

ELEC ENG 4CL4:

Control System Design

Notes for Lecture #1
Monday, January 5, 2004

Instructor:

Dr. Ian C. Bruce

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Office Hours: Mondays, 2:00-3:30pm.

Teaching Assistants:

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Office Hours: TBA

Web Site:

http://www.ece.mcmaster.ca/~ibruce/courses/EE4CL4_2004.htm

Course mailing list:

ee4cl4@mail.ece.mcmaster.ca

- This mailing list will be used as a primary means of communication for this course — please make sure that you check your email regularly!
- Only for instructor and TA use
- If you are not currently on this mailing list, please email me with your name, student number and email address.

Proposed Course Content:

- Introduction to the Principles of Feedback
- Modelling
- Continuous-Time Signals and Systems
- Analysis of Single-Input Single-Output (SISO) Control Loops
- Classical Proportional-Integral-Derivative (PID) Control
- Synthesis of SISO Controllers
- Fundamental Design Limitations in SISO Control
- Frequency Domain Design Limitations
- Models for Sampled-Data Control Systems
- Digital Control
- Architectural Issues in SISO Control

(may be subject to change!)

Textbooks:

Recommended text:

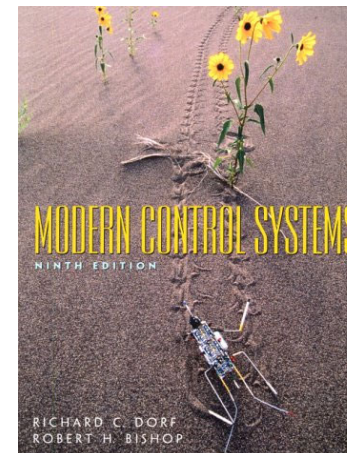
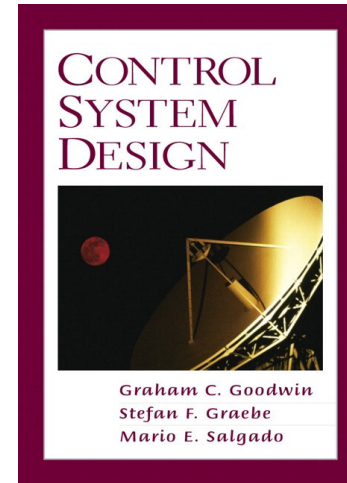
G. C. Goodwin, S. F. Graebe, and M. E. Salgado, "Control System Design," Prentice Hall, 2001.

Copies are available at [Titles Bookstore](#).

[Official Errata](#) - note that I've found some other errors in the textbook, so I will provide an additional PDF with a list of corrections.

Secondary reference (and an alternative text):

R. C. Dorf and R. H. Bishop, "Modern Control Systems," ninth edition, Prentice Hall, 2001.



Resources:

Worked problem sets for [Chapter 3](#),
[Chapter 4](#), [Chapter 5](#), [Chapter 6](#),
[Chapter 7](#), [Chapter 8](#), [Chapter 9](#),
[Chapter 12](#), and [Chapter 13](#).

[Course reserves](#) in the Thode library.

[Last year's homework assignments](#)
(problems and solutions).

Prerequisites:

Must have passed:

- EE3TP4 or EE3CK4 (or equivalent *Signals and Systems* course)

Should have done well in:

- EE3TP4 (or equivalent *Signals and Systems* course)

Assessment:

- 5 Homework Assignments (15%)
- 5 Labs (15%)
- Midterm exam (30%)
- Final exam (40%)

Rules for Students Missing the Midterm Exam:

- Students without a valid excuse will get zero points for the midterm, i.e., will lose 30% of their possible total grade.
- Students with a valid excuse approved by the Associate Dean's office will have an oral deferred midterm exam.

Lectures:

There will be ≤ 36 one-hour lectures (3 per week) in **BSB-304** on:

Mondays and Wednesdays 11:30am-12:20pm, and

Fridays 1:30-2:20pm.

Lecture notes in PDF format will be posted on the course web site before each lecture.

Tutorials:

There will be 1 one-hour tutorial per week.

The class is split into two sections for tutorials:

Section T2 is in **BSB-340** on
Tuesdays 11:30am-12:20am.

Section T1 is in **BSB-B116** on
Wednesdays 9:30-10:20am.

Labs:

There will be 5 three-hour labs in **T13-111** every second week on Mondays and Tuesdays 2:30-5:30pm, beginning January 12.

The class is split into four sections for labs.

Lab descriptions will be made available on the course web site in advance.

Lab reports are to be submitted one week from the date of your assigned lab.

Labs (cont.):

- Lab 1:** MATLAB/Simulink simulation of continuous casting.
- Lab 2:** MATLAB/Simulink analysis of control system stability.
- Lab 3:** PID tuning in MATLAB/Simulink.
- Lab 4:** Analysis of control design limitations and remedies within MATLAB/Simulink.
- Lab 5:** Simulation of digital control within MATLAB/Simulink.

Labs (cont.):

These labs are Matlab/Simulink based simulations that can also be performed outside of lab hours, but the TAs will only provide assistance during lab hours.

You may choose to complete the lab assignment partially or entirely in your own time (in groups preferably of two students but definitely no larger than three). However, if you choose to do this, you must show up during the first 2 hours of your scheduled lab time to give the TA a brief demonstration of your Matlab/Simulink code and model.

Homework:

There will be 5 homework assignments.

Homework assignments will be posted on the web site.

2 weeks will be given to complete each assignment.

Policy Reminders:

“The Faculty of Engineering is concerned with ensuring an environment that is free of all adverse discrimination. If there is a problem, that cannot be resolved by discussion among the persons concerned, individuals are reminded they should contact the Departmental Chair, the Sexual Harassment Officer or the Human Rights Consultant, as soon as possible.”

“Academic dishonesty consists of misrepresentation by deception or by other fraudulent means and can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: 'Grade of F assigned for academic dishonesty'), and/or suspension or expulsion from the university.

“It is your responsibility to understand what constitutes academic dishonesty. For information on the various kinds of academic dishonesty please refer to the Academic Integrity Policy, specifically Appendix 3, located at http://www.mcmaster.ca/senate/academic/ac_integrity.htm

“The following illustrates only three forms of academic dishonesty:

- 1. Plagiarism, e.g. the submission of work that is not one’s own or for which other credit has been obtained.**
- 2. Improper collaboration in group work.**
- 3. Copying or using unauthorized aids in tests and examinations.”**