

EEL4611L – Control Systems II Laboratory

Three Credits, Two and a half hours, Engineering Topic.

Instructor: Ajinkya Bankar.

Textbook: Control Systems Engineering by Norman S. Nise, Seventh Edition, John Wiley & sons, Inc.

Specific Course Information:

Laboratory experiments in various systems. Includes position and velocity control systems, zero order, first order and second order systems. Communications systems.

Specific Goals for the Course

a. Specific outcomes of instruction

Upon successful completion of this course, the student will:

- 1.How to develop a system block diagram to fulfill system specifications
- 2.How to create a technical report to document an engineering project
- 3.How to obtain the DC-motor and tacho-generator characteristics
- 4.How to analyze control systems with feedback and the influence of gain on the system stability
- 5.How to introduce velocity feedback into a closed-loop position controller and its effects How a simple system follows a ramp with an error, and the effect of the gain on the system response
- 6.How information is modulated and demodulated using amplitude modulation.

b. Explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

In this course the student will have to show

- (a) an ability to apply knowledge of mathematics, science, and engineering (X)
- (b) an ability to design and conduct experiments (simulations), as well as to analyze, interpret data (X)
- (c) an ability to design a system, component, or process to meet desired needs (X)
- (d) an ability to function in multi-disciplinary teams (N/A)
- (e) an ability to identify, formulate, and solve engineering problems (homework) (X)
- (f) an understanding of professional and ethical responsibility (N/A)
- (g) an ability to communicate effectively (through project reports) (X)
- (h) the broad education necessary to understand the impact of engineering solutions in a global and societal context (N/A)
- (i) a recognition of the need, and an ability to engage in life-long learning (N/A)
- (j) a knowledge of contemporary issues (X)
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice (X)
- (l) a knowledge of probability and statistics (N/A)

Brief list of the topics to be covered

- 1.Learn how to apply their basic knowledge in control theory for designing control systems using the time and frequency domain.
- 2.Learn how to design using root locus techniques
- 3.Learn how to design using the frequency response techniques

4. Learn how to design using state space concepts

5. Learn how to use MATLAB in the design of control systems. MATLAB software is available from the Engineering Information Center, after registering.

GRADING:

| Course Requirements | Weight |
|--------------------------------------------|--------|
| Homework | 25% |
| Quizzes | 25% |
| Exam 1 | 25% |
| Exam 2 | 10% |
| Final Project | 15% |
| Simulation Modeling & Analysis Homework | 25% |
| Overall Grade | 100% |

Conversion of Numerical Grade to Letter Grade

| | | |
|--------------|--------------|-------------|
| 95 ≤ A ≤ 100 | 83 ≤ B < 86 | 70 ≤ C < 76 |
| 90 ≤ A- < 94 | 80 ≤ B- < 82 | 60 ≤ D < 69 |
| 87 ≤ B+ < 89 | 77 ≤ C+ < 79 | F: Below 59 |