

ECE 431-001 Fall, 2008 Systems and Virtual Instrumentation

Prerequisite: ECE333 Signals and Systems

Course description: This course builds upon mathematics, science, and electrical engineering background to analyze dynamic and instrumentation systems. It emphasizes on modeling in frequency and time domains, stability criteria, analytic and simulation methods. The computer is used as an essential design and analysis tool. A short lab sequence is incorporated into the course for students to review/learn Matlab/Simulink interactively.

Instructor: Dr. Timothy Chang, Department of Electrical Computer Engineering

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Office hours: 4:30-5:30PM Tuesdays, 2:30-3:30PM Wednesdays (or by appointment)

A. Tentative Schedule:

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|----|---|----------------------|
| 1 | Introduction, Review of Laplace Transform | |
| 2 | Transfer Functions, Signal Flow Graphs, Stability | Matlab |
| 3 | Response of Linear Systems: Frequency Domain | Matlab-Simulink |
| 4 | Review of first/second order systems | Simulink |
| 5 | State space system analysis | Ansim: animation lab |
| 6 | Bode plot | |
| 7 | Nyquist plots | |
| 7 | Stability assessment: Routh Hurwitz | |
| 8 | Performance Characteristics and Feedback | |
| 9 | Root Locus | |
| 10 | Nonlinear systems and linearization | |
| 11 | The Nyquist Criterion | |
| 13 | Describing function and applications | |
| 14 | Review and Project presentation | |
| 15 | Final Exam | |

B. Text: Feedback Control Systems, 4th Ed., Phillips and Harbor, Prentice Hall, 2000.

Lecture notes to be downloaded from instructor's web site

C. References: Feedback & Control Systems, Stubberud et al., Schaum's Outline, 1994.

Modern Control Systems, Dorf, 8th Ed., Addison-Wesley.

D. Grading scheme: 10% Lab, 45% Quiz, 15% Project, 30% Final. There will be ten quizzes @5% held on Wednesdays (see dates below). The one quiz with the lowest score will be eliminated from the calculation so the total is 45%. No make up quiz if you are late or absent.

E. Important Dates:

- Quizzes 9/17, 9/24, 10/1, 10/8, 10/15, 10/22, 10/29, 11/5, 11/12, 11/19
- 11/26 Wednesday on a Friday schedule, no class held
- 12/10 project presentation
- TBA

Software: Matlab/Simulink (available from ist.bjit.edu)

NJIT Honor Code will be upheld, and that any violations will be brought to the immediate attention of the Dean of Students.