Course Number: ELC 151
Title: Feedback and Control Systems
Department/Program: Electronics, Computer and Communications Engineering
School: School of Science and Engineering
Semester and School Year: 1st Semester, August to December 2015
Instructor: Nathaniel Libatique, Ph.D

A. Course Description

This course is an introduction to the engineering of control systems. The analysis and design of intelligent systems will be explored by looking at both time and frequency responses. Gain adjustment and compensation techniques for transient design, steady-state design and stability will be introduced. Phase space techniques amenable to qualitative analyses of nonlinear systems are also introduced.

B. Learning Outcomes

By the end of this course students should be able to

- Represent systems using block diagrams, state space equations, root loci, Bode plots and Nyquist diagrams
- Analyze and design systems for stability, transient response and steady state error targets
- Perform control system visualizations, calculations and design using a computational platform of choice such as Labview, Matlab, Mathematica or R.

C. Course Outline

- Modeling in the frequency domain: transfer functions
- Modeling in the time domain: state space representation
- Temporal response of second order systems
- Block diagram algebra and reduction of multiple subsystems
- Stability and steady state errors
- Root locus techniques
- Frequency response techniques
- Optional-Extra topics

D. References

Required Readings

1. Norman Nise, Control Systems Engineering, Wiley.
2. Steven Strogatz, Nonlinear Dynamics and Chaos, Westview Press.

Suggested Readings

3. IEEE Spectrum including IEEE Explore journals and proceedings
4. Matlab, Labview or Mathematica manuals and documentation

5. Oppenheim, Willsky and Nawab, Signals and Systems, Prentice-Hall
6. Katsuhiko Ogata, Modern Control Engineering, Prentice-Hall.

E. Course Requirements – grade components

Long Exams (LE)	*A minimum* of 2 LE's will be given
Optional Project	*Equivalent* to 1 Long Exam (LE)
Quizzes and Seatwork	*Accumulated total* will count towards grade. Weight of this grade component will be a fraction of the weight of a Long Exam up to a maximum weight of two LEs, upon the discretion of the instructor
Final Exam/Final LE	*Weight* is one long exam. Coverage may be comprehensive (Final Exam) or circumscribed by last portion of material (final Long Exam). Instructor reserves the right to determine exemption from or optional nature of final exam requirement.
Homework and Recitation	*Bonus points* with semester's total worth of 3 to 7 percentage points added to the class standing depending on the instructor's discretion.

The grade will be composed of at least two long exams. The instructor, upon his discretion, may cancel the lowest of a student's long exams. However he may do this only if at least three major grade components (each of LE weight) of work had been accomplished by the student.

A > 93; B+ > 85; B > 78; C+ > 71; C > 64; D > 50; else F**.** Note that "C+ > 71" requires a class standing above 71, therefore a 71.00 is a C.

G. Classroom Policies

1. Make up exams. No make up work will be given for absences, **unless previously coordinated with the instructor** via email, handwritten note or advise **before** the scheduled exam. The instructor reserves the right to judge the merits of a request for a make-up exam.
2. Class Attendance. The maximum number of absences is 9 hours. Anybody coming in after the roll call will be marked with a fractional absence.
3. Dishonesty. Any form of dishonesty or falsehood related to the general conduct of the class (exams, homework, project, quizzes, etc.) will be considered a major offense and will be brought before the Associate Dean for appropriate action.
4. Consultation. By appointment.
5. Email: nlibatique@ateneoinnovation.org