

MECHANICAL & AEROSPACE ENGINEERING

Course:	ME 187, Automatic Control Systems Design
Semester:	Spring 2020
Prerequisites:	ME 111 ME130 ME 147
Credit Units:	3, Lecture
Class Code:	26549
Class Hours:	Monday & Wednesday, 7:30-8:45 PM
Class Location:	ENG 301
Instructor:	Dr. Neyram Hemati e-mail: neyram.hemati@sjsu.edu
Office Hours:	Monday & Wednesday, 8:45-9:45 PM
Text:	Control Systems Engineering, Eighth Edition, by Norman S. Nise, John Wiley and Sons.
Grading:	HW 10% Exam I 25% Exam II 25% Final 40%
HW:	The due dates will be announced at the time when assigned. No late HW will be accepted.
Final Exam Time:	Wednesday May 13, 2020; 19:45-22:00

Course Objectives:

1. To develop a fundamental understanding of the concept of dynamic systems.
2. To develop a fundamental understanding of the concept of feedback control systems.
3. To learn the process of modeling, analyzing, and designing linear feedback control systems.
4. To develop a fundamental understanding of linear control system design and basic control actions.
5. To learn to use Matlab as a tool in designing and simulating linear feedback control systems.

Student Learning Objectives:

1. The student will demonstrate a fundamental understanding of the concept of dynamic systems.
2. The student will demonstrate a fundamental understanding of the concept of feedback control systems.
3. The student will demonstrate the ability to model and analyze feedback control systems.
4. The student will demonstrate the ability to analyze feedback control systems in the time domain and the frequency domain.
5. The student will demonstrate a fundamental understanding of the concept of stability.
6. The student will demonstrate the ability to design control systems using the root locus technique and the frequency domain methods, e.g. Bode diagram and Nyquist plot.
7. The student will demonstrate the ability to conduct control system design through lead, lag, lead-lag, and PID compensation methods.
8. The student will demonstrate the ability to use Matlab and the Control System toolbox as in designing and simulating linear feedback control systems.

References:

1. "Matlab for Control Engineers," K. Ogata, Prentice Hall, 2008.
2. "Automatic Control Systems," F. Golnaraghi and B. Kuo, Wiley, 2009.
3. "Feedback Control of Dynamic Systems," 6th edition, by Franklin, Powell, and Emami Naeini, Addison-Wesley, 2009.
4. "Modern Control Systems," 12th edition, by R. Dorf and R. Bishop, Prentice Hall, 2010.

Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Refer to the current semester's [Catalog Policies](http://info.sjsu.edu/static/catalog/policies.html) section at <http://info.sjsu.edu/static/catalog/policies.html>. Add/drop deadlines can be found on the [current academic calendar](http://www.sjsu.edu/academic_programs/calendars/academic_calendar/) web page located at http://www.sjsu.edu/academic_programs/calendars/academic_calendar/. The [Late Drop Policy](http://www.sjsu.edu/aars/policies/latedrops/policy/) is available at <http://www.sjsu.edu/aars/policies/latedrops/policy/>. Students should be aware of the current deadlines and penalties for dropping classes.

Information about the latest changes and news is available at the [Advising Hub](http://www.sjsu.edu/advising/) at <http://www.sjsu.edu/advising/>.

Academic integrity

Your commitment as a student to learning is evidenced by your enrollment at San Jose State University. The [University's Academic Integrity policy](http://www.sjsu.edu/senate/S07-2.htm), located at <http://www.sjsu.edu/senate/S07-2.htm>, requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The [Student Conduct and Ethical Development website](http://www.sa.sjsu.edu/judicial_affairs/index.html) is available at http://www.sa.sjsu.edu/judicial_affairs/index.html.

Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified. If you would like to include your assignment or any material you have submitted, or plan to submit for another class, please note that SJSU's Academic Policy S07-2 requires approval of instructors.

Campus Policy in Compliance with the American Disabilities Act

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. Presidential Directive 97-03 requires that students with disabilities requesting accommodations must register with the [Disability Resource Center](http://www.drc.sjsu.edu/) (DRC) at <http://www.drc.sjsu.edu/> to establish a record of their disability.

AUTOMATIC CONTROL SYSTEM DESIGN		
Date	Topics	Readings
1/27/20	Introduction	Ch. 1
1/29/20	Linear Time Invariant Differential Equations	
2/3/20	Laplace Transformation	Ch. 2
2/5/20	Inverse Laplace Transformation	Ch. 4
2/9/20	Inverse Laplace Transformation	Ch. 4
2/11/20	Introduction to Matlab	
2/17/20	Block Diagram representation	Ch. 5
2/19/20	Mathematical Modeling of Dynamic Systems	Ch. 2&3
2/24/20	Transient Response Analysis	Ch. 4
2/26/20	Transient Response w/ Matlab	Ch. 4
3/2/20	Steady-State Response	Ch. 7
3/4/20	Steady-State Response	Ch. 7
3/9/20	Stability Analysis	Ch. 6
3/11/20	Stability Analysis	Ch. 6
3/16/20	Exam I	
3/18/20	Root Locus Analysis	Ch. 8
3/23/20	Root Locus Analysis	
3/25/20	Root Locus Analysis	
3/29/20	Spring Recess	Ch. 8
4/1/20	Spring Recess	Ch. 8
4/6/20	Root Locus with Matlab	
4/8/20	Control System Design by the Root Locus Method	Ch. 9
4/13/20	Control System Design by the Root Locus Method	Ch. 9
4/15/20	Control System Design by the Root Locus Method	Ch. 9
4/20/20	Frequency Response Analysis	Ch. 10
4/22/20	Frequency Response Analysis	Ch. 10
4/27/20	Frequency Response Analysis w/ MatLab	
4/29/20	Exam II	
5/4/20	Nyquist Stability Criterion	Ch. 10
5/6/20	Control System Design by Frequency Response	Ch. 11
5/11/20	Control System Design by Frequency Response	Ch. 11