorithms
Authors: Steven M. LaValle
Publisher: Cambridge University Press
Publication Date: 2006

Grading Policy

Your learning in this course will be evaluated based on the following elements:

- **Homework** assignments throughout the semester. These assignments will be similar in format to exam questions. Homework grading will be based on the standard of a reasonable good faith attempt to solve each part of the assignment. Therefore, you should complete the assignments but should not conclude that receiving full credit for the homework indicates that your answers were fully correct. (8%)
- **Projects** using ROS. There will be approximately six of these assignments, some of which will be completed individually and others in small groups. One of these projects will be assigned only to students in CSCE 752 and not to the students in the sister course CSCE 452. (34%)
- A **presentation** of current research in robotics. (10%)
- **Tests**, including two mid-term exams and final exam. (48%)

Letter grade thresholds

Thresholds for determining final grades appear below.

- A: ≥90%
- B: ≥80%
- C: ≥70%
- D: ≥ 60%
- F: < 60%

The instructor reserves the right to adjust these thresholds downward, but promises not to adjust them upward.

Gradebook access

Grades will be recorded via Canvas. It is your responsibility to verify that grades are correctly recorded on this site.

Corrections and regrades

My goal is to ensure that all of the grading for this course is fair and correct. If you believe there's been a mistake in grading, please bring it to the attention of the instructor within one week after the scores are posted. Regrade requests after one week will be politely declined.

Note on grades as computed by Canvas

Efforts have been made to ensure that Canvas is configured to calculate grades correctly, accounting for weights of various types of assignments and other details of the grading policy. Nevertheless, if a discrepancy is discovered between Canvas-computed grades and the state course policies, the course policies in this syllabus will govern assignment of final grades.

Deviations from the grading policy

I assume that every student takes the class intending to succeed, and I share that goal. However, in the interest of fairness and consistency, requests for grade increases that are inconsistent with the stated grading scale will be politely declined. Here is an incomplete list of hypothetical requests from students that are not sufficient reasons to deviate from the stated grading scale:

- *Getting a grade lower than ____ makes me feel sad.*
- *I am about to graduate.*
- *I am really close to getting a ____.*

- *I am willing to do extra work.*
- *If my grade is less than ____, I won't be able to graduate.*
- *I have a good GPA so far.*
- *I have been away from school for a few years.*
- *I have never failed a class before.*
- *I have never taken a course in this area before.*
- *I have too many other responsibilities.*
- *I have worked extremely hard in the course.*
- *I need a GPA of at least ____ to get the internship I want.*
- *It doesn't hurt to ask!*
- *I've never gotten a grade as low as !blank before.*
- *I want to get into graduate school.*
- *My parents will be disappointed in me.*
- *The course is too hard for me.*
- *I worked hard to finish the semester strong.*

Important reminder

Keep in mind that I am grading your work, not you as a person.

Late Work Policy

Work submitted by a student as makeup work for an excused absence is not considered late work and is exempt from the late work policy (Student Rule 7).

Course Specific Late Work Policy

- **Homework** assignments will not be accepted late. Solutions will be posted and discussed very shortly after the deadline.

- **Projects** and the **presentation** may submitted late, subject to a deduction of 0.0139% of the total available points for each minute late. This means, for example, that one day after the deadline, the maximum possible score is 80%; three days after the deadline, the maximum possible score is 40%; after approximately five days beyond the deadline, it will be impossible to earn any credit for a project.
- **Tests** missed without an approved excused absence will be awarded a score of zero.

Course Schedule

The schedule for the course is summarized below.

- Weeks 1-4: introduction, robot hardware, wheeled systems, navigation
- Test 1: February 16
- Weeks 6-10: control, localization, mapping, SLAM
- Test 2: March 25
- Weeks 11-15: motion planning, multiple robots, planning over information spaces, advanced topics
- Final Exam: May 1

Homework assignments will be due before the start of most lectures. Projects will be due approximately every two weeks. Students should plan their time, including potential plans to depart from College Station after the semester, in accordance with this schedule.

Additional Course Information

Attendance

You are expected to attend and participate in each lecture, and I will make every effort to ensure that class attendance is worth your time.

Mobile devices

Please silence any mobile devices before coming to class. If your phone rings in class, I reserve the right to answer it for you and take a message. Likewise, if my phone rings during class time, I will allow a student to answer it.

Fast Track credit

Some undergraduate students are participating in the College of Engineering's Fast Track program, which essentially allows graduate-level courses to count toward bachelor's and master's degrees. Only students enrolled in CSCE 752 can receive Fast Track credit for this course. Please ensure that you are enrolled in the correct course. University rules prohibit switching between CSCE452 and CSCE752 after the add/drop period, despite the similarity between the two courses.

Academic integrity

Academic misconduct undermines the educational mission of the course and is incompatible with each of our Aggie Core Values of Respect, Excellence, Leadership, Loyalty, Integrity, and Selfless Service. Therefore, you are expected to practice the highest possible standards of academic integrity. All incidents of academic misconduct will be reported to the Aggie Honor System Office (ASHO). The standard academic penalty for academic misconduct is an F* grade for the course. Other penalties may be imposed within the Honor Code process. This policy includes all forms of academic misrepresentation, including cheating; fabrication; multiple submissions; plagiarism; complicity; abuse and misuse of access; unauthorized access; and violation of college, program, departmental or course rules.

