CS 656 – Advanced Robotics, Fall 2015

Instructor: Professor Marko Vuskovic, (mvuskovic@mail.sdsu.edu)

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Laboratory: Robotics and Neural Networks Laboratory, GMCS-408, Tel. (619) 594-7898

Lectures: MW 19:00 – 20:15, HH-221
Office Hours: MW 16:00 – 18:30 GMCS-408A
Web Site: http://medusa.sdsu.edu/Robotics/index.htm

Course Description:
Comprehensive treatment of algebraic methods for spatial description of solid objects in physical space, manipulator forward and inverse kinematics, differential motion, robot statics, Cartesian-space and model-based robot control.

Contents:
1. Review of basic concepts of robot manipulator design and manipulator kinematics
2. Review of mathematical concepts used in robotics
3. Spatial description and coordinate transformations
4. Direct kinematics
5. Inverse kinematics
6. Velocities, differential motion and manipulator Jacobian
7. Robot statics
8. Cartesian-based robot control
9. Model-based control

Grading Policy:
Four mini projects (30%)
Two midterm exams (30%, 40%)
Six in-class guided quizzes not graded but must be completed successfully.

The projects consist of a series of dependent parts which are building on top of each other. Necessary programming background is Matlab. All programming assignments are strictly individual and mandatory, and must be completed with a score of 60 or more. Programming assignments turned after the deadlines lose 10 points every business day.

Calendar:
Test 1 – Wednesday October 21; test 2 – Wednesday December 9;
There will be no makeup exams.
Mini projects will be given two weeks each, the deadlines will be determined in class.
Quizzes will be scheduled in class, one week in advance.

Learning Outcomes:
- Understanding and ability to design and program robot manipulators.
- Increase ability to read and write scientific papers in general, and in the field of robotics in particular.
- Increase ability for practical problem solving.
- Affirm the understanding and applicability of mathematical concepts of linear algebra.

Lab Assistants: GMCS-425, Sujan Gandikote (sujan.gandikote@mail.com)

Textual Material:
M. Vuskovic: "Advanced Robotics", Lecture Notes
J. Craig: “Introduction to Robotics: Mechanics an Control”, Addison Wesley 3rd Ed. (Optional reading)

_Students with disability:_
If you are a student with a disability and believe you will need accommodations for this class, it is your responsibility to contact Student Disability Services at (619) 594-6473. To avoid any delay in the receipt of your accommodations, you should contact Student Disability Services as soon as possible. Please note that accommodations are not retroactive, and that accommodations based upon disability cannot be provided until you have presented your instructor with an accommodation letter from Student Disability Services. Your cooperation is appreciated.