

ECE 5283

Kalman Filtering

Fall 2005

TIME: TR 3:00 – 4:15 PM

PLACE: CEC 441

INSTRUCTOR:

Dr. J. P. Havlicek

CEC 432

Tel: 325-4279

Office Hours: TR 1:30 – 2:30 and by appointment

E-mail: joebob@ou.edu

TEXT:

R. G. Brown and P. Y. C. Hwang, *Introduction to Random Signals and Applied Kalman Filtering: with MATLAB exercises and solutions*, 3rd ed., John Wiley & Sons, New York, 1997.

Textbook Errata:

<http://www.wiley.com/college/brown/0471128392/instructor.html>

COURSE WEB PAGE: <http://coecs.ou.edu/Joseph.P.Havlicek/Kalman/>

PREREQUISITES: ECE 5223

REASONABLE ACCOMMODATION POLICY:

The University of Oklahoma is committed to providing reasonable accommodation for all students with disabilities. Students with disabilities who require accommodations in this course are requested to speak with the instructor as early in the semester as possible. Students with disabilities must be registered with the Office of Disability Services prior to receiving accommodations in this course. The Office of Disability Services is located in Goddard Health Center, Suite 166, (405) 325-3852 (Tel) or (405) 325-4173 (TDD only).

RELIGIOUS HOLIDAYS:

It is the policy of the University to excuse absences of students that result from religious observances and to provide without penalty for the rescheduling of examinations and additional required classwork that may fall on religious holidays. It is the responsibility of the **student** to make alternate arrangements with the instructor *at least one week prior to the actual date of the religious holiday*.

UNIVERSITY POLICY ON ACADEMIC HONESTY:

<http://www.ou.edu/provost/integrity>

This page outlines the University's expectations of academic honesty, defines misconduct, provides examples of prohibited conduct, and explains the sanctions available for those found guilty of misconduct. Additional information about the meaning of *academic misconduct* in this course is provided later in this syllabus.

The UOSA Statement of Academic Integrity will be used in this course.

COURSE DESCRIPTION:

This course will provide a review of stochastic processes and random signals followed by a comprehensive development of Kalman filtering and optimal estimation in both discrete and continuous time. Emphasis will also be placed on modeling, practical considerations, and the development of implementation skills.

HOMEWORK:

Homework will be assigned during class. You are encouraged to work together on homework, but **DO NOT COPY!** Each problem solution that you turn in must be your own; **if** you copy another person's solution and turn it in as your own, **then you are guilty of academic misconduct.** **If** you copy a homework solution from any other source and turn it in without working the problem yourself, **then you are guilty of academic misconduct.**

Some homework problems will involve computer programming. The standards of academic honesty articulated above apply to computer-based homework problems as well. In addition:

1. All computer codes and results that you turn in as homework solutions must be your own original work, except as noted in (4) below.
2. **If** you obtain code from another person in an electronic format and incorporate it into the solution that you turn in, **then you are guilty of academic misconduct.**
3. **If** you obtain code from another person in electronic or hardcopy format, type some or all of it in yourself, and then include this as part of the solution that you turn in, **then you are guilty of academic misconduct.**
4. In certain cases, it may be acceptable to incorporate existing public domain and/or library computer algorithms and codes into a solution that you submit. In such cases, however, you must always obtain prior authorization from the instructor and you must always document the source of any algorithms and/or code that are not your own original work.

PROJECTS:

There will be two substantial projects involving the design and implementation of Kalman filters. The first project will be an individual project. The same standards of academic honesty that apply to homework apply to the first project as well.

The second project will be a group project. Group assignments will be made by the instructor. The second project will be due on the last regular class meeting of the semester. Each group will present a written project report. This written report can be turned in early. Each group will also make a presentation and demonstrate their

project to the class during the final regular class meeting of the semester. This activity will be in lieu of a final exam.

TESTS & EXAMS:

There will be a midterm exam. The midterm will be announced in class at least one week in advance. The midterm exam will be open books and open notes. You may use calculators on the midterm. All work that you turn in on the midterm exam must be your own original work. At the discretion of the instructor, the midterm exam may be an in class exam, a takehome exam, or a combination of both.

GRADING:

Your final numerical grade will be calculated as shown in the following table.

What	Value
Homework	20%
Midterm	30%
Project 1	20%
Project 2	30%

These numerical grades will be converted into letter grades using a curve that I will determine. The same curve will be applied to everyone in the class. The curve will never hurt you relative to the standard ten-point grading scale.

COURSE OUTLINE:

1. Review of probability and stochastics.
2. Linear systems with stochastic inputs.
3. The Wiener filter.
4. The discrete Kalman filter.
5. The continuous Kalman filter.
6. Kalman filter extensions.