



Fall 2008

## MA570 *Fundamentals of Scientific Computation* Course Policy Statement

Professor Erik M. Bollt

**Office:** Science Center 369 **e-mail:** [bolltem@clarkson.edu](mailto:bolltem@clarkson.edu)

**Web:** [www.clarkson.edu/~bolltem](http://www.clarkson.edu/~bolltem)

**Course Text:** *Numerical Analysis*, Timothy Sauer, from Addison Wesley,

SBN-10: 0321268989, ISBN-13: 978-0321268983

### Dear Students:

Welcome back to academics and welcome to graduate ***Fundamentals of Scientific Computation!*** This is the math class you have been waiting for! I look forward to a great semester of learning with you. The key to success is effort and determination; a good attitude and a good work ethic is at least as important as talent. Remember too that no matter how much effort I show, I won't be able to learn the material for you. ***You have to make the effort!*** . . .

**Topics.** Scientific Computing, a sister topic to Numerical analysis, so named, is a HUGE topic. We will sample a selection of demonstrative and useful topics with an eye toward their application to relevant physical and engineering problems.

**We will cover:** Rather than try to rush through too many topics, we will focus on a few.

**On the Web:** At my website, [www.clarkson.edu/~bolltem](http://www.clarkson.edu/~bolltem), I will regularly post useful information about the class, such as homework info, and updates to the syllabus.

**Grading.** Listed below are the items I will be using to evaluate your progress this semester.

Homework:	10%
2 Midterm Exams:	30%
3 Projects:	30%
Final Exam:	30%

Attending the lectures is required; a significant number of unexcused absences will result in downward adjustment of your grade.

**Exams.** In-class exams will be during regular class time. The final exam will be comprehensive. All exams are closed-book and closed-notes.

## Calendar:

Date	Sections	Topics
Aug 25-29	Notes + App A,B	Intro to numerical methods and Matlab
Sept 1-5	Ch 0	Floating-point arithmetic and errors
Sept 8-12	Ch 1	Bisection, Newton and secant for single equation
Sept 15-19	Ch 1	More Newton + Newton's method for systems
	Proj 1 Assign +T	
Sept 22-26	Ch 2.1-2.2	Systems of equations, Linear Equations, - LU Factorization
Sept 29-Oct 3	Ch 2.3-2.5	Conditioning, and Iterative Methods
	+Fall Recess	
Oct 6-10	Ch 12.1-12.3	Eigenvalues, Singular Values, Power Method, Singular Values and Page Rank
Oct 13-17	Ch 3.1-3.3	Polynomial interpolation, Errors, and its Problems
	Proj 2 Assign	
Oct 20-24	Ch 3.3-3.4	Splines to the rescue, esp cubic splines
Oct 27-31	Ch 4.1-4.3 & 12.4	Least Squares Approx, and more SVD
Nov 3-7	Ch 5.1	Numerical Differentiation
Nov 10-14	Ch 5.2	Numerical Integration – Newton-Cotes formula
	Proj 3 Assign	
Nov 17-21	Ch 5.4-5.5	Adaptive and Gaussian Quadrature
Nov 24	Ch 12.4	Applics of SVD, Dimension Reduction and Compression
Dec 1-5	Wrapping it Up and Something Cool.	

**Homework :** Working through problems on you own is a crucial part of learning mathematics. That said, I also encourage you to work together on homework. My policy is to encourage unlimited help **on homework**, but all work must be in your own hand: you may neither electronically nor manually copy other's work. Probably the best way to really learn something is to teach it to someone else. Please note that homework is weighted extremely highly in your course evaluation.

I will assign homework regularly, and collect homework approximately once a week. Work handed in late will generally not be accepted. If you have to be absent on the day homework is collected, see me as soon as possible.

**Academic Integrity.** The Clarkson Regulations read, "a student will not claim as his or her own, the work of another, or any work that has not been honestly performed, will not take any examination by improper means, and will not aid and abet another in any dishonesty." (p. 19) Any violations will result in an F for the course and will be reported to the Academic Integrity Committee.

**Reading the text:** Remember that you do not read a math text like a paperback novel. To understand a math text, you need to keep paper and pencil at your side, and work/sketch details as you read each step, and you may need to re-read a step many times. The point is not to skim your eyes over a the text, but rather to understand. The same goes for the homework. Don't let the details go. If you are stuck, try again, then try again. If you stay stuck, seek help from a classmate, or me. Again, I encourage you to work together on homework. An efficient and fun way to do math can be to find a regular study partner, and do the reading and homework at the same time. Even when you are not the one who is stuck, the best way to deepen your own understanding is through helping your peers. This also develops good teamwork skills.

