

EML 6282 – Robot Geometry 2 Spring 2026 Syllabus

1. Basic Course Information

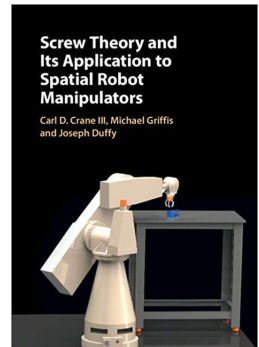
a) Instructor Dr. Carl Crane
NEB 551
352-219-6433
ccrane@ufl.edu
carl.crane@gmail.com

Class communication is via Canvas messaging.

Office hours: Wed, 8:30 – 10:15, Zoom, <https://ufl.zoom.us/j/8730685706>

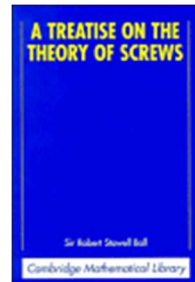
b) Class Meeting Time M, W, F 8th period, 3:00 – 3:50 am, NEB 201

c) Textbook Crane, C., Griffis, M., and Duffy., J. “Screw Theory and its Application to Spatial Robot Manipulators,” Cambridge University Press, 2022. ISBN: 0521630894



d) Additional (optional) References

Ball, R. S., "A Treatise on the Theory of Screws," 1900 ; reprinted by Cambridge University Press, 1998. ISBN: 0521636507



Hunt, K., "Kinematic Geometry of Mechanisms," Oxford University Press, 1978, ISBN: 0198561245



Davidson, J. and Hunt, K., "Robots and Screw Theory: Applications of Kinematics and Statics to Robotics," Oxford University Press, 2004, ISBN: 0198562454



2. Course Objectives and Outcomes

At the end of the class every student should:

- be able to understand basic principles of screw theory as applied to velocity analyses and static force analyses, i.e. twists of freedom, dynames, and wrenches
- be able to perform the forward and inverse kinematic velocity analysis for a serial robot and a parallel robot
- be able to perform the forward and inverse static force analysis for a serial robot and a parallel robot
- be able to perform the forward and inverse acceleration analysis for a serial robot manipulator

Topics that will be covered in the laboratory to meet these objectives:

- Chapter 1: Geometry of Points, Lines, and Planes
- Chapter 2: Coordinate Transformations and Manipulator Kinematics
- Chapter 3: Statics of a Rigid Body
- Chapter 4: Velocity Analysis
- Chapter 5: Reciprocal Screws
- Chapter 6: Singularity Analysis
- Chapter 7: Acceleration Analysis
- Mobility

3. Course Assessment

Grading

Exam 1 - 20 %
Exam 2 - 20 %
Exam 3 - 20 %
Final Exam - 25%
Homework - 15 %

4. Other Course Information

- all course correspondence will be via Canvas
- late homework will not be accepted