EML 6282 – Robot Geometry 2
Spring 2022 Syllabus

1. Basic Course Information

a) Instructor   Dr. Carl Crane
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352-219-6433
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Class communication is via Canvas messaging.

Office hours: Wed, 9:30 – 10:30 via Zoom (https://ufl.zoom.us/j/8730685706)

b) Class Meeting Time   M, W, F 4th period, 10:40 – 11:30 am, FLG 230

c) Textbook   Copies of class text can be purchased at Target Copy Center, University Avenue.

d) Additional (optional) References

Ball, R. S., "A Treatise on the Theory of Screws," 1900 ; reprinted by Cambridge University Press, 1998. ISBN: 0521636507
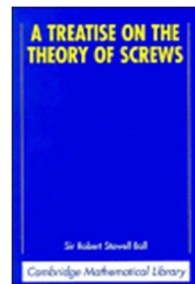
Hunt, K., "Kinematic Geometry of Mechanisms," Oxford University Press, 1978, ISBN: 0198561245

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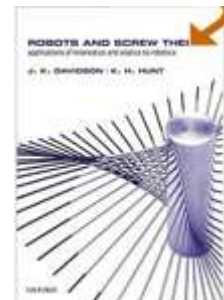
2. Course Objectives and Outcomes

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