College of Staten Island, Fall 2016

NUMERICAL ANALYSIS

(MTH 335, Section 43260)

Instructor: Prof. Carlo Lancellotti, Rm. 1S-220, ext. 3634, carlo.lancellotti@csi.cuny.edu.

Times and locations: Tuesday and Thursday 12:20-2:15 in Rm. 2S-221.

Office hours: Tuesday and Thursday 9:05-9:55.

Textbook: *Elementary Numerical Analysis* (3rd Ed.) by K. Atkinson and W. Han,
John Wiley & Sons (2004), ISBN 0-471-43337-3.

Grading policy: Homework 20%, Exam 1 25%, Exam 2 25%, Final 30%.

Course outline: Each numbered lecture in the table below corresponds to a two-hour class.

Lecture	Sections	Topics	Homework Problems
1	1.1-1.2-1.3	Taylor polynomials, polynomial evaluation	(1.1)2; (1.2)1,2; (1.3)5
2	2.1-2.2-2.3	Floating point numbers, errors and their propagation	(2.2)7; (2.3)1,4
3	3.1-3.2-3.3	Root finding: the Bisection, Newton and Secant methods	(3.1)5,7; (3.2)10; (3.3)5
4	3.4-3.5	Fixed-point iteration. Ill-behaved problems	(3.4)3,13; (3.5)1
5	6.1-6.2-6.3	Linear systems and matrices. Gaussian elimination	(6.3)1
6	6.4	LU factorization	2,9
7	6.5	Errors in solving linear systems	1,3,4
8	6.6	Iteration methods	1,3,5
9	7.2	Eigenvalue problems	1,16
10	7.3	Nonlinear systems	2,3
11		Review	
12		Exam 1	
13	4.1-4.2	Polynomial interpolation	(4.1)8,24,25; (4.2)1
14	4.3	Spline functions	1,2,5,9
15	5.1-5.2	Trapezoidal and Simpson rules	(5.1)4; (5.2)1,7
16	5.3	Gaussian numerical integration	1,4
17	8.1	Introduction to ordinary differential equations	2
18	8.2-8.3	Euler's method	(8.2)1; (8.3)6
19	8.4	Numerical stability, implicit methods	2,5,6
20	8.5	Taylor and Runge-Kutta methods	2,8,11,12
21	8.6	Multi-step methods	1
22	8.7-8.8	Systems of ODEs. Boundary value problems	(8.7)5,6; (8.8)7
23		Review	
24		Exam 2	
25	9.1	The finite difference method for PDEs. Poisson equation	3
26	9.2	One-dimensional heat equation	4,5
27	9.3	One-dimensional wave equation	4,6
28		Review for the final	