CONCORDIA UNIVERSITY
FACULTY OF ENGINEERING AND COMPUTER SCIENCE

Robotic Manipulators I: Mechanics, ENGR6411

Instructor: Chun-Yi Su	**Office**: H549-9
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Lectures: 20:30-23:00 on Monday	**Office Hours**: when available
ENGR6411 Web: http://me.concordia.ca/~cysu/encs472&engr641.htm	

Textbook:

Introduction to Robotics: Mechanics and Control, 2nd Ed.
by J. J. Craig, Addison Wesley, 1989

References:

- *Robotics: Control, Sensing, Vision, and Intelligence*, by Fu, Gonzalez, and Lee, McGraw Hill, 1987
- *Robotics Dynamics and Control*, by M. W. Spong and M. Vidyasagar, John Wiley, 1989

Software:

- The Student Edition of MATLAB, by MathWorks, Prentice-Hall, 1998
  Robotics Toolbox for MATLAB

Syllabus:

	Hours
Introduction	1
Spatial Description and Transformation	9

Descriptions of position and orientation, frames, rotations of a frame, homogeneous transformations, transform arithmetic, transform equations, representation of a frame's orientation, examples.

Manipulator Kinematics	8

Link description, link connection, Denavit-Hartenberg convention, manipulator kinematics, joint space and Cartesian space, examples.

Inverse Kinematics	9

Solvability, manipulator subspace, algebraic and geometric approaches, Pieper's solution procedure, examples.

Velocities and Static Forces	10

Linear and angular velocity of a rigid body, velocity propagation from link to link, Jacobian and singularities, static forces, Jacobian in the force domain, Cartesian transformation of velocities and static forces, examples.

Assessment:

Assignment:	10%
Projects:	15%
Mid-term:	25%
Final:	50%