ECE451/551
Control Systems Design I
(Fall 2022)

Instructor: Dr. R. Tymerski, FAB 160-18.
Office Hours: TBA

TA: none

Course Learning Objectives:

1) To apply modern control theory principles to the design of control systems.
2) Demonstrate proficiency with software (Matlab/Simulink) that aids in the design process.

Book:

Design of Feedback Control Systems, R. Stefani, B. Shahian, C. Savant, and G. Hostetter, 4th Edition, Oxford University Press, 2002. The appropriate chapters we will cover are available on the course webpage.

Grading system:

- Midterm (Wk 4, Oct. 19) 20%
- Group (Matlab/Simulink) Projects with formal reports: 70%
- Class attendance/participation: 10%

A guideline for the grading scale is:

A → 90 − 100 pts
B → 80 − 89 pts
C → 70 − 79 pts
D→ 60 − 69 pts
F → < 60 pts

Instructor discretion may be applied to the boundaries between letter grades.

Content: This course introduces modern control theory for the feedback design of continuous time systems. We will cover Chapters 8, 9 and 10. Not all material in these chapters will be covered.

Learning Outcomes:

At the end of this course, students will be able to:

1. Understand matrix forms: phase variable, dual-phase variable, Jordan
2. Understand concepts of stability, controllability and observability
3. Pole placement design of control systems
4. Understand and apply integral control design
5. Understand and apply observer design; full and reduced order
6. Optimal controller and observer design (LQR, LQE (Kalman filter), LQG, LQG/LTR

Notes:

1) A set of notes is available online on the course webpage.
2) There are no extra credit assignments of any kind.
3) On occasion the instructor may need to communicate with the whole class or specific members of the class via the email address the student specified during registration. It is the student's responsibility to keep this address updated.
4) Any form of cheating on the quizzes or any exams will not be tolerated. If you cheat on an exam, you get a score of zero on that exam. This is viewed very seriously. Your case will be referred to the PSU Office of the Dean of Student Life for adjudication.
5) Accommodations are collaborative efforts between students, faculty, and the Disability Resource Center. Students with accommodations approved through the DRC are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through the DRC should contact the DRC immediately.
6) If you are already registered with DRC for this class see me ASAP.
7) The contents of this syllabus are subject to change. Any changes will be announced in class.