San José State University
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Office Hours: Tu & Th 17:00-18:00 (or by appointment) via Zoom

Class Days/Time: Lecture, Sec. 1 (40321): Tu-Th 1:30 PM-2:

Required Hardware

- We will be using the MinSeg Mega robotic kit for most of the labs and the final project. The ME department will provide the kits via an equipment loan program.
- To perform the labs, you will need to install MATLAB and Simulink on your computer, as well as the Arduino Support Package for Simulink via MATLAB's add-on explorer, and the Rensselaer Arduino Support Package library (RASPlib). You will also need a multimeter for the labs.

Required Software

- MATLAB and Simulink (Free for SJSU students via the campus-wide license: https://www.mathworks.com/academia/tah-portal/san-jose-state-university-31511582.html; A Mathworks account with SJSU email address is necessary to access the license). When installing MATLAB, install the following Toolboxes:
  - Simulink
  - Simscape
  - Control System Toolbox
  - Signal Processing Toolbox
  - Optimization Toolbox
  - Symbolic Math Toolbox
- Students without a strong background in MATLAB and/or Simulink are highly encouraged to complete "MATLAB Onramp" and "Simulink Onramp" courses from https://matlabacademy.mathworks.com/. These courses are free, and come with a certificate upon successful completion.

Grading Information

The weighting of course components for determining the course grade are as follows:

- Homework: 15%
- Lab Activities and Reports: 25%
- Midterm Exam: 20%
- Term Project: 10%
- Final Exam: 30%
- Lecture questions (Extra credit): 2%

The grade for each lab is the aggregation of three sub-grades:

- Preparation before the lab: 30%
- Completion check at the end of the lab: 30%
- Report: 40%

The scores on your homework, laboratory reports, midterm exam, term project, and final exam will be combined and totaled using the weighting scheme described above. The grade will be rounded up to the nearest integer, and a final letter grade will be determined using the following criteria:

Midterm and Final Exams

Both the midterm and the final exam will be based on the topics covered in the lectures. The exams will be closed book and closed notes, but you will be given the necessary formula. Reviewing the lecture notes, homework problems, and the labs will help you prepare for the exams.

Due to the online class system, all the exams will be carried out online via Canvas through the Respondus Monitor system. You will need to make sure you have a quiet place, a reliable internet connection, and a device with properly working camera and microphone. You must not communicate with anyone, by any means, during the exams.

Project

There will be a project assigned toward the end of the semester on developing a control system for the MinSeg robot to stabilize it in the upright position. The project will include analytical, computational, and experimental components.

Zoom Meeting Registration

The class registration link is available on Canvas. Please provide your correct and complete first and last name and email address the first time you attend the class. Once your registration is completed, the Zoom link will be sent to you via email. You can click on that link from any device to join the class without any further registration. Please make sure to keep the email or the meeting link for the rest of the semester.

ME-190: Mechatronic Systems Design (Fall 2021 Tentative Course Schedule)

Week	Date	Topics
1	8/19	Course overview, introduction to MATLAB
2	8/24, 8/26	Introduction to MATLAB and Simulink
3	8/31, 9/2	Modeling electrical systems
4	9/7, 9/9	Discretization of differential equations
5	9/14, 9/16	Analog and digital filtering
6	9/21, 9/23	Laplace Transform and transfer function
7	9/28, 9/30	State-space modeling and simulation
8	10/5, 10/7	Modeling electromechanical systems
9	10/12, 10/14	Midterm Review - **Midterm Exam (10/14)**
10	10/19, 10/21	Modeling and analysis of DC motors
11	10/26, 10/28	Fundamentals of feedback systems
12	11/2, 11/4	Control design using classical methods
13	11/9, 11/11	Control design using modern methods
14	11/16, 11/18	Review of rigid body dynamics
15	11/23	