

Mathematics 373
Numerical Analysis I
SPRING 2000

Instructor: Dr. Barbara Osofsky, Hill 710 phone 445-3485 OR Hill 308 phone 445-2390, email: osofsky@math.rutgers.edu, home page <http://math.rutgers.edu/~osofsky>

Time and Location: T, Th 2:50–4:10, SEC 203.

	Tuesday, Thursday	10:00 – 12:00	Hill 308
Office Hours:	Wednesday	2:00 - 4:00	Hill 308
	By appointment		Hill 710

Textbook: *Numerical Analysis*, R. Burden and J. Faires, Sixth Edition, Brooks/Cole

Bring a scientific calculator to each class.

Prerequisite: Calc4 plus some programming in a high level language

Material covered: root finding, interpolation, numerical differentiation and integration, numerical solutions of ordinary differential equations.

Material for the course will be posted on the Web, reachable from my home page. Check it frequently for homework answers, changes in assignments, future additions to the syllabus, and other relevant information.

Starred exercises in the exercise list below are due at the next lecture. Programming assignments due dates will be announced when they are assigned around the date listed here. They will be handed out a week or two in advance of the due date. Late assignments will not be graded. Exercises, quizzes, and other assignments will count for up to 20% of your final grade.

Syllabus

Lect	Date	Sect	Topic	Exercises
1	1/18	1.1, 1.2	Review of calculus, Roundoff errors	p 13: 2, 3, 5, 6*, 7, 9, 12*: p 27: 5, 9, 10*
2	1/20	1.2, 1.3	Sign. digits, Algorithms and convergence	p 37:1, 3, 4*, 6*
	1/25		SNOW DAY	
3	1/27	2.1, 2.2	Bisection, fixed point iteration (start)	p 53: 3, 9, 10*: p 63: 1
4	2/1	2.2	Fixed point iteration	p 63: 3, 4*, 6, 11, 12*
5	2/3	2.3	Newton's method	p 75: 1, 2, 6a*, 8a*
6	2/8	2.4, 2.5	Error analysis, Accelerating convergence	p 86: 1, 2, 5: p 90: 1, 7, 9, 10c*, 11
7	2/10	2.6	Roots of polynomials	p 100: 1a, 2a*, 4a
8	2/15	3.0, 3.1	Taylor poly's and Lagrange poly's	p 119: 1, 3a, 9, 10*, 11, 12
9	2/17	3.2	Divided Differences	p 132: 1, 2, 4*
10	2/22	3.3	Hermite Interpolation	p 141: 1a, 2a, 4*, 6*; Program 1*
11	2/24	3.4	Cubic Splines	P 154: 1, 2, 11, 13
12	2/29		Hourly 1 thru 3.4. Class time and place	Open book, open notes
13	3/2	4.1	Numerical differentiation	P 177: 1, 3, 5
14	3/7	4.2	Richardson Extrapolation	P 186: 1, 5, 8
15	3/9	4.3	Elements of Numerical Integration	P197: 7, 9, 11, 15, 16
			SPRING BREAK	
16	3/21	4.4	Composite numerical integration	P 205: 1, 9, 11
17	3/23	4.5	Romberg Integration	P 213: 1, 7, 10, 11
18	3/28	4.6	Adaptive Quadrature Methods	P 221: 1, 2, 4, 5
19	3/30	5.1	Initial value problems	P258: 1, 2
20	4/4	5.2, 5.3	Euler and Higher Order Taylor Methods	P267: 1, 2; P 274: 3, 5
21	4/6		Hourly 2: 4.1 to Euler method. Class time, place	Open book, open notes
22	4/11	5.4	Runge-Kutta Methods	P284: 4a, 5a, 6a, 11a
23	4/13	5.5	Error Control and Runge-Kutta-Fehlberg	P292: 1, 4
24	4/18	5.6	Multistep Methods	P 304: 1a, 2a, 10, 11
25	4/20	5.7, 5.8	Variable step size, extrapolation	P 310: 1, P 317: 1
26	4/25	5.9	Higher order equations and systems	P 328: 1; Program 2*
27	4/27	5.10, 5.11	Stability and stiffness	P 339: 1, 2; P 347: 2, 3
	5/8		Final Exam Monday 12:00—3:00 pm	SEC 203

Hourly 1 had a change of topics covered since the initial syllabus