

CAAM 335 · MATRIX ANALYSIS

Fall 2008 · Rice University

Lectures: MWF 11AM, Duncan Hall 1070

Recitations: Thurs 9:30-11:00PM, Herzstein Hall 210

Web Site: <http://www.caam.rice.edu/~caam335>

Instructors: Matthias Heinkenschloss (heinken @ rice.edu), Duncan Hall 3088, (713) 348-5176
Office Hours: Tues/W 1:00-2:00pm, or by appointment.

Recitations: Weekly; time to be announced

Teaching Assistant: Derek Hansen (derekjhansen @ rice.edu), Duncan Hall 2004 (713) 348-2290
Office Hours: Thurs/F 1:00-3:30pm

Physical Laboratory: The lectures will be accompanied by an *optional* 1-credit laboratory in which students examine concepts from the course more deeply in the context of physical experiments. Lab meetings: Thurs 9:00-9:30PM, Herzstein Hall 210.

Prerequisites: MATH 212 and CAAM 210

Less formally: you should be familiar with multivariable calculus and elementary matrix manipulations (matrix addition and multiplication, Gaussian elimination), and be able to write MATLAB programs.

Grading: 40% problem sets, 60% exams. (Class participation and improving performance on the exams will be considered when assigning borderline grades.)

Problem Sets: Problem sets will be assigned roughly once a week. You may collaborate on the problems, but your write-ups must be your own independent work. Transcribed solutions are unacceptable. *You may not consult solutions from previous sections of this class.*

Late Policy: You may turn in two problem sets one class period late without penalty. Subsequent late assignments will be penalized 20% each. Homework will not be accepted more than one class period late without a written excuse. This implies that you may not use two 'lates' on one assignment.

Exams: Three take-home, timed, closed-book exams will each account for 20% of the final grade. Each exam must be your individual, unassisted effort; indicate compliance by writing out in full and signing the traditional pledge. Approximate exam dates are given on the reverse.

Course Notes: *Matrix Analysis* by Steve Cox (available as a course pack from the campus store).
A PDF version is available from the course web site.
You may also view a version of the notes via Connexions: <http://cnx.rice.edu>.

Recommended Reading: Carl Meyer, *Applied Matrix Analysis and Linear Algebra*
Gilbert Strang, *Linear Algebra and Its Applications*, 3rd ed.
Gilbert Strang, *Introduction to Applied Mathematics*
Lars Ahlfors, *Complex Analysis*, 3rd ed.
R. V. Churchill, & J. W. Brown, *Complex Variables and Applications*, 5th ed.
D. J. Higham & N. J. Higham, *MATLAB Guide*

Programming: Most homework assignments will require some MATLAB programming. Your solutions should adhere to good programming standards, and must not be copied from other students. Consult the course web site for pointers to MATLAB tutorials.

Any student with a disability requiring accommodation in this course is encouraged to contact the instructor during the first week of class, and also to contact Disability Support Services in the Ley Student Center.

CAAM 335 · Course Outline

1. Matrix Methods for Electrical Systems
2. Matrix Methods for Mechanical Systems
3. The Column and Null Spaces
4. The Fundamental Theorem of Linear Algebra
5. Least Squares
6. Matrix Methods for Dynamical Systems
7. Complex Numbers and Functions
8. Complex Integration
9. Back to Dynamical Systems
10. The Eigenvalue Problem
11. The Spectral Representation of a Symmetric Matrix
12. The Singular Value Decomposition (SVD)
13. Matrix Methods for Biochemical Networks

Tentative Exam Topics

There will be three timed (three hour), closed-book, take-home exams. You will have at least a four day window in which to take each exam.

Exam 1, Chapters 1–4

Exam 2, Chapters 5–8

Exam 3, Chapters 9–13