

ME 4811
Multivariable Control of Naval Engineering Systems

Fall Quarter, AY 02

DESCRIPTION Review of state space control design and analysis. Pole placement for single and multiple input systems. State estimators, tracking systems, disturbance compensation. Nonlinear control, optimal control, robust control, and discrete system control. Kalman filter and effects of measurement noise.

INSTRUCTOR Prof. Fotis A. Papoulias, Rm. 323, Phone 656 - 3381
Open door

OBJECTIVES

- Design a compensator (controller and observer) for a linear system and verify its response using simulations.
- Design a disturbance estimation and compensation control law.
- Perform an integral control design in state space.
- Set up the LQR/LQG optimization problems and solve using MATLAB/SIMULINK.
- Utilize Lyapunov functions to analyze simple nonlinear control systems and limit cycle behavior.

TEXT Class Notes. Also chapters 11 through 13 from Ogata.

MEETINGS The class is taught as 3 lecture hours and 2 lab hours per week.

Lectures	Monday	11:00 - 11:50 AM	ME – 150
	Tuesday	11:00 - 11:50 AM	ME – 150
	Wednesday	11:00 - 11:50 AM	ME – 150
Lab (as needed)	Thursday	10:00 - 11:50 AM	ME – 150

GRADING	Midterm	1	30 %
	Lab Exercises	10	40 %
	Final Exam	1	30 %

EXAMS All exams are open book, open notes

Midterm	TBD	TBD
Final Exam	Dec. 14, 8:00-10:00	Comprehensive

LABS Labs are numerical and they utilize MATLAB and SIMULINK. Typically they are due one week after their assignment.

- 1 Simulations
- 2 Control Law Design
- 3 Observer Design
- 4 Tracking Systems

- 5 Disturbance Estimation
- 6 Optimal/Sliding Mode Control
- 7 Discrete Time Control
- 8 Effects of Noise
- 9 Robust Control
- 10 Nonlinear Systems