

ME 481/581

Digital Control

Spring 2009

Instructor. Dr. Gregory P. Starr—I consider myself to be a shadetree mechanic who learned some math; I have always been fascinated with things that *move* (that’s why I’m not a civil engineer). My office is ME 423 (MTTC 242), phone 277-6298 (272-7156), email address starr@unm.edu, office hours are walk-in or by appointment.

Goal of Course. You should all have had an introductory course in automatic control systems, so you know that the function of a control system is generally threefold:

- Command tracking - the output should track the input
- Disturbance rejection - disturbances should not affect the output much
- Parameter sensitivity - parameter variations should not affect the output much

In digital control (mostly everything is digital nowadays) we have a computer which samples the error signal (or more likely forms the error itself) and uses some kind of algorithm to compute the control force which is sent to the plant. Our task is to model such sampled-data systems and learn how to come up with a good control algorithm.

Textbooks. Gregory P. Starr, Introduction to Applied Digital Control. When I first began teaching this course in 1979 I used my own notes, mostly cobbled up from the old digital books of the 50s (literally!). Then the 1st edition of Franklin & Powell came out—a great book! Then everything went downhill. The subsequent editions of that book—and many new books—were bloated to around 1000 pages of largely unnecessary material. So in the mid-90s I wrote up a set of notes that contained only what I thought was useful. These are the notes I will have bound and distribute to you for a nominal fee.

Exams/Projects. There will be a midterm exam, plus a midterm project and a final project—both projects using real hardware! The midterm and final projects will use different control techniques; you will write them up as parts I and II of the same project report (using the actual data acquired during the experimental validations) and submit it at the end of the semester.

Mailing List. A UNM mailing list (ME581-L) exists for this course. I will email announcements, *etc.*, so you should subscribe by sending a message to: listserv@list.unm.edu, leave the Subject field blank. In the body of message type (with no other text): `subscribe ME581-L YourFirstName YourLastName`

Once the subscribe request is approved, you will receive a notification.

Homework. We will do all the homework problems in my notes. I will provide homework solutions for most homework assignments—I strongly feel that I shouldn’t ask you to do anything I wouldn’t do. I will usually have homework “hints and answers” documents available on my website for you to download. This has proven to be quite helpful.

Computational Aids. Both MATLAB and MAPLE are helpful computational aids: the first for primarily numerical computation, and the second for primarily symbolic computation.

Grading. The following table shows the weighting used to evaluate your performance in this course:

Homework	20%
Midterm Exam	20%
Midterm Project	30%
Final Project	30%
TOTAL	100%