

**San José State University**  
**Mechanical Engineering**  
**ME187, Automatic Control System Design, Spring 2023**

Instructor(s): Neyram Hemati  
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Office Hours: Monday & Wednesday 8:45-9:45  
Class Days/Time: Monday & Wednesday 7:30-8:45  
Classroom: Engineering 401  
Prerequisites: ME111, ME130, ME147

**Course Description:**

Develop a fundamental understanding of the concept of dynamic systems. Develop a fundamental understanding of the concept of feedback control systems. Learn the process of modeling, analyzing, and designing linear feedback control systems. Develop a fundamental understanding of linear control system design and basic control actions. Learn to use Matlab as a tool in designing and simulating linear feedback control systems.

**Course Format**

“Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally three hours per unit per week) for instruction, preparation/studying, or course related activities, including but not limited to internships, labs, and clinical practice. Other course structures will have equivalent workload expectations as described in the syllabus.”

**Final Examination and Evaluation**

**Textbook:** Control Systems Engineering, Eighth Edition, by Norman S. Nise, John Wiley and Sons.

<b>Grading:</b>	HW	10%
	Exam #1	25%
	Exam #2	25%
	Final	40%

**HW:** The due dates for the HW will be announced at the time when assigned. No late HW will be accepted.

**Final Exam Time:** Wednesday, May 17, 2023; 7:45-10:00 PM

**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,” 6<sup>th</sup> edition, by Franklin, Powell, and Emami Naeini, Addison-Wesley, 2009.
4. “Modern Control Systems,” 12<sup>th</sup> edition, by R. Dorf and R. Bishop, Prentice Hall, 2010.

**University Policies**

Per [University Policy S16-9](http://www.sjsu.edu/senate/docs/S16-9.pdf) (<http://www.sjsu.edu/senate/docs/S16-9.pdf>), relevant university policy concerning all courses, such as student responsibilities, academic integrity, accommodations, dropping and adding, consent for recording of class, etc. and available student services (e.g. learning assistance, counseling, and other resources) are listed on [Syllabus Information web page](https://www.sjsu.edu/curriculum/courses/syllabus-info.php) (<https://www.sjsu.edu/curriculum/courses/syllabus-info.php>). Make sure to visit this page to review and be aware of these university policies and resources.

**AUTOMATIC CONTROL SYSTEM DESIGN**

<b>Date</b>	<b>Topics</b>	<b>Readings</b>
1/25/23	Introduction	Ch. 1
1/30/23 2/1/23	Linear Time Invariant Differential Equation Laplace Transformation	Ch. 2
2/6/23 2/8/23	Inverse Laplace Transformation Inverse Laplace Transformation	Ch. 4 Ch. 4
2/13/23 2/15/23	Introduction to Matlab Block Diagram Representation	Ch. 5
2/20/23 2/22/23	Mathematical Modeling of Dynamic Systems Transient Response Analysis	Ch. 2&3 Ch. 4
2/27/23 3/1/23	Transient Response w/ Matlab Steady-State Response	Ch. 4 Ch. 7
3/3/23 3/8/23	Steady-State Response Stability Analysis	Ch. 7 Ch. 6
3/13/23 3/15/23	Stability Analysis Exam I	Ch. 6
3/20/23 3/22/23	Root Locus Analysis Root Locus Analysis	Ch. 8
3/27/23 3/28/23	Spring Recess Spring Recess	
4/3/23 4/5/23	Root Locus Analysis Root Locus with Matlab	Ch. 8
4/10/23 4/12/23	Control System Design by the Root Locus Method Control System Design by the Root Locus Method	Ch. 9 Ch. 9
4/17/23 4/19/23	Control System Design by the Root Locus Method Frequency Response Analysis	Ch. 9 Ch. 10
4/24/23 4/26/23	Frequency Response Analysis Frequency Response Analysis w/ MatLab	Ch. 11
5/1/23 5/3/23	Exam II Nyquist Stability Criterion	Ch. 10
5/8/23 5/10/23	Control System Design by Frequency Response Control System Design by Frequency Response	Ch. 11 Ch. 11
5/17/21	Review	