



蘇州大學
Soochow University

ENR 304 Control System

Summer 2024

Course Credits: 4

Contact Hours: 56 hours

Instructor: TBA

Email:TBA

COURSE OBJECTIVES

This course offers a comprehensive exploration of feedback control principles and their practical applications in controlling dynamical systems. Topics covered include PID control, dynamical systems modeling, small-signal stability and linearization, time- and frequency-domain response and analysis, and state-space modeling. Emphasis is placed on both theoretical concepts and practical applications through laboratories.

Upon Completion of this Course, students will be able to:

1. Compute the system response characteristics; determine transient response, steady-state response and steady-state errors;
2. Calculate and estimate the stability measures, error measures and time response measures from the analysis of mathematical models of some simple engineering systems;
3. Design P/PI/PID controllers using the root-locus and frequency response techniques;
4. Apply the basic control systems engineering principles of modelling, analysis and design to simple control systems.

PREREQUISITES

PHY 120 Introduction to Electronics

GRADING

Grades will be determined by accumulating points, with 100 points being the



maximum, as follows:

ITEM	POINTS
5 Labs and Reports	50 Points
2 Quizzes	20 Points
Midterm Exam	10 Points
Final Exam	20 Points
Total	100 Points

Late submissions will be graded at the end of the course. Grades will be assigned according to the following rule:

$$A \geq 90 > B \geq 80 > C \geq 70 > D \geq 60 > F.$$

We reserve the right to make adjustments to the overall grading policy.

COURSE MATERIALS

Required Texts:

Modern Control Systems, Richard C. Dorf and Robert H. Bishop, 13th Edition, Pearson.

Recommended (Optional) Texts or Other Materials:

None

COURSE TOPICS

MODULE	TASKS
Module 1	Topics: Topic 1: Introduction to Control Systems Topic 2: Mathematical Models of Systems Topic 3: The State Variables of a Dynamic System Topic 4: The State Differential Equation Assessments: Lab #1 Lab Report #1



Module 2	<p>Topics: Topic 5: Error Signal Analysis Topic 6: Sensitivity of Control Systems to Parameter Variations Topic 7: Disturbance Signals in a Feedback Control System Topic 8: Control of the Transient Response</p> <p>Assessments: Lab #2 Lab Report #2 Quiz 1</p>
Module 3	<p>Topics: Topic 9: Test Input Signals Topic 10: Performance of Second-Order Systems Topic 11: The Steady-State Error of Feedback Control Systems Topic 12: The Simplification of Linear Systems</p> <p>Assessments: Lab #3 Lab Report #3 Midterm Exam</p>
Module 4	<p>Topics: Topic 13: The Concept of Stability Topic 14: The Routh–Hurwitz Stability Criterion Topic 15: The Relative Stability of Feedback Control Systems Topic 16: The Stability of State Variable Systems</p> <p>Assessments: Lab #4 Lab Report #4 Quiz #2</p>
Module 5	<p>Topics: Topic 17: The Root Locus Method Topic 18: Frequency Response Methods Topic 19: Robust Control Systems Topic 20: Digital Control Systems</p> <p>Assessments: Lab #5 Lab Report #5 Final Exam</p>

ATTENDANCE

1) Class attendance is required. Missing classes without permission will lead to decrease in overall grade.



Missing less than two classes: no penalty.

Missing more than two classes: 7% will be taken off from the overall grade.

If the instructor reports a student's frequent missing of class to the Soochow University Academic Administration Office, the student might get a written warning and might be prohibited from attending final exam.

2) Participants in this course are expected to arrive in class promptly and adequately prepared. The primary objective of this course is to critically engage with the readings and the subject matter. Therefore, course participants are expected to have completed the reading prior to class and prepare thoughtful reflections/commentaries to share with fellow colleagues.

LEARNING REQUIREMENTS

- 1) Late assignments are not acceptable and are subjected to grade deductions.
- 2) Assignments submitted in the wrong format will be counted as not submitted.
- 3) Failure to submit or fulfill any required course component results in failure of the class.
- 4) Make-up for midterm and final exams only with valid excuses, as defined by the University.
- 5) In order to earn a Certificate of Completion, participants must thoughtfully complete all assignments by stated deadlines and earn an average quiz score of 50% or greater.

TECHNOLOGY POLICY

The use of electronic devices in class is distracting, both for the user and for the rest of the class. Only non-programmable calculators can be used in the tests and exam. Any attempts to use cell phones and other electronic communication devices will be seemed as cheating. Laptops are discouraged, unless you use them for activities DIRECTLY related to the course (eg., note taking, reading course documents).

ACADEMIC INTEGRITY POLICY

Soochow University highly values the academic integrity and aims to promote the academic fairness, honesty and responsibility. Any academic dishonesty behaviors



蘇州大學
Soochow University

and any attempts to cheats and plagiarism will be reported to the university administration office. A written warning and the relevant penalties will be imposed. The record might be shown on the official university transcript.

DISABILITY ACCOMMODATION

Soochow University is committed to maintaining a barrier-free environment so that students with disabilities can fully access programs, courses, services, and activities at Soochow University. Students with disabilities who require accommodations for access to and/or participation in this course are welcome.

Note:

Please contact the University Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material.