

Weapons and Systems Engineering
ES308 Control Systems Design Laboratory

Catalogue Data: ES308 Control Systems Design Laboratory (1-2-2). Applied control systems design. Implementation of analog and sample data controllers in laboratory hardware. Topics include: Sensor Calibration, Motor Identification, Proportional Compensator Design and Implementation, Proportional-Integral Compensator Design and Implementation, and State Variable Feedback Compensator Design and Implementation.

Prerequisite: ES303 or ES303H

Textbook: Norman S. Nise, Control Systems Engineering, 5th edition, John Wiley, 2008.

Coordinator: R. O'Brien

Objectives: To identify a system model from experimental data; describe the effect of uncertainty in measurements and system models on system performance; implement classical (PID) and modern (state feedback) controllers on a small board computer using C

Topics	Lecture periods	Laboratory sessions
1. Intro to Hardware, Sensor Calibration	1	1
2. Motor Identification	1	1
3. Proportional Control	2	2
4. Sample and Hold; D/A Issues	1	1
5. Proportional/Integral Design and Implementation	2	2
6. State Variable Methods	1	1
7. Hydraulic Plant Compensator Design and Implementation	1	1
8. Final Project	3	3

Classroom schedule:

Course meets for one 50 minute lecture and two 50 minute consecutive lab periods.

Contribution of course to professional component:

The course puts theory learned in previous semester to practice. The course also provides an excellent foundation for their capstone design projects.

Relationship of course to program outcomes:

- Outcome (a) & (e): Compensator design, state feedback design
- Outcome (b): Model identification for the final project
- Outcome (k): Matlab/Simulink for model and controller analysis and evaluation, C programming to implement compensators and controllers
- Outcome (d): Working together as lab partners and sharing the responsibility for design, simulation, implementation, and testing
- Outcome (g): Communication effectively in lab reports

Prepared by: R. O'Brien Date: 28 February 2012