CAAM 453/553 · NUMERICAL ANALYSIS I

Fall 2009 · Rice University

Lectures:	MWF 9AM, Duncan Hall 1064
Web Site:	http://www.caam.rice.edu/~caam453
Instructor:	Mark Embree (embree@rice.edu) Duncan Hall 3019, (713) 348-6160
Office Hours:	Monday 10–11AM, Thursday 1:30–3:00PM, or by appointment
Prerequisite:	CAAM 335, or equivalent background in linear algebra and MATLAB programming
Grading:	Homework 50%, Exams 50% *Class participation will be considered when assigning borderline grades, as will improvement from the midterm to the final.*
453 or 553 ?	Students may take this course as either CAAM 453 or 553: both meet for the same MWF lectures, but CAAM 553 will include more theoretical homework and exam problems, and potentially several supplemental lectures with additional theoretical material. CAAM graduate students enroll in CAAM 553; others comfortable writing rigorous mathematical proofs may also consider this option. Students cannot take both CAAM 453 and 553 for credit.
Homework:	Approximately eight problem sets shall be assigned, each involving both written work and computational exercises in MATLAB. You are encouraged to discuss these assignments, but the final write-up (including computer code) must be entirely your own work. As a rule of thumb, you should spend an hour working each problem independently before collaborating with others. *You may not consult solutions from previous sections of this class.* CAAM 453 students are welcome to attempt any CAAM 553 problems they like. While these problems will not count for credit, they will be favorably influence borderline grades. Late policy: Your first two late assignments will not incur a penalty, but each subsequent late assignment will be penalized 20%. No work will be accepted more than one class period late without prior arrangement or a written excuse. (This implies that you may not generally use two 'lates' on one assignment.)
Exams:	Two take-home, closed book exams will each account for 25% of the final grade. The first will take place in mid October; the second during the finals period. These pledged exams must be your own individual, unassisted effort.
Texts:	Lloyd N. Trefethen and David Bau III, *Numerical Linear Algebra*, SIAM, 1997. Endre Süli and David F. Mayers, *An Introduction to Numerical Analysis*, Cambridge, 2003.
Recommended Reading:	W. Gautschi, *Numerical Analysis: An Introduction*, Birkhäuser, 1997. G. H. Golub and C. F. Van Loan, *Matrix Computations*, 3rd ed., Johns Hopkins, 1996. M. L. Overton, *Numerical Computing in IEEE Floating Point Arithmetic*, SIAM, 2001. G. W. Stewart, *Afternotes on Numerical Analysis*, SIAM, 1996. G. W. Stewart, *Afternotes Goes to Graduate School*, SIAM 1998. D. J. Higham and N. J. Higham, *MATLAB Guide*, 2nd ed., SIAM, 2005. Check the course web site for additional suggestions throughout the semester.
Outline:	This course studies algorithms for numerically solving problems of continuous mathematics. We will focus on basic numerical linear algebra, interpolation and approximation of functions, definite integrals (quadrature), the numerical solution of differential equations, and root finding for nonlinear scalar equations. CAAM 454/554 Numerical Analysis II (Spring) covers iterative linear algebra and optimization. CAAM 551 Numerical Linear Algebra (Fall) describes more advanced algorithms for solving large linear systems and eigenvalue problems.

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 Room 111 of the Allen Center.