

# MA/CS/EGR 537 Numerical Analysis (002), Spring 2012

Announcements	Syllabus
<h2>Course Syllabus</h2>	
<p><b>Meeting Location and Times:</b> 347 Whitehall Classroom Building, MWF 11-11:50am</p>	
<p><b>Instructor Information:</b>            Dr. Jeffrey S. Ovall            761 Patterson Office Tower            (859) 257-6792            e-mail</p>	
<p><b>Office Hours:</b> MWF 1-2pm, or by appointment</p>	
<p><b>Textbook:</b>  <i>Numerical Analysis: Mathematics of Scientific Computing</i>  <i>The Sally Series; Pure and Applied Undergraduate Texts, Vol. 2</i>            David Kincaid, Ward Cheney</p>	
<p>Although the book contains "undergraduate" on the cover, it is appropriate for a graduate text. You will not need the book for at least the first week of class, so shop around to get a good deal. There are a variety of editions and variants of this book--if you have questions about a particular one, bring it to my office for appraisal.</p>	
<p><b>Course Notes:</b> I will often base my lectures on these PDF notes, and when I deviate from the presentation in book, it will be in favor of presentation in the notes. The notes also contain many detailed examples. The notes may be modified a bit during the term (this will be evident by the date on the front of the PDF), as I find typos, add new material, or determine better ways of conveying "old" material.</p>	
<p><b>Software:</b> Some assigned problems will require (modest) programming. Although I do not care which programming language(s) you use, if you want any debugging help from me, I suggest that you use some version of C (or C++) or Fortran, or MATLAB. For those with minimal programming backgrounds, I suggest MATLAB or other similar (but free) software such as Octave or Scilab.</p>	
<p><b>Topics:</b> This course, together with MA/CS 522, form the preliminary exam sequence (in the mathematics department) for Numerical Analysis. The topics which will definitely be discussed in the course (and are "fair game" for the preliminary exam) will be drawn from Chapters 1-3 and 6-8 of the required text, and include</p>	
<ol style="list-style-type: none"> <li>1. <b>Introductory Material:</b> Calculus "review"; convergence and convergence rates for sequences; floating-point (computer) arithmetic</li> <li>2. <b>Polynomial and Spline Interpolation and Approximation:</b> Basic polynomial results, polynomial interpolation, norms and inner-products, orthogonal polynomials, splines</li> <li>3. <b>Finding Roots and Fixed-Points:</b> The bisection method, Newton's Method, the secant method, fixed-point iterations, multivariate versions of some of these</li> <li>4. <b>Numerical Differentiation and Integration:</b> finite difference approximations of derivatives; Richardson extrapolation; basic interpolatory quadratures; Gaussian quadrature; various quadrature improvements (change-of-variable, Romberg Integration, etc.)</li> <li>5. <b>Numerical Methods for Ordinary Differential Equations:</b> Basic existence/uniqueness results, Euler methods, Taylor and Runge-Kutta methods, multistep methods</li> </ol>	
<p>Absent from this list are topics pertaining to numerical linear algebra, which are covered in MA/CS 522 and MA/CS 622. If time permits, some discussion will also be given basic discretization techniques (finite differences and/or finite elements) for partial differential equations, as a bit of an introduction to material discussed more fully in MA 625.</p>	
<p><b>Grading:</b> The course grade will be based on six assignments, one (in-class) midterm, and one (in-class) comprehensive final exam. Your course grade will be assigned based on the percentage earned of 500 possible points: 6x25=150 for assignments, 160 for the midterm and 200 for the final. Slight curves (in your favor) may be used on each assignment and exam, in order to ensure a fair distribution of grades. If you earn at least 425 points (85%), you will receive an A; and those earning between 350 (75%) and 424 points are guaranteed at least a B. Barring violations of academic integrity (see below) all students who complete the course (make an honest attempt on all assignments and exams) will get at least a C.</p>	
<p><b>Assignments:</b> Each assignment will be due at the beginning of class on the dates given below. Your assignments should be clearly written, and well-organized--if your penmanship is poor, consider using a word processor. I will select only a subset of problems from each assignment for grading, but solutions to all assigned problems will be posted after the due date. You are welcome to (even encouraged to) discuss the assignments with each other, but your write-ups should reflect your own work. Problems for a given assignment may be added below at least two class days before the due date (at which point the problem set is complete), but you are encouraged to begin working on problems as they are posted.</p>	
<ol style="list-style-type: none"> <li>1. Due Friday, January 27: (From course notes, pp. 31-35) 1-5, 7, 9-13, 15 Solutions</li> <li>2. Due Friday, February 17: (From course notes, pg. 35) 15; (From book, pp. 323-327) 4-6, 14, 21, 26, 31, 32; (From book, pp. 335-338) 8, 9, 14, 15, 23</li> <li>3. Due Friday, March 2:</li> <li>4. Due Friday, March 30:</li> <li>5. Due Friday, April 8:</li> <li>6. Due Friday, April 27:</li> </ol>	
<p><b>Exams:</b> Because the dates of the midterm and final exam are given well in advance, make/adjust your travel plans accordingly. Only in exceptional cases (left to my discretion) will an exam be given on an alternate date.</p>	
<ul style="list-style-type: none"> <li>• Midterm Exam: Friday, March 9, 11-noon, CB 347</li> <li>• Final Exam: Friday, May 4, 1-3pm, CB 347 (official final exam schedule)</li> </ul>	
<p><b>Important Dates:</b> Some key dates from the academic calendar are:</p>	
<ul style="list-style-type: none"> <li>• January 11 - Wednesday - First day of classes</li> <li>• January 16 - Monday - Martin Luther King Birthday - Academic Holiday</li> <li>• February 1 - Wednesday - Last day to drop a course without it appearing on the student's transcript, or to change grading option</li> <li>• March 12-17 - Monday through Saturday - Spring Vacation - Academic Holidays</li> <li>• April 6 - Friday - Last day to withdraw from the University or reduce course load. Students can withdraw or reduce course load after this date only for urgent non-academic reasons.</li> <li>• April 27 - Friday - Last day of classes</li> <li>• April 30-May 4 - Monday through Friday - Final Examinations</li> </ul>	
<p><b>Academic Integrity:</b> All violations of academic integrity will be taken seriously, and dealt with according to university regulations. University policies related to academic violations, in various formats and in varying degrees of detail, can be found by following the links given here and here.</p>	

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