MECA 482: Control System Design
Fall 2022

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Office: OCNL 416
Office Hours: Tuesday 1-3
Wednesday 2-3
Thursday 12-1

Sections: Lecture Sections (PLMS 112):
01: Monday Wednesday Friday, 12-12:50PM
02: Monday Wednesday Friday, 1-1:50PM

Course Description and Goals
Analysis of dynamic systems and application of control systems for performance and stabilization. Topics include transfer functions, stability, steady state error, state space, and frequency domain and time domain performance specifications. Concepts are reinforced with a hands-on design project and simulation.

Prerequisites
EECE 211, MATH 260. Recommended: MECA 380, MECH 320; either CSCI 111 or MECH 208

Student Learning Objectives
After completion of this course, students will be able to:

• Model linear time invariant differential equations of mechanical, electrical, and electro-mechanical systems in time and frequency domains
• Design a control strategy for steady state error specifications as well as time domain and frequency domain specifications such as gain margin, phase margin, settling time, and overshoot
• Model using state space methods and use feedback to place the poles in desired locations
• Apply feedback and feedforward control strategies
• Represent dynamic systems as block diagrams
• Simulate dynamic systems using Matlab and Simulink
• Interpret and design using Bode plot, Nyquist diagram, and Nichols chart
• Interpret and design using root locus techniques
• Implement PID, lead, lag, and notch controllers
• Interpret the poles and zeros of the system into time and frequency response characteristics
• Implement observers for unmeasured states of a system and evaluate observability of a system

Course Usage of Blackboard Learn
Copies of the course syllabus, all assignments, schedule, and due dates can be found on Blackboard Learn. You are responsible for regularly checking Blackboard for updates and announcements, which can be accessed through the Chico State Portal.

Classroom Etiquette
During classroom sessions, students are expected to be completely engaged and committed to the class (no personal web surfing, messaging, social media, etc.).

Dropping and Adding
You are responsible for understanding the policies and procedures about add/drops, academic renewal, etc., found in the CSU Chico University Catalog. You should be aware of the new deadlines and penalties for adding and dropping classes.

Grading Policy
• 30% Assignments
• 20% Design Project
• 20% Midterm
• 30% Final
A ≥ 93% > A- ≥ 90% > B+ ≥ 87% > B ≥ 83% > B- ≥ 80% > C+ ≥ 77% > C ≥ 73%
73% > C- ≥ 70% > D ≥ 60% > F

Late Assignments
Late assignments will lose 10% of the full credit for each day they are late up for up to a week, after which it will not be accepted excepting extenuating circumstances.

Equipment / Textbooks / Additional Resources

Computer and Software (Required)
You are required to have a laptop with MATLAB/Simulink installed for assignments

Course Textbook (Required)
Franklin Powell, Feedback Control of Dynamic Systems 8th edition
ISBN: 978-0134685717
Earlier editions are fine. You are welcome to use either the print version, enhanced e-book version, or other digital copy or pdf.

Supplemental Textbook (Optional)
Norman Nise, Control Systems Engineering 7th edition
ISBN: 978-1118170519
This covers much of the same course content in an alternative format.
Recommended Book for Motion Control Systems (Optional)
George Ellis, Control System Design Guide
ISBN: 978-0128102411
I would recommend this book for anyone interested in motion control.

University Policies and Campus Resources

University Policy Regarding COVID-19 Safety

On-Campus Spaces for Attending Online Classes (Optional)
For students who have a mix of online and in-person classes, the University has prepared spaces for students to attend classes on-campus. The closest options to our classrooms include Meriam Library (MLIB), Bell Memorial Union (BMU), and the Science Building (SCI), more information can be found here: Student Learn Space Locations.

Academic Integrity
Students are expected to be familiar with the University’s Academic Integrity Policy. Your own commitment to learning, as evidenced by your enrollment at California State University, Chico, and the University’s Academic Integrity Policy requires you to be honest in all your academic coursework. Faculty members are required to report all infractions to the Office of Student Judicial Affairs. The policy on academic integrity and other resources related to student conduct can be found on the Student Judicial Affairs website.

IT Support Services (Optional)
Computer labs for student use are located on the first and fourth floor of the Meriam Library, Room 116 and 450, Tehama Hall Room 131, and the Bell Memorial Union (BMU) basement. You can get help using your computer from IT Support Services; contact them through the ITSS web site. Additional labs may be available to students in your department or college.

Student Services (Optional)
Student services are designed to assist students in the development of their full academic potential and to motivate them to become self-directed learners. Students can find support for services such as skills assessment, individual or group tutorials, subject advising, learning assistance, summer academic preparation and basic skills development. Student services information can be found on the current students page of the CSU Chico web site.

Americans with Disabilities Act
If you need course adaptations or accommodations because of a disability or chronic illness, 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. Please also contact Accessibility Resource Center (ARC) as they are the designated department responsible for approving and coordinating reasonable accommodations and services for students with disabilities. ARC will help you understand your rights and responsibilities under the Americans with Disabilities Act and provide you further assistance with requesting and arranging accommodations.
Accessibility Resource Center  
530-898-5959  
Student Services Center 170 arcdept@csuchico.edu

Student Learning Center (Optional)
The mission of the Student Learning Center (SLC) is to provide services that will assist CSU, Chico students to become independent learners. The SLC prepares and supports students in their college course work by offering a variety of programs and resources to meet student needs. The SLC facilitates the academic transition and retention of students from high schools and community colleges by providing study strategy information, content subject tutoring, and supplemental instruction. The University Writing Center has been combined with the Student Learning Center. You can also visit the Student Learning Center web site.

Blackboard ALLY
Chico State is committed to providing you the best learning experience possible. With this goal we have activated Blackboard ALLY in your courses. ALLY is a revolutionary product that focuses on making digital course content more accessible to all students. You will now be able to download any content in this course in the format that fits best with your learning style. PDF, HTML, .EPUB and Audio files are now available for most content items. Here is a link to more information on formats available as well as what each format offers. Should you have any questions or experience issues while using ALLY please contact the Office of Accessible Technology and Services at oats@csuchico.edu or 530-898-6532.