It is not acceptable in this course to submit work completed by anyone else as your own, to make your own work available to anyone else, nor to distribute or post the materials for the course in any venue. Any use of words, images, code, or ideas of others must be accompanied by complete and accurate citations. Use of the words, images, code or ideas of others without complete and accurate citation is plagiarism, which is considered a form of academic misconduct. The expectation is

that the words, images, code, and ideas you submit will be your own original work, with the exception of occasional correctly cited quotations in support of your own ideas.

Unless an assignment includes instructions to the contrary, it is permissible to consult Internet resources to complete the assignments in this class, provided that you give adequate citations of every resource you consult. This policy includes both human-generated and AI-generated material. It is not permissible to copy code or anything else directly from the web. Representing the work of others as your own is never acceptable.

Submission of identical or substantially identical work will be considered strong evidence that violations of academic integrity by all involved have occurred. This means, among other things, that posting project code in any publicly-viewable venue (for example, a public GitHub repository) is strongly discouraged. If others locate and utilize your code, you will be held responsible for providing it.

Additional details about the university's policies on academic misconduct appear below.

Policy changes

Changes to the syllabus at the instructor's reasonable discretion, including changes to the evaluation and grading mechanisms, are possible but unlikely. Any such changes will be announced.

AI Statement

Submitting work with a significant percentage of AI-generated content, unless otherwise permitted, can be considered academic misconduct under Texas A&M University Student Rule 20. Students must therefore cite the use of Generative AI tools and document what they have contributed to an assignment.

Technology Support

Technology Services (IT) - Main Campus

Hours: 24/7
Phone: (979) 845-8300
Email: helpdesk@tamu.edu
Call/Chat/Email/visit: https://it.tamu.edu/help

Canvas LMS Technical Support

Hours: 24/7/365
Phone: (877) 354-4821
Email: support@instructure.com

Support is available by clicking the Help button at the far left in the Canvas global navigation menu.
Canvas Resources are also linked on the home page of every Canvas course.

University Policies

This section outlines the university-level policies that must be included in each course syllabus. The TAMU Faculty Advisory Council established the wording of these policies.

Academic Integrity Statement and Policy

"An Aggie does not lie, cheat or steal, or tolerate those who do."

"Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that

the item submitted is indeed the work of that student. Students must keep appropriate records at all times. The inability to authenticate one's work, should the instructor request it, may be sufficient grounds to initiate an academic misconduct case" (Section 20.1.2.3, Student Rule 20).

You can learn more about the Aggie Honor System Office Rules and Procedures, academic integrity, and your rights and responsibilities at aggiehonor.tamu.edu.

University Attendance Policy

The university views class attendance and participation as an individual student responsibility. Students are expected to attend class and to complete all assignments.

Please refer to Student Rule 7 in its entirety for information about excused absences, including definitions, and related documentation and timelines.

Makeup Work Policy

Students will be excused from attending class on the day of a graded activity or when attendance contributes to a student's grade, for the reasons stated in Student Rule 7, or other reason deemed appropriate by the instructor.

Please refer to Student Rule 7 in its entirety for information about makeup work, including definitions, and related documentation and timelines.

Absences related to Title IX of the Education Amendments of 1972 may necessitate a period of more than 30 days for make-up work, and the timeframe for make-up work should be agreed upon by the student and instructor" (Student Rule 7, Section 7.4.1).

"The instructor is under no obligation to provide an opportunity for the student to make up work missed because of an unexcused absence" (Student Rule 7, Section 7.4.2).

Students who request an excused absence are expected to uphold the Aggie Honor Code and Student Conduct Code. (See Student Rule 24.)

Notice of Nondiscrimination

Texas A&M University is committed to providing safe and non-discriminatory learning, living, and work environments for all members of the University community. The University provides equal opportunity to all employees, students, applicants for employment or admission, and the public, regardless of race, color, sex (including pregnancy and related conditions), religion, national origin, age, disability, genetic information, or veteran status.

Texas A&M University will promptly, thoroughly, and fairly investigate and resolve all complaints of discrimination, harassment (including sexual harassment), complicity, and related retaliation based on a protected class in accordance with System Regulation 08.01.01, University Rule 08.01.01.M1, Standard Administrative Procedure (SAP) 08.01.01.M1.01, and applicable federal and state laws. In accordance with Title IX and its implementing regulations, Texas A&M does not discriminate on the basis of sex in any educational program or activity, including admissions and employment.

The following person has been designated to handle inquiries and complaints regarding the non-discrimination policies: Jennifer M. Smith, TAMU Associate VP & Title IX Coordinator at YMCA Ste 108, College Station, TX 77843, 979-458-8407, or email civilrights@tamu.edu. For other reporting options, visit the U.S. Department of Education Office for Civil Rights Complaint Assessment System to locate the address and phone number of the office that serves your area, or call 1-800-421-3481.

