

MECH 466 Automatic Control (4 credits)

Department of Mechanical Engineering, UBC
Second semester 2008/09

Instructor:

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Recommended pre-requisites: One of EECE251, EECE263, PHYS209

Course description and goals:

This course is an introductory course on automatic control. The main goal of the course is to provide the students with basic tools in modeling, analysis and design for linear feedback control systems. Students will learn how to model mechanical, electrical, and electromechanical systems as differential equations and transfer functions. The analysis in this course includes stability of open-loop and closed-loop systems, time responses and frequency responses of low order systems. The design methods are divided into root-locus techniques and frequency response techniques using Bode plots for designing PID and lead/lag controllers. Students will also learn how to apply the automatic control theory to real engineering problems with Matlab and through laboratory exercises.

This course will give the basic knowledge for more advanced control courses, such as state-space control techniques, nonlinear control, robust control, optimal control, adaptive control, digital control, sampled-data control, hybrid control, and system identification.

Course textbook (required):

To be determined.

References (optional):

- *Feedback Control of Dynamic Systems (5th Edition)*, G.F.Franklin, J.D.Powell, and A.Emami-Naeini, Prentice-Hall, 2006.
- *Feedback Control Systems (4th Edition)*, C.L.Phillips and R.D.Harbor, Prentice-Hall, 2000.
- *Mechatronics: An Integrated Approach*, C.W. de Silva, CRC Press, 2004.
- *Modern Control Engineering (4th Edition)*, K.Ogata, Prentice-Hall, 2002.
- *Control Systems Engineering (5th Edition)*, N.S.Nise, John Wiley & Sons, 2008.

- *Modern Control Systems (11th Edition)*, R.Dorf and R.Bishop, Prentice-Hall, 2008.
- *Feedback systems: An Introduction for Scientists and Engineers*, Karl J. Astrom and Richard M. Murray. http://www.cds.caltech.edu/~murray/amwiki/Main_Page
- *Automatic Control Systems, Eighth edition*, Benjamin C. Kuo and Farid Golnaraghi, Wiley, 2002.

Grading scheme:

Laboratory exercise (10%), Mid-term (20%), Final (70%)

(This grading scheme is tentative. The instructor reserves the right to change the scheme.)

Exams:

Mid-term and Final

Policies: Closed-book. Calculators are not allowed. Alternative exams can be arranged ONLY for medical reasons and with doctor's notes. For other reasons, talk with the instructor before the exam dates.

Labs:

- Five labs. Details will be announced later.