UNIVERSITY OF CALIFORNIA
UCMERCED

Syllabus for ME210-01: Linear Controls

Spring 2018
Instructor: Sushma Shrinivasan

Designation:	Graduate level
Catalog Description:	Dynamics of Linear Systems, Concepts of Stability, Feedback Control, Root Locus Design, Frequency-Domain Analysis and Compensator Design, State-Space Representation, Controllability and Observability, Linear Observers, Matrix Methods for Control Design, Linear Quadratic Regulator (LQR) Optimal Control
Text Books and Other Required Materials:	Instructor material will be provided. Recommended textbook: Feedback Control of Dynamic Systems (6th edition) by G.F. Franklin, J.D. Powell and A. Emami-Naeini, Prentice Hall. Reference Books • Modern Control Engineering (1970) by K. Ogata, Prentice-Hall, Inc. • Automatic Control Systems (6th ed. 1991) by B.C. Kuo, Prentice-Hall, Inc. • Modern Control Systems (1987) by R. C. Dorf, Addison-Wesley Publishing Company.
Course Objectives/ Student Learning Outcomes:	After successful completion of this class, students will be able to: • Apply advanced skills to analyze dynamics of linear systems • Apply the knowledge of matrix theory to analyze linear systems and to design linear controls for regulating the dynamics of the system • Gain a thorough understanding of the theory of feedback controls and stability as well as contemporary research issues of control design • Apply methods of control design including root locus, frequency domain, state space designs • Understand the concepts of controllability and observability • Apply the concepts of optimization to design optimal controls • Apply control theories, control methods, and critical thinking skills to control problems of engineering systems Students will practice and demonstrate these abilities in homework exercises and control design projects. They will demonstrate their proficiency formally in the midterm and final examinations.
Program Learning Outcomes:	
Prerequisites by Topic:	Calculus, Ordinary Differential Equations, Complex Analysis, Linear Algebra, Matrix Theory, Vibration, and Dynamics.
Course Policies:	1. Turn in completed assignments in class. 2. No makeup exams will be given provided the absence was due to illness or accident documented by a physician's statement. 3. Students are expected to abide by the UCM Code of Academic Conduct and UC Merced Principles of Community (http://studentlife.ucmerced.edu and

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	http://studentaffairs.ucmerced.edu/principles-community).
Academic Dishonesty Statement:	a. Each student in this course is expected to abide by the University of California, Merced's Academic Honesty Policy. Any work submitted by a student in this course for academic credit will be the student's own work. b. You are encouraged to study together and to discuss information and concepts covered in lecture and the sections with other students. You can give "consulting" help to or receive "consulting" help from such students. However, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else, in the form of an e mail, an e mail attachment file, a diskette, or a hard copy. Should copying occur, both the student who copied work from another student and the student who gave material to be copied will both automatically receive a zero for the assignment. Penalty for violation of this Policy can also be extended to include failure of the course and University disciplinary action. c. During examinations, you must do your own work. Talking or discussion is not permitted during the examinations, nor may you compare papers, copy from others, or collaborate in any way. Any collaborative behavior during the examinations will result in failure of the exam, and may lead to failure of the course and University disciplinary action.
Disability Statement:	Accommodations for Students with Disabilities: The University of California Merced is committed to ensuring equal academic opportunities and inclusion for students with disabilities based on the principles of independent living, accessible universal design and diversity. I am available to discuss appropriate academic accommodations that may be required for student with disabilities. Requests for academic accommodations are to be made during the first three weeks of the semester, except for unusual circumstances. Students are encouraged to register with Disability Services Center to verify their eligibility for appropriate accommodations.
Topics:	Review of mathematical foundation for analysis of dynamics of linear systems. Concepts of stability, the Laplace domain description of stability, Nyquist stability Feedback controls for linear systems, compensators, frequency domain analysis State space representation of dynamic systems, controllability, observability, pole placement, and linear quadratic regulator (LQR) optimal control
Class/laboratory Schedule:	MW 4:30-5:45pm CLSSRM 114; No labs
Midterm/Final Exam Schedule:	Midterm Exam- Tentative date: March 14th in-class Final Exam- 3:00-6:00pm, CLSSRM 114, On May 10th, 2018
Course Calendar:	
Professional Component:	Engineering practice of vibration analysis, stability analysis, feedback control design and optimal control of linear dynamic systems.
Assessment/Grading Policy:	Homework- 25% Midterm- 25% Project- 25% Final Exam- 25%
Coordinator:	Sushma Shrinivasan
Contact Information:	Email : sshrinivasan@ucmerced.edu
Office Hours:	M,T,W- 3:30-4:30pm in AOA 143 or by appointment