SE 320: Control Systems

TR 12:30-1:50 pm
119 Materials Science & Eng Bld

Instructor: Rasoul Etesami, 143 Coordinated Science Lab (CSL), (Email: *etesami1@illinois.edu*)
Office Hours, 3:30-5:00 pm Thursdays, 143 CSL.

TAs: – Abbas Bataleblu (abbasb2@illinois.edu)
– Manoj Lakshmi (lmanoj2@illinois.edu)
– Haonan (Carl) Xu (haonan9@illinois.edu)
– Yiyue Jiang (yiyuej2@illinois.edu)
TAs' Office Hours: TBD

Required Text: *Feedback Control Systems:* Fifth Edition,
by Charles L. Phillips and John M. Parr, Prentice-Hall publ.

TENTATIVE COURSE OUTLINE:

Reading	Topics	Lectures
Chapter 1:	Introduction to Control Systems	Week 1
Appendix B:	Laplace Transforms definition of Laplace transform and inverse Laplace transform; examples of common transforms; properties and theorems	Weeks 1-2
Chapter 2:	Mathematical models for physical systems circuits, mechanical systems, electromechanical systems transformers and gears, more examples	Weeks 2-4
Chapter 4:	System Responses to Inputs responses in time-domain and frequency domain; design specifications	Weeks 4-5
Chapter 5:	Closed-loop Systems stability; transient response and steady state response; sensitivity	Weeks 5-7
Chapter 6:	Stability Analysis history and notions of stability; Routh-Hurwitz criterion; roots of the characteristic equation	Weeks 8-9
Chapter 8:	Frequency Response Analysis Frequency responses; Bode diagrams; Nyquist Criterion	Weeks 10-12
Chapter 9:	Frequency Response Design gain compensation; lag and lead compensation; lag-lead compensation PID design and implementation	Weeks 13-14
Chapter 7:	Root-Locus Methods root-locus principles and methods; lead design; lag design; PID design	Week 15

Specific Course Information

- **Course Description:** Fundamental control systems and control systems technology. Sensors, actuators, modeling of physical systems, design and implementation of feedback controllers; operational techniques used in describing, analyzing and designing linear continuous systems; Laplace transforms; response via transfer functions; stability; performance specifications; controller design via transfer functions; frequency response; simple nonlinearities.
- **Prerequisites:** CS101, MATH 285, & TAM212; Credit or Concurrent registration in ECE211
- **Labs:** The lab sessions will begin the week of September 29. More information about the labs can be found at: http://coecsl.ece.illinois.edu/se320/

Assignments and Exams:

- There will be approximately six homework sets, assigned roughly every other week. Homework assignments and their solutions will be posted on Canvas.
- Three problems will be selected "randomly" from each assignment for grading. Solutions to all problems will be provided to students.
- **NO LATE HOMEWORK** will be accepted. However, each student's lowest homework score will be dropped before final course grades are computed. It is important to write your solutions clearly, as unclear submissions may affect your grades.
- No collaboration or use of external solution sources, including AI tools such as ChatGPT, is permitted for homework assignments. Violations will be addressed in accordance with the UIUC Student Code § 1-402 on academic dishonesty.
- There will be *one* **two-hour** *evening* midterm exam during the semester. **TENTATIVE DATE: Tuesday, Oct 28, 7–9 pm**.
- There will be one *in-class* final exam held during the final week. The exact time and location will be announced later in the semester.
- Students requiring accommodations must submit their forms no later than September 15.

Course Grade Composition:

Item	% of grade
Homework Problem Sets	40%
Midterm Exam	20%
Final Exam	20%
Lab Reports	20%

- Total Score ≥ 94: A+, Total Score ≥ 87: A, Total Score ≥ 82: A-
- Total Score ≥ 78: B+, Total Score ≥ 74: B, Total Score ≥ 70: B-
- Total Score ≥ 67: C+, Total Score ≥ 64: C, Total Score ≥ 60: C-
- Total Score ≥ 50: D, Total Score < 50: F.

Total scores greater than or equal to $x.5$ will be rounded to $x+1$, and will be rounded to x, otherwise.