Civil Rights, Free Speech, and Title IX Policies

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit discrimination and harassment based on an individual's race, color, sex, (including pregnancy and related conditions), religion, national origin, age, disability, genetic

information, veteran status, or any other legally protected characteristic. This includes forms of sex-based violence, such as sexual assault, sexual harassment, sexual exploitation, dating/domestic violence, and stalking.

Students can report discrimination/harassment, access supportive resources, or learn more about their options for resolving complaints on the University's Civil Rights & Title IX webpage.

Students should be aware that all university employees (except medical or mental health providers) are mandatory reporters, which means that if they observe, experience or become aware of an incident that they reasonably believe to be discrimination/harassment alleged to have been committed by or against a person who was a student or employee at the time of the incident, the employee must report the incident to the university.

Americans with Disabilities Act (ADA) Policy

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact the Disability Resources office on your campus (resources listed below). Disabilities may include, but are not limited to, attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability-related needs with Disability Resources and their instructors as soon as possible.

To request academic accommodations, contact the designated ADA office based on your location:

- Texas A&M University, College of Nursing, College of Dentistry, Irma Lerma Rangel College of Pharmacy College Station, College of Medicine, School of Public Health, Institute of Biosciences and Technology, EnMed Program, Bush School in Washington DC, Mays Business School – CityCentre, TAMU Engineering Academies, Texas A&M University Higher Education Center at McAllen and Texas A&M University at Galveston should contact Disability Resources at (979) 845-1637 or disability@tamu.edu.

- Texas A&M University School of Law should contact the Office of Student Affairs at (817) 212-4111 or law-disability@law.tamu.edu to request accommodations.
- Irma Lerma Rangel College of Pharmacy in Kingsville should contact the Disability Resource Center at Texas A&M University-Kingsville at (361) 593-3024 or drc.center@tamuk.edu to request accommodations.
- Texas A&M University College of Veterinary Medicine & Biomedical Sciences in Canyon should contact the Office of Student Accessibility at West Texas A&M University – Canyon at (806) 651-2335 or osa@wtamu.edu.

If you are experiencing difficulties with your approved accommodations, contact the office responsible for approving your accommodations or the Texas A&M ADA Coordinator Julie Kuder at ADA.Coordinator@tamu.edu or (979) 458-8407.

Pregnancy Accommodations

Texas A&M provides reasonable accommodations to students due to pregnancy and/or related conditions, such as childbirth, recovery, and lactation. Students should contact the University's Pregnancy Coordinator as soon as they become aware of the need for accommodation. Depending on the circumstances, accommodations could include extended time to complete assignments or exams, changes in course sequence, or modifications to the physical classroom environment.

Texas A&M will also allow a voluntary leave of absence, ensure the availability of lactation space, and maintain grievance procedures to provide for the prompt and equitable resolution of complaints of sex discrimination. For information regarding pregnancy accommodations, email TIX.Pregnancy@tamu.edu.

Statement on Mental Health and Wellness

Texas A&M University recognizes that mental health and wellness are critical factors influencing a student's academic success and overall wellbeing. Students are encouraged to engage in healthy self-care practices by utilizing the resources

and services available through University Health Services. The TELUS Health Student Support app provides access to professional counseling in multiple languages anytime, anywhere by phone or chat, and the 988 Suicide & Crisis Lifeline offers 24-hour emergency support at 988 or 988lifeline.org.

Texas A&M College Station

Students needing a listening ear can contact University Health Services at 979.458.4584. Call 911 or visit your nearest emergency room if you are currently experiencing a life-threatening situation or if your safety is at risk. 24-hour emergency help is also available through the 988 Suicide & Crisis Lifeline (988) or at 988lifeline.org.

Statement on the Family Educational Rights and Privacy Act (FERPA)

FERPA is a federal law designed to protect the privacy of educational records by limiting access to these records, to establish the right of students to inspect and review their educational records, and to provide guidelines for the correction of inaccurate and misleading data through informal and formal hearings.

Currently enrolled students wishing to withhold any or all directory information items can do so within howdy.tamu.edu using the Directory Information Withholding Form. The complete FERPA Notice to Students and the student records policy is available on the Office of the Registrar webpage.

Items that can never be identified as public information are a student's social security number, citizenship, gender, grades, GPR, or class schedule. All efforts will be made in this class to protect your privacy and to ensure confidential treatment of information associated with or generated by your participation in the class.

Directory items include name, UIN, local address, permanent address, email address, local telephone number, permanent telephone number, dates of attendance, program of study (college, major, campus), classification, previous institutions attended, degrees, honors and awards received, participation in

officially recognized activities and sports, medical residence location, and medical residence specialization.

Free Speech and Civil Discourse

Texas A&M recognizes that the pursuit of truth through open and robust discourse is critical to academic inquiry. However, as a community of scholars, the university has an aspirational expectation that such discourse will be conducted in accordance with Aggie Core Values. In this “marketplace of ideas,” we encourage civil dialogue creating an environment that allows individuals to express their ideas and to have their ideas challenged in respectful and responsible ways. Students can learn more about Freedom of Expression and Free Speech on the University's website about the First Amendment.