UNIVERSITY OF CALIFORNIA, SANTA CRUZ
EE154 – Intro to Feedback Control Systems
Assigned Reading and Homework Problems

Professor William B. Dunbar

Reading list:

1. The required textbook is [FPE] Franklin, Powell and Emami-Naeini, "Feedback Control of Dynamic Systems, Fourth Ed." Prentice Hall, 2002. Available in the bookstore.
2. Supplemental reading material: R. M. Murray, Ed., "Control in an Information Rich World: Report of the Panel on Future Directions in Control, Dynamics, and Systems," *SIAM*, Philadelphia, 2003. Available online (click on Panel Report):

   `http://www.cds.caltech.edu/%7Emurray/cdspanel/` .

Problem sets are due **at the beginning of class on the following Wednesday**.

Reading assignments and problems sets per week:

W1 Read [FPE] Chapters 1 and 2 and Appendix A. Problems: 2.3, 2.5, 2.9, 2.16, 2.29, 2.31. *Bonus problems*: 2.10, 2.18.

W2 Read [FPE] Chapter 3. Dynamic response, including Laplace transform and time-domain specifications and analysis. Problems: 3.3 (parts (a) and (c) only), 3.9 (parts (a) and (d) only), 3.11, 3.16, 3.19, 3.24, 3.29. *Bonus problems*: 3.10, 3.25.

W3 Read [FPE] Sections 4.1-4.2. Basic properties of feedback. Intro to proportional-derivative control and proportional-integral-derivative control. Problems: 3.33, 3.42, 3.43, 4.4, 4.8. *Bonus problems*: 4.5 or 4.6.

W4 Read [FPE] Sections 4.3-4.4. Steady-state tracking and digital implementation issues.

W5 Read [FPE] Sections 5.1, 5.2, 5.5-5.7 and Appendix B. Root locus analysis and design. Midterm exam.

W6 Read [FPE] Sections 6.1. Bode frequency response analysis and nonminimum phase systems.

W7 Read [FPE] Sections 6.2-6.4. Neutral stability, Nyquist stability criterion and stability margins.

W8 Read [FPE] Sections 6.5-6.6. Robustness metrics. Gain-phase relationship and closed-loop frequency response. Intro to compensation.

W9 Read [FPE] Sections 6.7. Frequency response design of controllers (compensation).

W10 Read [FPE] Sections 6.9. Intro to time delay. Review course material for EE154 final exam. Undergraduates enrolled in EE154 take a final exam. Students enrolled in CMPE241 do a final project and submit a report on the final project on the day of the final exam; they do not take a final exam.