

ME EN 2450: NUMERICAL METHODS

Spring 2006

Lecturer: Eric R. Pardyjak

Lecture Time/Location: M,W 2:00 pm-2:50 pm EMCB 101

Office Hours: 3pm – 4pm M W - Room 169 KEN

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Text: *Numerical Methods for Engineers* by S.C. Chapra and R.P. Canale, Fifth Edition, McGraw Hill 2006 and *Introduction to Matlab 7 for Engineers* by W.J. Palm III, McGraw Hill 2006

Description of the Course: An introduction to numerical methods, including: order of convergence, error accumulation, root finding, solution of linear and nonlinear equations, numerical integration and differentiation, and solution of ordinary differential equations. Partial differential equations and their numerical solution will be discussed.

Prerequisites: CP SC 1000 Engineering Computing
MATH 2250 Ordinary Differential Equations and Linear Algebra

Corequisites: MATH 2210 Calculus III

Scope of the Course: The lecture material will cover part or most of the material in chapters 1 through 12, as well as chapter 17 and 21 through 30. In addition some supplemental material may be handed out. The reading assignments (see schedule below) are arranged such that they are made prior to when the material in the lecture will be covered. It is a good idea to read the assigned sections before coming to lecture.

Homework: Weekly homework assignments will be given during class and posted on the web site. Homework will be collected in class on the due date. Late homework will generally not be accepted.

Computers: You are expected to be proficient in a programming language (e.g. C, C++, Basic, Fortran, etc.). Commercial math packages (Matlab, Maple, EES, etc.) will be used during the semester. Each assignment will specify the appropriate language or package to be used. If no language is specified, Matlab is the preferred default.

Grading and Exams: The total course grade is comprised of homework, quizzes (approximately bi-weekly), a midterm and final exams. The grading scheme is summarized below.

Homework: 35%

Quizzes: 10%

Midterm: 25%

Final: 30%

No make up exams will be given unless arrangements are made prior to the exam.

Cheating: You are allowed to cooperate on homework by sharing ideas and methods. Copying will not be tolerated. Submitted work copied from others will be considered academic misconduct and will be reported to the appropriate University entities.

Exemptions: The University of Utah conforms to all standards of the Americans with Disabilities Act. If you wish to qualify for exemptions under this act, notify the instructor and the Center for Disabled Students Services, 160 Union.

Week	Class #	Date	Day	Topics	Chapra	Palm
1	1	Jan 9	M	Introduction, modeling	Ch.1	Ch.1
	2	Jan 11	W	Computers, Software & Round-Off Errors	Ch.2, 3	
2		Jan 16	M	MLK Holiday		
	3	Jan 18	W	Truncation Errors & Taylor Series	Ch. 4	
3	4	Jan 23	M	Taylor Series	Ch. 4	
	5	Jan 25	W	Roots of Equations – bracketing methods	Ch. 5	3.1,3.2
4	6	Jan 23	M	Roots of Equations – open methods	Ch. 6	
	7	Feb 1	W	Roots of Equations – polynomials	Ch. 7	1.3
5	8	Feb 6	M	Roots of Equations – applications	Ch. 8	
	9	Feb 8	W	Linear Equations – Introduction	Ch. 9	Ch. 6
6	10	Feb 13	M	Linear Equations – Gauss Elimination	Ch. 9	
	11	Feb 15	W	Linear Equations – Gauss-Jordan Elimination	Ch. 10	
7		Feb 20	M	Presidents Holiday		
	12	Feb 22	W	Linear Equations – Gauss-Seidel	Ch. 11	
8	13	Feb 27	M	Linear Equations – applications	Ch. 12	
	14	Mar 1	W	Review		
9	15	Mar 6	M	Mid-term Exam		
	16	Mar 8	W	Least Squares Regression	Ch. 17	Ch. 5
10		Mar 13	M	Spring Break		
		Mar 15	W	Spring Break		
11	17	Mar 20	M	Least Squares Regression	Ch. 17	
	18	Mar 22	W	Numerical Integration – Basic Methods	Ch. 21	8.1
12	19	Mar 27	M	Numerical Integration – Gauss quadrature	Ch. 22	8.2
	20	Apr 3	W	Numerical Differentiation	Ch. 23	8.3
13	21	Apr 5	M	Integration/Differentiation – applications	Ch. 24	
	22	Apr 10	W	ODE – Euler’s Method/Runge Kutta	Ch. 25	8.4
16	23	Apr 12	M	ODE – Runge Kutta	Ch. 26	8.5
	24	Apr 17	W	ODE – Runge Kutta/Shooting Method	Ch. 27	
17	25	Apr 19	M	PDE – Introduction & Elliptic Equations	Ch. 29	
	26	Apr 24	W	PDE – Elliptic Equations	Ch. 29	
18	27	Apr 26	M	PDE – Parabolic Equations – finite difference	Ch. 30	
19		Apr 28	F	Final Exam 1-3pm		