Syllabus for EECS 120, Spring 2002

Instructor
Professor Pravin Varaiya, Office: 271M Cory, OH: Mon 3-4 pm, Wed. 3-4 pm
If you need to make an appointment for another time, send email to Kari Hansen (kari@eecs).

Secretary
Chris Colbert, Office 275 Cory Hall

Teaching Assistants
John Slavinsky, jps@eecs, Office hours: M 11:30-12:30; Tu 1:30-2:30, 297 Cory
Lixia Zhou, lzhou@eecs, Office hours: W, Th 1:00-2:00, 297 Cory

Reader
Benson Lu, bensonlu@cory.eecs.berkeley.edu

Lectures: MW 4-6 pm, 277 Cory

Recitations:
W 3-4 pm, 241 Cory, Tu 3-4 pm, 3109 Etcheverry, Th 2-3 pm, 293 Cory, F 10-11 am, 3113 Etcheverry.

Readings: Readings will be assigned from the following sources:
Varaiya [Va], Class notes for EECS 120, Sp02, posted on the course website.
Ziemer, Tranter and Fannin [ZTF], Signals and Systems: Continuous and Discrete, 4th ed.
Lee, Varaiya [LV], Syntax and interpretation of Signals and Systems, EECS 20N notes.
Couch [Co], Digital and Analog Communication Systems, 4th ed.
For Matlab, see Mastering Matlab 5.

Matlab Assignments: MATLAB is available on EECS instructional Unix (Cory 117 and 199) and Windows NT computers, as well as available in a student edition which you can use at home. However, the student edition does not have the Control Toolbox which will be used in several exercises.

Communications
All class information will be stored online at http://www-inst.eecs.berkeley.edu/~ ee120. Check there for class notes, homework assignments, and all other class materials. For notices and announcements, we will post messages to the EECS120 newsgroup (uch.class.ee120) or send email to individuals. We will assume that everyone will have seen our postings within 24 hours of their appearance.

Grading: Two 90-min midterms will be held after class, 6:30-8:00 pm, tentatively on W, 3/6, and W, 5/1. There will be a 20-min quiz every Wednesday, on the previous week’s material. The course grade will be calculated on a curve as (15)HW + (15) MT1 + (15) MT2 + (15) Quiz + (40) Final. Final Exam group 16, May 20, 12:30-3:30 pm.

Grades will be posted on WebCT. Create your account at http://webct.berkeley.edu

Homework: Homework will generally be handed out on Mon and due 9 days later by 9:00 am Wed, in the box outside 275 Cory. Late HW will not be accepted. Up to three students may work jointly and turn in a single writeup. Homeworks will be selected from the ‘Exercises’ link on the website.

Prerequisites: Math 53/54, EECS20. We will build on EECS20, looking deeper into applications in communications, control, signal processing and the underlying mathematical tools.

Syllabus This is a tentative schedule of lectures. You are responsible for the reading assignments. The pace
of the course is quite rapid, and the material is cumulative. There are four major parts.

I. Communication systems and modulation

   Readings [Va] Ch 1.
   Homework Due Feb 6.

2. **1/30, 2/4** Fourier transforms (FT). Inverse FT, important properties. FT and FS of a periodic signals.
   Homework Due Feb 11. exercises in Handout 2.

3. **2/6, 2/11** AM, Hilbert Transform, SSB-AM.
   Readings [Va] Ch 3; [Co] Ch 4, Sec 5,6, pp 304–321.
   Homework Due Feb 20. Feb 18 is holiday.

4. **2/13, 2/27** Superheterodyne. TV. PM. Narrowband FM, FM
   Homework Due Feb 25.

5. **2/20, 2/25** FM and phase modulation.
   Homework Due Mar 4.

6. **2/27** Digital communication.
   Homework Due Mar 11.

   Readings Part I
   Homework None. Mid-term on 3/6.

II. Stability, Z and Laplace Transforms

1. **3/11, 3/13** Boundedness and stability; ZT
   Readings [Va] Ch 5; [ZTF] Ch XXX

2. **4/1, 4/3** ZT and LT. Transfer function.
   Readings [Va] Ch 6; [ZTF] Ch XXX
   Homework Due 4/8.

3. **4/8, 4/10** Solutions of linear differential equations and state space models.
   Readings [Va] Ch 6; [ZTF] Ch XXX
   Homework Due 4/8.

III. System composition and Feedback control
1. 4/15, 4/17 Equalization.  
   **Readings** [Va] Ch 7; [ZTF] Ch XXX  
   **Homework** Due 4/15.

2. 4/22, 4/24 PID control  
   **Readings** [Va] Ch 7; [ZTF] Ch XXX  
   **Homework** Due 4/22.

3. bf 4/29, 5/1 Further control techniques  
   **Readings** [Va] Ch 8;  
   **Homework** None. Midterm on 5/1.

IV. Controllability and observability

1. 5/6, 5/8 Cayley-Hamilton theorem and controllability, Pole placement  
   **Readings** [Va] Ch 9;  
   **Homework** Due 5/6.

2. 5/13 Summary. **Readings** Review;  
   **Homework** Not to be turned in.

**Final Exam. 5/23, 12:30-3:30 pm**