Instructor: Dr. Xuping Xu, Associate Professor of Electrical, Computer, and Software Engineering
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Office and Office Hours: REDC 166, M:10:30-11:30AM, T:1:30-3:30PM, F:12:20-1:20PM, or by appointment

Course Title: E E 380, Linear Control Systems, Required Course

Course Meeting Day, Time, and Location: MWF: 1:25-2:15PM, REDC 101

Course Description: State variables; time-domain and frequency-domain design and analysis; design of feedback control systems; Root Locus.

Prerequisite: MATH 220; E E 350 or E E 312


Course Objectives: Upon successful completion of this course, students should understand the following:

1. How to obtain mathematical models of simple engineering systems.
2. How to obtain system responses using the Laplace transform.
3. How to represent and analyze systems using transfer functions and block diagrams.
4. The structure and characteristics of a feedback control system.
5. The transient and steady-state responses.
6. The performance of second-order systems.
7. How to analyze the stability of a linear system.
8. How to draw simple root locus plots.
9. How to design simple lead and lag compensators for closed-loop control systems.
10. Frequency domain stability analysis using Nyquist plots and Nyquist criterion.
11. How to use Matlab/Simulink to plot system responses and help design systems.

Topics Covered:

Introduction to Control
The Laplace Transform
Mathematical Modeling of Physical Systems
System Responses, Stability Analysis
Root Locus
Frequency Domain Analysis
Design of Control Systems

Textbook Chapters
1
2
3
5
6
8
7, 9

Class/Laboratory Schedule: Lecture: 3hrs/week

Contribution of Course to Meeting Professional Component: Major junior level class that devotes adequate attention and time to the basics of dynamic system modeling, analysis, and controller design. It helps to prepare students for more advanced systems courses.

Relationship of Course to Program Outcomes: This course addresses the following program educational outcomes: a, e, i, k, m, o

Prepared by and Date of Preparation: Xuping Xu, January 10, 2008
Course Webpage: http://ecse.bd.psu.edu/eebd410

Calendar/Dates:
- Exam #1: Monday – 02/18 in class
- Exam #2: Monday – 03/31 in class
- Final Exam: To be announced

Grading Criteria:
- 2 Exams: 40% (Exam #1: 20%, Exam #2: 20%)
- Final Exam: 30%
- Assignments & Quizzes: 30%

Grade Assignment: A: 93-100; A-: 90-92; B+: 87-89; B: 83-86; B-: 80-82; C+: 76-79; C: 70-75; D: 65-69; F: <65. These guidelines may be revised downward in favor of the students during the course of the semester.

Attendance Policy: Students are expected to be regular and punctual in class attendance. You are responsible for all materials covered in class.

Makeup Policy: Makeups for missed exams and quizzes will be allowed in the event of an illness or emergency, but the instructor must be notified before the exam or quiz. There will be no makeups for unexcused absences.

Assignments: Problems will be assigned and collected. One or several problems will be selected and graded, or a quiz based on the assignment will be given. Homework assignments are due at the start of the class period. After they are graded, selected problems will be explained in class and solutions to other problems will be posted. All assignments that are turned in should be neat and legible. In addition, assignments must be turned in on engineering paper (available in bookstore) and stapled. Failure to do so will result in a grade of zero on the assignment.

Late Policy: Assignments turned in late (after the start of class) will be penalized 25 percentage points. Assignments handed in more than 1 day late will NOT be accepted.

Academic Integrity: Penn State Erie puts a very high value on academic integrity, and violations are not tolerated. Academic integrity is one of Penn State’s four principles to which all students must abide. Any violation of academic integrity will receive academic and possibly disciplinary sanctions, including the possible awarding of an XF grade which is recorded on the transcript and states failure of the course was due to academic dishonesty. All acts of academic dishonesty are recorded so repeat offenders can be sanctioned accordingly.

I encourage students to help one another, but plagiarizing will not be tolerated in this course. You should be able to explain to me every single detail of your solution to the problem. Both parties involved in the plagiarizing case will receive zero points. Provable cases of cheating will be prosecuted to the fullest extent allowable by the University and the Commonwealth of Pennsylvania. More information on academic integrity can be found at: http://www.pserie.psu.edu/faculty/academics/integrity.htm

References: (24 hr reserve in the library)
Learning Resources: The Learning Resource Center provides the following tutoring services relevant to the course:

- Writing tutoring is available in the Learning Resource Center, 203 Lilley Library.
- Math tutoring is available in the Roche Annex (2nd floor Roche Hall).
- Engineering tutoring is available in the REDC, Room 240.
- Tutoring for other subjects and study skills is offered by appointment. Stop in at the Learning Resource Center.
- For more information go to: http://pennstatebehrend.psu.edu/academic/lrc/tutor.htm