Course Syllabus

ME / ECE 5704 – Robotics & Automation
Dylan Losey, Virginia Tech
Fall 2023

1 Location

Lecture: New Classroom Building, Room 160
Mondays, Wednesdays and Fridays, 12:20-1:10pm

2 Website

Canvas website: https://canvas.vt.edu/courses/181707/

3 Description

Robots will change the future of our society. Self-driving cars, assistive prostheses, and surgical robots are already here — what will be next? This course provides an introduction to modern robotics. You will learn the fundamental methods needed to represent, model, and control robotic arms. These tools will enable you to move forward in both research and industrial applications.

4 Prerequisites

Graduate standing.

5 Corequisites

None.

6 Learning Objectives

Imagine that someone gives you a robot arm they have no idea how to use. By the end of this class, you will be able to: (a) express the position, orientation, and velocity of the robot, (b) build geometric and dynamic models of the robot, and (c) control the robot to follow a desired trajectory.

7 Instructor

Prof. Dylan Losey
213D Goodwin Hall
losey@vt.edu
https://dylanlosey.com/

8   Graduate Teaching Assistants

Diksha Aggarwal <diksha@vt.edu>
Taizoon Chunawala <taizoonac@vt.edu>
John Joyce <johnj2175@vt.edu>

9   Textbooks

- (Primary) Modern Robotics by Lynch and Park, 2019. Download here.

- (Secondary) Robot Modeling and Control by Spong, 2006. Download here.

10   Grading

Please note that ME 5704 / ECE 5704 has no lab component. You should not enroll in both this graduate course and ME 4584.

- Homework: 40%

- Midterm: 25%

- Final: 35%

11   Grade Scale

Letter Grade	Percent Grade	Letter Grade	Percent Grade	Letter Grade	Percent Grade
A	$93 - 100$	C+	$77 - 79$	P	≥ 65
A-	$90 - 92$	C	$73 - 76$	F	< 65
B+	$87 - 89$	C-	$70 - 72$		
B	$83 - 86$	D+	$67 - 69$		
B-	$80 - 82$	D	$65 - 66$		

I will round up when appropriate. For example, 89.5% rounds to an A- but 89.4% is a B+.

Pass / Fail. If you elect to take this class P/F, an *F* letter grade is marked as "failing," while any letter grade *D* or above is marked as "passing."

12   Modules

This course is composed of eight sequential modules.

- Basics

- Rigid-Body Motion

- Forward Kinematics

- Jacobian

- Inverse Kinematics

- Dynamics

- Control

- Motion Planning

13   Office Hours

Time: Fridays, 1:30-2:30pm
Location: Goodwin 213D

Office hours are held weekly on Fridays. All students are invited to attend. I also encourage students to use the Discussion feature on Canvas, which I regularly check to answer questions. I will not respond to emails requesting help on homework.

14   Assignments

There are 8 assignments, each of which is worth 5% of your final grade. Homework is due on Saturday by midnight. Late assignments are not accepted, except when the student has an illness, emergency, or other pressing issue. If you need to ask for an extension due to one of these reasons do not hesitate to contact me. However, you must make your request before the homework deadline.

15   Exams

The course has a midterm and a final exam that will be conducted in our normal lecture room. The midterm will occur during our regular class time. Both the midterm and the final are closed book, and you are not allowed to use online resources, tablets, or computers. However, you are encouraged to bring up to 2 sheets worth of notes (with writing on the front and back of each) for reference during the test. You may also bring a graphing calculator, although this calculator is not necessary.

16   Teamwork

Group discussion and collaborative work is encouraged on the homework and when studying for exams. However, you must submit your own assignment. All assignments submitted are considered graded work and are subject to the Honor Code. Students are not allowed to collaborate during the exams.

17   Services for Students with Disabilities

Every student in this course should have an equal opportunity to succeed. If you anticipate or experience academic barriers that may be due to disability, including but not limited to ADHD, chronic or temporary medical conditions, deaf or hard of hearing, learning disability, mental health, or vision impairment, please contact the Services for Students with Disabilities (SSD) office (540-231-3788, ssd@vt.edu, or visit www.ssd.vt.edu). If you have an SSD accommodation letter, please email me as soon as possible so that I can accommodate your needs. I am happy to discuss your accommodations in a private meeting during office hours (or by appointment).

18   Honor Code

The Undergraduate Honor Code pledge that each member of the university community agrees to abide by states:

"As a Hokie, I will conduct myself with honor and integrity at all times. I will not lie, cheat, or steal, nor will I accept the actions of those who do."

Students enrolled in this course are responsible for abiding by the Honor Code. A student who has doubts about how the Honor Code applies to any assignment is responsible for

obtaining specific guidance from the course instructor before submitting the assignment for evaluation. Ignorance of the rules does not exclude any member of the University community from the requirements and expectations of the Honor Code. Academic integrity expectations are the same for online classes as they are for in person classes. All university policies and procedures apply in any Virginia Tech academic environment. For additional information about the Honor Code, please visit: https://www.honorsystem.vt.edu/

19 Honor Code Pledge

The Virginia Tech honor code pledge for assignments is as follows:

"I have neither given nor received unauthorized assistance on this assignment."

The pledge is to be written out on all graded assignments at the university and signed by the student. The honor pledge represents both an expression of the student's support of the honor code and a commitment to uphold the academic standards at Virginia Tech.

20 Academic Misconduct

If you have questions or are unclear about what constitutes academic misconduct on an assignment or exam, please speak with me. The normal sanction I will recommend for a violation of the Honor Code is an F* sanction as your final course grade. The F represents failure in the course, and * identifies a student who has failed to uphold the values of academic integrity at Virginia Tech.