Robotic Systems

University of South Florida
Department of Mechanical Engineering

EML 4930/6801 (Fall 202?)

This is a SAMPLE syllabus, not meant for students taking the course in a specific semester

<u>Instructor:</u>	Dr. Redwan Alqasemi – ENG 007 – alqasemi@usf.edu – 974-2115 TA: John Smith – ENG room – email@usf.edu – 974-xxxx
<u>Time:</u>	Class time: TR 3:30 – 4:45 PM Office hours: TA: TR 2-3 PM On Microsoft Teams (or by appointment) Professor: TR 4:45-5:15 PM in person (or by appointment)
<u>Classroom:</u>	ISA 3048
<u>Textbook:</u>	"Introduction to Robotics, Mechanics and Control," Fourth Edition by John J. Craig, Pearson, 2018; ISBN 0133489795
<u>Goals:</u>	The purpose of this course is to understand the science and engineering of mechanical manipulation from the prospective of Kinematics.
<u>Background:</u>	Basic statics and dynamics, linear algebra, and higher-level programming. Students will use MATLAB, Python and/or ROS to work on homework and projects. Introductory controls course is desired but not necessary.
<u>Topics:</u>	Introduction Spatial Descriptions and Transformations Manipulator Kinematics Inverse Manipulator Kinematics Jacobian: Velocities and Static Forces Trajectory Generation Robot Programming and Simulation

<u>Grading:</u>

Test 1	25 % (no makeup)
Test 2	25 % (no makeup)
Quizzes	15 % (no makeup)
Homework	10 % (should be done independently)
Final Project	25 % (Teamwork)

Scale (%): A+ (98-100); A (90-97); A- (86-89); B+ (83-85); B (80-82); B- (76-79); C+ (73-75); C (70-72); C- (66-69); D+ (63-65); D (60-62); D- (56-59); F (0-55)

<u>Notes:</u>

1) While group studying is encouraged, each student has to do his/her homework and test independently. There will be no tolerance for cheating.

2) MATLAB, Python and/or ROS lessons and lab demos will be specified as the course progresses.

3) Short 3-minute quizzes of the contents of the previous 2 lectures will be given at the beginning of each class.

4) Students in need of academic accommodations for a disability may consult with Students with Accessibility Services to arrange appropriate accommodations within a reasonable time prior to needing an accommodation.

Tentative Class Schedule:

Date	Class #	Topic (Associated Videos)	Chapter #
8/24	1	Introduction (Ch1_Part: 1, 2a, 2b, 3)	1
8/26	2	Spatial Descriptions & Transformations (Ch2_Part: 1a, 1b, 1c)	2
8/31	3	Spatial Descriptions & Transformations (Ch2_Part: 2a, 2b, 3a, 3b)	2
9/2	4	Spatial Descriptions & Transformations (Ch2_Part: 4a, 4b, Programming)	2
9/7	5	Spatial Descriptions & Transformations (Ch2_Part: 5a, 5b)	2
9/9	6	Spatial Descriptions & Transformations (Ch2_Part: 5c, 5d, 6)	2
9/14	7	Programming	-
9/16	8	Manipulator Kinematics (Ch3_Part: 1, 2a)	3
9/21	9	Manipulator Kinematics (Ch3_Part: 2b, 2c, 2d)	3
9/23	10	Manipulator Kinematics (Ch3_Part: 2e, 3, 4)	3
9/28	11	Programming and Project Distribution	-
9/30	12	Lab Tour (ENG 19A) and Review	-
10/5	13	Test 1 (25 %)	-
10/7	14	Inverse Manipulator Kinematics (Ch4_Part: 1, 2, 3)	4
10/12	15	Trajectory Generation (Ch7_Part: 1, 2, 3)	7
10/14	16	Programming	-
10/19	17	Jacobian: Velocities and Static Forces (Ch5_Part: 1a, 1b)	5
10/21	18	Jacobian: Velocities and Static Forces (Ch5_Part: 2a, 2b)	5
10/26	19	Jacobian: Velocities and Static Forces (Ch5_Part: 3a, 3b)	5
10/28	20	Jacobian: Velocities and Static Forces (Ch5_Part: 4a, 4b, 5)	5
11/2	21	Programming	-
11/4	22	Comprehensive Example (CompEx_Part: 1, 2)	-
11/9	23	Comprehensive Example (CompEx_Part: 3, 4)	-
11/11	-	Veteran's Day Holiday	-
11/16	24	Review	-
11/18	25	Test 2 (25 %)	-
11/23	26	Project Review	-
11/25	-	Thanksgiving Holiday	-
11/30	27	Project Demonstrations	-
12/2	28	Project Demonstrations	-

