ECE 818: Robotics, Spring 2019

Instructor: Vaibhav Srivastava; 1210 Engineering Building; Email: vaibhav@egr.msu.edu
Lectures: M/W 12:40-2:00 pm, 2320 Engineering Building
Office hours: M/W 11:00-11:55 am

Textbooks:

1. Francesco Bullo and Stephen L. Smith. Lectures on Robotic Planning and Kinematics. available at http://motion.me.ucsb.edu/book-lrpk/ (main text)
2. Bruno Siciliano, Sciavicco Lorenzo, Luigi Villani, and Giuseppe Oriolo. Robotics: Modelling, Planning and Control. Springer Science & Business Media, 2010. (available via Springer link)
3. Mark W. Spong, Seth Hutchinson, and Mathukumalli Vidyasagar. Robot modeling and control. New York: Wiley, 2006.
4. Kevin M. Lynch and Frank C. Park. Modern Robotics. Cambridge University Press, 2017. (available at http://hades.mech.northwestern.edu/images/7/7f/MR.pdf)

D2L: The following material will be posted on D2L (d2l.msu.edu).

- Lecture slides
- Homework assignments
- Homework solutions

Grading: The final grade is computed using the following weights to the homework and exam grades:

Homework	Exam 1	Exam 2	Exam 3
25%	25%	25%	25%

Policies:

- Homework assignments will be due at 12:40 pm on Wednesdays in class. No extension will be granted. The smallest homework grade will be dropped in final grade calculation.
- Exams are in class. 5 letter paper (10 sides) cheat sheets will be allowed.
- Every student is expected to submit his/her own work. When there are MATLAB assignments, include a copy of the MATLAB script.
- If you have class/work conflict with the office hour, send e-mail to the instructor to arrange for alternative time.

Tentative Exam Schedule:
Exam 1: Wednesday, February 15
Exam 2: Wednesday, March 27
Exam 3: Monday, April 29

Important: Please read the Spartan Code of Honor at http://asmsu.msu.edu/initiatives/spartan-code-of-honor/

Course Outline:

Rigid Body Kinematics

1. Rotation Matrices
2. Parameterization of Rotation Matrices
3. Displacement Matrices
4. Velocity kinematics

Kinematics of Robotic Manipulators

1. Configuration Spaces
2. Position Kinematics of Manipulators
3. Velocity Kinematics of Manipulators

Dynamics of Robotic Manipulators

1. Rigid body dynamics
2. Manipulator Dynamics

Control of Robotic Manipulators

1. Independent joint control
2. Feedback linearization and trajectory tracking
3. Force Control

Mobile Robots

1. Kinematic modeling
2. Control of mobile robots

Motion Planning

1. Planning via Decomposition and search
2. Motion Planning via Sampling