ME 507 Process Modelling and Control
Spring 2012

Prof Gevelber, Mechanical Engineering

Office: 730 Comm Ave, room 203A. Phone W 617-353-9693, H 617-964-7515,
email: gevelber@bu.edu fax: 617-358-1298.

Mailing address: Mechanical Engineering, 110 Cummington St., Boston MA 02215.

Office Hours: by appointment. Please take advantage to ask questions, that's
what I'm here for.

Course Goal: This course provides an integrated study of physical system dynamics, control
concepts, and process design. The goal is to deepen student's physical intuition as well as learning
how to determine the appropriate roles for changing the system design and adding closed loop
control. Case studies are used to examine the opportunities for developing new process capabilities
and products.   Examples are drawn from a variety of applications including welding, MEMS, CD
manufacturing, thermal processing, film deposition for electronics, optics, and energy applications,
robotics, biomedical applications and high speed machining.

Requirements and Grading

Homework (20%) . Typically due on Thursday.   Solutions will be handed out, so late home works
will not be accepted [unless medical or other excuse].   Please bring questions to class on Tuesdays!

Two quizzes (20% each) and take-home at the end of term (30%)

Project (10 %)

Project: I'm looking for you to analyze a process you choose from the perspective of the course.
(Teams of two are acceptable.) Ideally, it will be a process that can yield a significant competitive
advantage if developed and/or improved. However, working on something that you are familiar with
is acceptable. I will be glad to discuss options.

Your project should include a description of the processing objectives/performance benchmarks,
important process physics/dynamics, control objectives, design options, and possible control
strategies. Detailed analysis of the system is not required (i.e. this should be descriptive and not
quantitative). A one paragraph outline of your project is due the 4th session. You will present your
project the last class of the term. This is a chance to reinforce the relevance of the course to your
own work.

You must provide an extended outline, including sources by the 14th class.

Matlab will be used to assist in dynamic simulations, controls analysis, processing, linear algebra, and graphics (it also has other great tools/applications). DL students will need a ACS account and be able to logon to the campus computers via VPN. On campus student will use Matlab on ACS.

Texts:

Introduction to Physical System Dynamics, R. Rosenberg and D. Karnopp, McGraw Hill, 1983. (RK)

Control System Design and Simulation, J. Golten and A. Verwer.

Notes from N. Hogan and M. Athans.

Recommended References:

Linear Algebra and Its Applications, G. Strang, Academic
Press, 1980. Readable text on linear algebra

Modern Control Engineering, K. Ogata, Prentice-Hall: The bible, has worked problems.

Feedback Control of Dynamic Systems, G.F. Franklin,
et.al., Addison-Wesley: Nice treatment of mechanical systems
for both classical and some modern approach

Feedback Control Systems, Phillips & Harbor, Prentice Hall.

Automatic Control Systems, B. C. Kuo, Prentice Hall. Verbose, but has it all.