Homework Due Dates:

Chapter	Homework #	Problem Number	Due Date
Ch. 1	HW #1 Points possible (10)	MATLAB 1 (Use Python or Matlab)	31-Aug
Ch. 2	HW #2 Points possible (140)	2.1	16-Sep
		2.2	
		2.3	
		2.4	
		2.13	
		2.27	
		2.28	
		2.29	
		2.30	
		2.31	
		2.32	
		2.33	
		2.34	
		2.37	
	HW #3 Points possible (150)	MATLAB 2A (Use Python or Matlab)	21-Sep
		MATLAB 2B (Use Python or Matlab)	
		ROS (Given in class)	
Ch. 3	HW #4 Points possible (60)	3.1	30-Sep
		3.3	
		3.8	
		3.9	
		3.19	
		3.20	
	HW #5 Points possible (50)	MATLAB 3 (Use Python or Matlab)	7-Oct
Ch. 4	HW #6 Points possible (30)	4.1	12-Oct
		4.4	
		4.8	
	HW #7 Points possible (50)	MATLAB 4 (Use Python or Matlab)	12-Oct
Ch. 7	HW #8 Points possible (20)	Given in Class	14-Oct
Ch. 5	HW #9 Points possible (70)	5.1	2-Nov
		5.2	
		5.7	
		5.10	
		5.11	
		5.13	
		5.15	

The fine prints… The following policy statements apply to all syllabi at all USF campuses

2021 Fall COVID-19 Mitigation Expectations

All students and instructors are expected to wear face coverings, at all times, during in-person classes. Per guidance from the CDC and Board of Governors, we expect that all members of our community will wear a mask on campus, vaccinated or unvaccinated. This is especially important while indoors, in crowded outdoor settings, if you have a weakened immune system or an underlying medical condition. Masks will be made available to anyone who needs one.

USF strongly urges all community members to get fully vaccinated. Vaccines are our most reliable means of preventing the spread of COVID-19. The vaccine is free, readily available, and all of USF's faculty, staff, and students are of age to be eligible for the vaccine; therefore, if someone chooses not to be vaccinated, they are assuming significant risk, including isolation and quarantine. Vaccines are also the most reliable way to ensure that students do not face any disruption to their studies or social activities, and faculty and staff do not face disruption to their teaching, research, or university work.

It is critically important that individuals who feel unwell stay home and contact Student Health Services or their primary care provider for medical advice. Report all possible exposures to assessCOVID@usf.edu.

Students in in-person classes may be assigned to the same seat for the duration of the Fall semester. This can assist with exposure assessments should they be necessary.

A student who will be absent from an in-person class (due to isolation, quarantine or other reason) must notify the instructor immediately for guidance on academic continuity and student learning.

Instructors may schedule remote office hours during the Fall 2021 semester.

In-person classes may be asked (by USF leadership or the COVID-19 team) to transition to temporary remote instruction at any point in the Fall semester.

Academic Integrity

Academic integrity is the foundation of the University of South Florida's commitment to the academic honesty and personal integrity of its university community. Academic integrity is grounded in certain fundamental values, which include honesty, respect, and fairness. Broadly defined, academic honesty is the completion of all academic endeavors and claims of scholarly knowledge as representative of one's own efforts. The process for faculty reporting of academic misconduct, as well as the student's options for appeal, are outlined in detail in USF Regulation 3.027.

Academic Grievance Procedure

The purpose of these procedures is to provide all undergraduate and graduate students taking courses at the University of South Florida an opportunity for objective review of facts and events pertinent to the cause of the academic grievance. An "academic grievance" is a claim that a specific academic decision or action that affects that student's academic record or status has violated published policies and procedures, or has been applied to the grievant in a manner different from that used for other students.

