

ECE 761 Advanced Controls: Robotics (3cr)

Summer 2020

Course Information:

- Instructor: Jacob Glower
- Office: n/a
- Class Style: Flip classroom
- Lectures posted on-line and on YouTube
- Class time for short presentations & help with homework
- Class Time: Shared with ECE 341 on Zoom
- MTWRF 11am - 1pm, 6pm -8pm
- Text: On-Line lecture notes (www.BisonAcademy.com)
- YouTube videos (also on Bison Academy)
- Room: Zoom
- Email: Jacob.Glower@ndsu.edu

Bulletin Description:

Advanced topics in control systems.

Course Objectives:

By the end of the semester, students should be able to:

- Translate a point in one coordinate frame to another (coordinate transforms)
- Be able to determine the location of the tip of a robot given the joint angles (forward kinematics)
- Be able to determine the joint angles given the tip position of a robot (inverse kinematics)
- Be able to determine the dynamics of a robot manipulator (LaGrangian dynamics), and
- Be able to determine the joint forces required to apply a force at the tip (Jacobians)

Required Student Resources:

Internet Access

- Lecture notes posted on BisonAcademy
- Lectures posted on YouTube

Matlab

- All homework uses matlab extensively

Alternate References:

- An Introduction to Robotics, John J. Craig
- Robot Manipulators, Richard P. Paul

Class Organization

This class is run as a flip classroom.

- Lecture notes are posted on Bison Academy.
- Videos for the lecture notes are also linked on Bison Academy to YouTube videos

Each class will have a short introduction to the day's topics and an explanation of the homework set. Most of the class time is then dedicated to completing the day's homework assignment and demonstrating it.

Classes will be held on Zoom at two times

- Mornings: 11am - 1pm
- Evenings: 6pm - 8pm

These two times are to accommodate students who are working. Attendance is optional - all material you need is posted on Bison Academy. However, you're welcome to attend either or both sessions.

Homework Assignments

Each day has a homework set which is to be turned in by 8am the following day (when I start grading them). To demonstrate your program works, you can

- Make a youtube video and send me the link, or
- Attend one of the Zoom sessions and demonstrate your code by sharing your screen.

Grading:

Grading is based 100% on the homework sets. Grades are rounded to the nearest 1%, with your final grade being

A	B	C	D	F
90% or more	80% - 89%	70% - 79%	60% - 69%	59% or less

Legal Stuff

Attendance: According to NDSU Policy 333 (www.ndsu.edu/fileadmin/policy/333.pdf), attendance in classes is expected. Students are responsible for the material covered in class and in assignments regardless of their attendance. Note that all lecture notes, homework sets, and solutions are available on-line at www.BisonAcademy.com

Students with Special Needs: Any students with disabilities or other special needs, who need special accommodations in this course, are invited to share these concerns or requests with the instructor and contact the Disability Services Office (www.ndsu.edu/disabilityservices) as soon as possible.

Academic Honesty: The academic community is operated on the basis of honesty, integrity, and fair play. NDSU Policy 335: Code of Academic Responsibility and Conduct applies to cases in which cheating, plagiarism, or other academic misconduct have occurred in an instructional context. Students found guilty of academic misconduct are subject to penalties, up to and possibly including suspension and/or expulsion. Student academic misconduct records are maintained by the Office of Registration and Records. Informational resources about academic honesty for students and instructional staff members can be found at www.ndsu.edu/academichonesty.

Academic Honesty Defined: All written and oral presentations must "respect the intellectual rights of others. Statements lifted verbatim from publications must be cited as quotations. Ideas, summaries or paraphrased material, and other information taken from the literature must be properly referenced" (Guidelines for the Presentation of Disquisitions, NDSU Graduate School).

ECE Honor Code: On my honor I will not give nor receive unauthorized assistance in completing assignments and work submitted for review or assessment. Furthermore, I understand the requirements in the College of Engineering Honor System and accept the responsibility I have to complete all my work with complete integrity.

Veterans and Student Soldiers: Veterans and student soldiers with special circumstances or who are activated are encouraged to notify the instructor in advance.

