

University of Wisconsin - Madison
Department of Electrical and Computer Engineering

ECE334 - State Space Systems Analysis
Spring 2006

Course Administration and Outline

- Instructors: Professor Ian Hiskens
2554 Engineering Hall
Phone: (608) 261-1096; Email: hiskens@engr.wisc.edu
- Office hours: Tuesday, 12:30-1:30pm, 2554EH
Wednesday, 2:00-3:00pm, 2554EH
- Required text: J.S. Bay, *Fundamentals of Linear State Space Systems*, McGraw-Hill, 1999.
(Many good books on linear systems are available as background references.)
- Web Site: <http://www.engr.wisc.edu/ece/courses/ece334.html>
- Software: The CAE supported package MATLAB will be useful.
- Homework: Regular problem sets will be assigned.
- Exams: A mid-term exam will be held in class on Thursday, March 9.
Please report conflicts early.
The final exam is set for Friday, May 12, 2:45pm.
- Grading Policy: Homework 30%; Mid-term exam 25%; Final exam 45%.

Topics:

- Differential equations, state space, linearization.
- Vectors and vector spaces: independence, bases, rank, norms, subspaces, range and null spaces.
- Eigenvalues, eigenvectors, characteristic equation, frequency domain connection, engineering interpretation, singular values.
- Cayley-Hamilton, matrix exponential.
- Solution of linear differential equations, complex eigenspace and oscillations.
- Stability: Lyapunov, BIBO.
- Controllability and observability.
- Realizations.
- State feedback.
- Observers.