EEL3657 - Control Systems I

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

Instructor: Dr. Amaury A. Caballero

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

Specific Course Information: The goal of the course is to teach the basic elements of Control Theory, as well as its applications.

Specific Goals for the Course:

a. Specific outcomes of instruction

Upon successful completion of this course, the student will:

1.Be able to apply the Laplace Transform for finding mathematical models (transfer function) for linear, time invariant feedback control systems.

2.Be able to find the time response from the transfer function as well as the use of poles and zeros to determine the response of a control system.

3.Be able to simplify a complex system using block diagrams and flow graphs.

4.Be able to determine the stability of a system represented as a transfer function, and how to determine the system gain to yield stability.

5.Be able to find steady-state error for feedback control systems, with and without disturbances.

6.Be able to define a root locus and how to sketch a root locus manually and using MATLAB.

7.Be able to use the root locus in the feedback control systems analysis.

8.Be able to use frequency response to analyze stability (Nyquist and Bode plots), and how to use frequency response in the feedback control systems analysis using MATLAB.

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) (N/A)

(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 (X)

Brief list of the topics to be covered

1.Introduction to Control Systems
2.Modeling in the Frequency Domain
3.Modeling in the Time Domain
4.Time Response
5.Reduction of Multiple Subsystems
6.Stability
7.Steady State Errors
8.Root-Locus Techniques
9.Frequency Response Techniques

GRADING:

Course Requirements	Weight
Test # 1	25%
Test # 2	25%
Test # 3	25%
Final Project	25%
Overall Grade	100%

Conversion of Numerical Grade to Letter Grade

95<=A<=100	83<=B<85	70<=C<75
90<=A-<94	80<=B-<82	60<=D<69
86<=B+<89	76<=C+<79	F: Below 60