CDS 101/110a, Fall 2008

From MurrayWiki

CDS 101/110a	Schedule	Recitations	FAQ	AM08 (errata)

This is the homepage for CDS 101 (Analysis and Design of Feedback Systems) and CDS 110 (Introduction to Control Theory) for Fall 2008.

Instructor

- Richard Murray, murray@cds.caltech.edu
- Doug MacMynowski, macmardg@cds.caltech.edu
- Lectures: MWF, 2-3 pm, 74 JRG
- Office hours (RMM): Fridays, 3-4 pm (by appt)
- Prior years: FA06, FA07

Teaching Assistants (cds110-tas@cds)

- Julia Braman, head TA
- Gentian Buzi, Shuo Han, Max Merfeld, Luis Soto
- Office hours: Fri 4-5, Sun 4-5 in 114 STL

Course Ombuds

- TBD

Announcements

Archive

- 28 Sep 08: Week 1 - Introduction and Review
  - Wed lecture is for *all* students (including CDS 101 - this week only)
  - Fri: MATLAB/SIMULINK sessions from 2-4p and 4-6 pm in 328 SFL; bring a laptop with MATLAB installed if you have one
- 21 Aug 08: created course homepage

Course Syllabus

Contents

CDS 101/110 provides an introduction to feedback and control in physical, biological, engineering, and information sciences. Basic principles of feedback and its use as a tool for altering the dynamics of systems and managing uncertainty. Key themes throughout the course will include input/output response, modeling and model reduction, linear versus nonlinear models, and local versus global behavior. The course has several variants:

- CDS 101 is a 6 unit (2-0-4) class intended for advanced students in science and engineering who are interested in the principles and tools of feedback control, but not the analytical techniques for design and synthesis of control systems.
- CDS 110 is a 12 unit class (3-0-9) that provides a traditional first course in control for engineers and applied scientists. It assumes a stronger mathematical background, including working knowledge of linear algebra and ODEs. Familiarity with complex variables (Laplace transforms, residue theory) is helpful but not required.
- CDS 210 is a special section of CDS 110, that will be an advanced version of the course for CDS graduate students and others interested in a more theoretical approach to the material. CDS 210 will have an additional Friday lecture and a separate set of homework sets.

Lectures and Recitations

The main course lectures are on MW from 2--3 pm in 74 Jorgansen. CDS 101 students are not required to attend the

Wednesday lectures, although they are welcome to do so. In addition to the main lectures, a series of problem solving (recitation) sessions are run by the course teaching assistants and given on Fridays from 2--3 p m. The recitation session locations will be determined in the first week of classes and will be posted on the course web page.

The TAs will hold office hours on Fridays from 4-5 pm and Sundays from 4-6 pm in 112 Steele (CDS library). <-- {\em All students must show up for office hours or recitation at least once in the first three weeks of the course (even if you just stop in and introduce yourself to the TAs at office hours).} -->

Grading

The final grade will be based on homework sets, a midterm exam, and a final exam:

- *Homework (50%):* Homework sets will be handed out weekly and due on Mondays by 5 pm to the box outside of 109 Steele. Students are allowed three grace periods of two days each that can be used at any time (but no more than 1 grace period per homework set). Late homework beyond the grace period will not be accepted without a note from the health center or the Dean. MATLAB code and SIMULINK diagrams are considered part of your solution and should be printed and turned in with the problem set (whether the problem asks for it or not).
- *Midterm exam (20%):* A midterm exam will be handed out at the beginning of midterms period (29 Oct) and due at the end of the midterm examination period (4 Nov). The midterm exam will be open book and computers will be allowed (though not required).
- *Final exam (30%):* The final exam will be handed out on the last day of class (5 Dec) and due at the end of finals week. It will be an open book exam and computers will be allowed (though not required).

Collaboration Policy

Collaboration on homework assignments is encouraged. You may consult outside reference materials, other students, the TA, or the instructor, but you cannot consult homework solutions from prior years and you must cite any use of material from outside references. All solutions that are handed in should be written up individually and should reflect your own understanding of the subject matter at the time of writing. MATLAB scripts and plots are considered part of your writeup and should be done individually (you can share ideas, but not code).

No collaboration is allowed on the midterm or final exams.

Software

Computer exercises will be assigned as part of the regular homeworks. The exercises are designed to be done in MATLAB, using the Control Toolbox and SIMULINK. Caltech has a site license for this software and it may be obtained from IMSS (http://software.caltech.edu) (Caltech students only). An online tutorial is available at

http://www.engin.umich.edu/group/ctm/basic/basic.html

Course Text and References

The primary course text is *Feedback Systems: An Introduction for Scientists and Engineers* by Åström and Murray (2008). This book is available in the Caltech bookstore and via download from the companion web site. The following additional references may also be useful:

- A. D. Lewis, *A Mathematical Approach to Classical Control*, 2003. Online access (http://penelope.mast.queensu.ca/math332/notes.shtml) .

In addition to the books above, the textbooks below may also be useful. They are available in the library (non-reserve), from other students, or you can order them online.

- B. Friedland, *Control System Design: An Introduction to State-Space Methods*, McGraw-Hill, 1986.
- G. F. Franklin, J. D. Powell, and A. Emami-Naeni, *Feedback Control of Dynamic Systems*, Addison-Wesley, 2002.