

**MECH 7710: Optimal Estimation and Control
Spring 2011**

Instructor: Dr. David M. Bevly (Ross 264)

Phone: 844-3446

Office Hours: MW 11-2

Class Website: <http://eng.auburn.edu/~dmbevly/mech7710/>

Textbook: No single text book is required for this course

Suggested References: Applied Optimal Control
by: R.F. Stengel

Applied Optimal Estimation
by: Gelb

Introduction to Random Signals and Applied Kalman Filtering
by: Brown, R. G. and Hwang

Digital Control of Dynamic System
by: Franklin Powell and Workman,

Probabilistic Methods of Signal and System Analysis
by George Cooper and Clare McGillem

Matlab Help located at:

http://www.eng.auburn.edu/departement/ee/pages/comp_tools.html

Pre-Requisites: **ELEC 7500 or MECH5970:** Basic understanding of classical and state-space systems/analysis and synthesis tools

Matlab: A good working knowledge of MATLAB is essential to this course and is assumed

Working knowledge of Discrete Systems, z-transforms, difference equations

Grading Policy:

1.	2 Exams	40
2.	Homework	40
3.	Project	20
	Total	100

Scale:

90-100 - A	70-79 - C
80-89 - B	60-69 - D
Below 60 - F	

Tentative Lecture Topics (Subject to Change):

Approximate Number of Weeks	Topics	Reading Materials Class Notes Plus
2	Random Processes	FPW Appendix D Gelb Sten 2.4,4.1
4	Estimation with a Stochastic Perspective	Gelb FPW Chapter 9 STEN Chapter 4
2	Parameter Identification	FPW Chapter 8 STEN 4.1
4	Optimal Control with Noise	FPW Chapter 9 Gelb Sten Chapters 5,6
2	Sensitivity and Robustness Analysis	

Goals:

Overall: Develop skills for the design of real world, modern, digital controllers accounting for: Measurement noise, model uncertainty, and process noise. Introduce the Kalman filter

Specific:

- Understand Random Processes
- Introduction to Plant Identification
- Combine Optimal Estimation and Control Techniques
- Explore performance and robustness issues of new design techniques with examples

General Policies:

Class attendance is expected but not *formally* recorded. Late submission of assigned work or make-up examinations will be allowed if and only if accompanied by an approved University excuse. You are encouraged to discuss homework and problem sets but submitted work should be your own.

Accessibility:

It is the policy of Auburn University to provide accessibility to its programs and activities, and reasonable accommodations for persons defined as having a disability under Section 504 of the rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act of 1990. Students who need special accommodations should make an appointment to see the instructor as soon as possible or contact The Student with Disabilities Program office at (334) 844-5943 (Voice/TT)