

MEEN 5600 – Feedback control (combined section with MEEN 4800)

**Course Catalogue:**

3 hours. Introduces the fundamental principles of modeling, analysis and control of dynamic systems. Topics include: mathematical modeling of dynamic systems, including mechanical, electrical, fluid and thermal systems; Laplace transform solution of differential equations; transfer functions and system responses in time and frequency domain; control systems design; state space based analysis and design of control systems; and computer simulation for modeling and control system design (Matlab/Simulink).

**Time and Place**

**Lecture, T&TR 05:30-06:50 PM, Remote**

**Prerequisite**

Prerequisite(s): MEEN 3230

**Instructor**

Maurizio Manzo, Ph.D.  
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**Office Hours**

by appointment

**Textbook**

**By Franklin, “Feedback Control of Dynamic Systems”, 8th Edition Pearson, ISBN: 9780134685717**

**Computer usage**

Matlab, Matlab Toolboxes, Matlab Simulink

**Evaluation**

Homework	10%
Exam I	20%
Exam II	20%
Final Project	40%
Attendance & Quiz	10%

It is your responsibility to attend the exams. Make-up exams may be granted for excused (i.e. official university) absences.

Letter grades will be based on following scale:

A: 90-100%; B: 80-89%; C: 70-79%; D: 60-69%; F: < 60%.

### **Homework**

**No late homework** unless pre-approved and/or under special circumstances. No any late homework will be accepted unless supported by an official university policy excuse.

**CHEATING IS STRICLTY NOT ALLOWED**

### **Project**

Groups of 3. The selection of the topic must be approved by the instructor.

### **Course Objectives**

1. Dynamic analysis of engineering systems for control system design. Use of knowledge from calculus, physics, differential equations, linear algebra, dynamic systems, and electrical science. Ability to systematically formulate models for physical engineering systems and understand their solutions
2. Design of feedback control devices for engineering systems. Ability to design closed-loop control systems based on feedback of measured signals. Design of control schemes and controller gains to obtain the desired performance from the closed-loop control system
3. A recognition that new advanced control strategies are continually being developed 4. Conducting a project-level analysis for a selected control problem

### **Course Outline**

This is a tentative course outline. Instructor will attempt to follow it closely, and reserves the right to substitute any other relevant material at any point throughout the course.

- Intro to feedback control
- Review of dynamic models and dynamic response
- A first analysis of feedback
- The root-locus design method
- The frequency-response design method
- State-space design
- Control system design examples

**Policies and Procedures Note: The course outline above is subject to change depending upon the overall course progress.**

1. **Attendance:** Attendance is mandatory. Lectures, videos, and class discussions will contain vital information needed to do well on the exams.
2. **Cell Phones:** Please remember to turn off phones prior to class.

3. The course website, Canvas, may be used for posting course materials, assignments, and grades, as well as for email communications. Students are encouraged to check the course website often.
4. Students will complete regularly assigned homework. Homework have to be submitted on time by the following week for grading. **Late submissions will get zero grade.**
5. This course provides opportunities for students to take advantage of several software packages supported by the department in the classroom in simulation studies, homework assignments, or in projects.
6. There will be no make-up exams or assignments unless you have a documented university excused absence. If you know in advance that you will miss an exam, you must contact instructor before the scheduled exam.
7. This syllabus is subject to change at any time during the semester with changes to be announced in class.
8. The instructor reserves the right to change the grade distribution at the end of the semester. If any changes occur, the changes will be less stringent than the distribution above.
9. All rules relating to academic dishonesty will be enforced in accordance with University policies. Cheating on examinations and laboratory assignments, and plagiarism on various papers and reports are types of disciplinary misconduct for which penalties are assessed under the UNT Code of Student Conduct and Discipline. Major responsibility for implementing the University's policy on scholastic dishonesty rests with the faculty. Be advised that the instructor of this course supports and fully implements this policy. The following actions will be taken when evidence of such misconduct is observed. The student will be presented with the evidence of misconduct and given an opportunity to explain the same. Based on the outcome of this private conference, the matter will be either dropped or the student will be given a grade of "F" in the course and be referred to the Dean of Students for further counseling and/or disciplinary action.
10. Students are responsible to protect their work so it is not available to others for submission as their efforts. This is especially true of files that are generated on the computer. Students who knowingly allow others to use their work are partners in this unethical behavior.
11. An I (incomplete) grade is given only for extenuating circumstances and in accordance with University and Departmental Policies.
12. **Discussion and exchange of ideas are important parts of the learning process and I encourage collaboration in a community of scholars. However, you must be sure the work you submit for grading is your own. Submitted works that are copies from solution manuals or website solutions or your classmates will be treated as plagiarism.**
13. Grades are based in part on the student's ability to communicate. You must present your entire solution in an orderly way for each problem. Full grade points will be assigned only on the correct final answers with correct steps. You must show complete process of your solution. Partial credits will be assigned for correct steps taken towards the solution.
14. Requests for the review of a graded exam/assignment must be made within one week of the grade announcement. Upon review, the exam/assignment score may increase, remain the same, or decrease.

15. The Student Perception of Teaching (SPOT) Evaluation is a requirement for all organized classes at UNT. This short survey will be made available to you at the end of the semester, providing you a chance to comment on how this class is taught. I am very interested in the feedback I get from students, as I work to continually improve my teaching. I consider the SPOT to be an important part of your participation in this class.

### **Disabilities Accommodation**

The University of North Texas complies with Section 504 of the 1973 Rehabilitation Act and with the Americans with Disabilities Act of 1990. The University of North Texas provides academic adjustments and auxiliary aids to individuals with disabilities, as defined under the law. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodations of their disabilities. If you believe that you have a disability requiring accommodation, please see the instructor and/or contact the Office of Disability Accommodation at 940 565-4343 during the first week of class.