Disability Access

Students with disabilities are responsible for registering with Students Accessibilty Services (SAS) (SVC 1133) in order to receive academic accommodations. SAS encourages students to notify instructors of accommodation needs at least five (5) business days prior to needing the accommodation. A letter from SAS must accompany this request. Please visit the Student Accessibility Services website for more information.

Disruption to Academic Progress

Disruptive students in the academic setting hinder the educational process. Disruption of the academic process (USF Regulation 3.025) is defined as the act, words, or general conduct of a student in a classroom or other academic environment which in the reasonable estimation of the instructor: (a) directs attention away from the academic matters at hand, such as noisy distractions, persistent, disrespectful or abusive interruption of lecture, exam, academic discussion, or general University operations, or (b) presents a danger to the health, safety, or well-being of self or other persons.

Food and Housing Insecurity

We recognize that student facing financial difficulty in securing a stable place to live and/or in affording sufficient groceries may be at risk of these financial issues affecting their performance in classes. Students with these needs are urged to contact Feed-A-Bull (feedabull@usf.edu or their website), or Student Outreach and Support (socat@usf.edu or their website).

Intellectual Freedom and Viewpoint Diversity Act (House Bill 233)
Preliminary Guidance Document

Students may, without prior notice, record video or audio of a class lecture for a class in which the student is enrolled for their own personal, educational use. A class lecture is defined as a formal or methodical oral presentation as part of a university course intended to present information or teach enrolled students about a particular subject. Recording class activities other than class lectures, including but not limited to lab sessions, student presentations (whether individually or part of a group), class discussion, clinical presentations such as patient history, academic exercises involving student participation, test or examination administrations, field trips, private conversations between students in the class or between a student and the faculty member is prohibited. Recordings may not be used as a substitute for class participation and class attendance and may not be published or shared without the written consent of the faculty member. Failure to adhere to these requirements may constitute a violation of the USF Student Conduct Code.

Religious Observances

All students have a right to expect that the University will reasonably accommodate their religious observances, practices and beliefs (USF Policy 10-045). The University of South Florida, through its faculty, will make every attempt to schedule required classes and examinations in view of customarily observed religious holidays of those religious groups or communities comprising USF's constituency. Students are expected to attend classes and take examinations as determined by the university. No student shall be compelled to attend class or sit for an examination at a day or time prohibited by his or her religious belief. However, students should review the course requirements and meeting days and times to avoid foreseeable conflicts, as excessive absences in a given term may prevent a student from completing the academic requirements of a specific course. Students are expected to notify their instructors at the beginning of each academic term if they intend to be absent for a class or announced examination, in accordance with this Policy.

Sexual Misconduct / Sexual Harassment

USF is committed to providing an environment free from sex discrimination, including sexual harassment and sexual violence (USF Policy 0-004). The USF Center for Victim Advocacy is a confidential resource where you can talk about incidents of sexual harassment and gender-based crimes including sexual assault, stalking, and domestic/relationship violence. This confidential resource can help you without having to report your situation to the Title IX Office unless you request that they make a report. Contact the USF Center for Victim Advocacy: 813-974-5757. Please be aware that in compliance with Title IX and under the USF Policy, educators must report incidents of sexual harassment and gender-based crimes including sexual assault, stalking, and domestic/relationship violence. If you disclose any of these situations personally to an educator, he or she is required to report it to the Title IX Office. For more information about Title IX, a full list of resources, or to report incidents of sexual harassment, sexual violence, relationship violence or stalking visit: usf.edu/title-ix

Statement of Academic Continuity

In the event of an emergency, it may be necessary for USF to suspend normal operations. During this time, USF may opt to continue delivery of instruction through methods that include, but are not limited to: Canvas, Teams, email messaging, and/or an alternate schedule. It is the responsibility of the student to monitor the Canvas for each class for course-specific communication, and the USF, College, and Department websites, emails, and ALERTUSF messages for important general information (USF Policy 6-010).