

ME 364L/397: Automatic Control System Design
Fall 2021, Unique No. 19420/19690

Instructor:	Prof. Raul G. Longoria
Contact info:	r.longoria@mail.utexas.edu, (512) 471-0530
Lectures:	TTH 11-12:30p, ETC 3.142
Office/hours:	Via Zoom, MW 1-2 pm (see Canvas for link)

1. Course aims / objectives: This course provides an introduction to analysis of linear, controlled engineering systems, particularly aimed toward students in mechanical engineering. Feedback principles are reviewed, including concepts in stability analysis. Classical Routh, Nyquist, Bode, and root locus methods are emphasized. Some practical discussion is given to control components, industrial compensators, and effective controller design and implementation. Use of computer-based analysis will also be emphasized (using Matlab and Python).

2. Prerequisites: It is expected that you have familiarity with topics covered in ME 344 or equivalent. **ME 344 is a required pre-requisite for undergraduates in this course.** It is also expected that you know how to use Matlab or Python for analysis and simulation. Both will be featured in this course, and it is expected that you are familiar with how to gain access to either platform.

3. Format and procedures: This course is delivered using lecture-based presentation, but notes will be recorded using Zoom. Exercises and case studies will be completed in the form of homework assignments. Class discussion and in-class examples will be emphasized.

4. ME 364L vs 397: Graduate students should be registered for ME 397 (this includes students in the Integrated BS/MSE program). There will be explicit differences between assignments, quizzes, and expectations for students enrolled in the undergraduate (364L) section versus the graduate (397) section.

5. Course Schedule: This syllabus conveys current plans and objectives. Adjustments may be made based on how the class is progressing. *Always* refer to the *Home Page* on Canvas. The tentative schedule in Table 1 represents planned course coverage.

Table 1: Tentative schedule of topics and assignments

Topic	Subject	HW
1	Introduction	HW 1
2	Modeling and analysis for control	HW 2
3	Dynamic response analysis	HW 3*
4	Feedback principles and design	HW 4
5	Root locus analysis and design	HW 5
6	Frequency domain analysis and design	HW 6*
7	State-space models and control	HW 7
8	Digital control implementation	HW 8
9	Nonlinear systems	HW 9*
10	Review	
–	Final exam	–

NOTE: HW with * indicate possible project-type assignment.

6. Course Readings/Materials: (a) **Textbook:** Handouts, slides, and excerpts from selected textbooks will be provided on Canvas. You are expected to read and seek out other sources as needed. (b) **Supplemental references:** There are many good textbooks such as: 1) Ogata, Modern Control Engineering, Prentice-Hall; 2) Franklin, Powell, and Emami-Naeini, Feedback Control of Dynamic Systems, Pearson Publishing, and more.

7. Course Readings/Materials: (a) **Assignments and Submissions:** Assignments are made on Canvas with specified due dates and requirements. These must be uploaded as PDF documents to Canvas. Homework assignments that take on a project-type flavor may be more heavily weighted than exercise-type problems. (b) **Preparation and submission of assignments:** All submitted work must be neatly prepared and organized. **Handwriting must be legible and dark enough to appear on scanned documents.** Any submission that is not legible or reasonably organized will not be graded. Late penalties may apply. **A single pdf file is required.** (c) **Late policy:** Late submissions will be dealt with on a case by case basis, and penalties will be applied if late submissions become common. (d) **Make-ups:** Make-ups on HW or Quizzes will be handled on a case by case basis, however there should be *prior* notice given for consideration. (e) **Quizzes:** Dates for any quizzes will be scheduled on the course Canvas page. (f) **Final exam:** In past semesters this has been converted to a project, but do not expect that this semester. The final exam date will be scheduled by the University.

8. Grading Policy: Homework: 25%, Quiz 1: 20%, Quiz 2: 25% Final exam: 30%

9. Attendance and Behavior: Class attendance and completing homework assignments is expected. **If you don't have time for this course, please find one more suitable to your schedule.** You are also expected to show respect and civility in all discourse with fellow students, administrators, and the course instructor.

10. Academic Integrity: University of Texas Honor Code - The core values of The University of Texas at Austin are learning, discovery, freedom, leadership, individual opportunity, and responsibility. Each member of the university is expected to uphold these values through integrity, honesty, trust, fairness, and respect toward peers and community. Each student in this course is expected to abide by this honor code. Any work submitted for academic credit must be the student's own work.

11. Course Outcomes: This course addresses the following ABET program outcomes: 1, 6, 7. In particular, attention by the student should be given to Outcome 4, "Ability to set up and conduct experiments, and to present the results in a professional manner."

12. Other University Notices and Policies: Be familiar with the University's official e-mail student notification policy. It is your responsibility to keep the University informed of changes in e-mail address. Students are expected to check Canvas and e-mail on a frequent and regular basis in order to stay current with University-related communications, recognizing that certain communications may be time-critical. (see <http://www.utexas.edu/its/help/utmail/1564>).

Documented Disability Statement. The University of Texas at Austin provides upon request appropriate academic adjustments for qualified students with disabilities. For more information, contact the Office of the Dean of Students at 471-6259, 471-4241 TDD. Notify the course instructor or TA as quickly as possible if the material being presented in class is not accessible (e.g., instructional videos need captioning, course slides are not readable, etc.).

Behavior Concerns Advice Line (BCAL). If you are worried about someone's behavior, use the Behavior Concerns Advice Line to discuss your concerns. This service is provided through a partnership among the Office of the Dean of Students, the Counseling and Mental Health Center (CMHC), the Employee Assistance Program (EAP), and The University of Texas Police Department (UTPD). Call 512-232-5050 or visit <http://www.utexas.edu/safety/bcal>.

Religious Holy Days: University policy requires students to notify their instructors as far in advance of the absence as possible so that arrangements can be made. You will be given an opportunity to complete missed work within a reasonable time after the absence.

Drop Policy. Contact the ME department Undergraduate Office about drop policy.