

CS 384, Spring 2008

NUMERICAL ANALYSIS

Syllabus and Schedule

Instructor:

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Office Hours

Monday 11 – 12 AM
Wednesday 11 – 12 AM
By appointment

Time and location

TR 1:30 – 2:45 p.m.
ET 107

Course description

Prerequisite: two semesters of calculus and CS 160

Subjects: Iterative methods for solving non-linear equations
Direct and iterative methods for solving linear systems
Interpolation
Approximate computation of derivatives, integrals and functions
Numerical methods for solving ordinary differential equations
Error analysis

Learning outcomes

The learning outcomes (course objectives) specific for our course are as follows:

- The ability to construct and implement algorithms to find the root of functions, applying the bisection, Newton, secant and false position methods ((a), (b),(c), (i), (j)); practice and testing in homework 1- 2, Exam 1.
- Applying estimations on various speeds of convergence and to apply acceleration principles ((a), (b), (c), (i), (j)); practice and testing in homework 2, Exam 1.
- Constructing interpolation polynomials in Lagrange, Newton, Hermit and spline forms ((a), (b),(c), (i), (j)); practice and testing in homework 3 - 4, Exam 1.
- Applying the basic numerical integration and differentiation methods, and constructing Richardson and Romberg matrices ((a), (b),(c), (i), (j)); practice and testing in homework 5 - 6, Exam 1 -2.
- The ability to solve initial value problems using Runge-Kutta methods of varying orders, and to apply multi-step and predictor- corrector methods ((a), (b),(c), (i), (j)); practice and testing in homework 7 - 8, Exam 2.

- Finding solutions of linear systems of equations using Gaussian elimination with scaled partial pivoting and recognizing the fundamental algebraic properties of vectors and matrices as related to system of equations. ((a), (b),(c), (i), (j)); practice and testing in homework 9 -10, Exam 2.
- The ability to carry out and utilize error analysis of the approximations ((a), (b),(c), (i), (j)); practice and testing in homework 1- 10, Exam 1 - 2.

Textbook

Burden, R.L. and Faires, D.J.: Numerical Analysis, 8th edition, Brooks/Cole Publishing Co., Pacific Grove, CA, 2001. ISBN: 0-534-38216-9

Grade configuration

Exam 1	45%
Exam 2 (final)	50%
Assignments	5%
Total	100%

What to submit

Submit your homework solutions in the form of computer edited and printed text, showing your detailed explanations for all applied deductions (hand written mathematical formulas are accepted).

It is optional to submit implemented computer algorithms (codes), however it cannot replace the hard copy of the homework.

Submission requirements for the tests are specified on the exam books.

General policies and hints

Homework assignments provide the best preparation for the examinations. There will be several problems assigned each week, 1 or 2 of those will be randomly chosen and graded.

Teamwork is encouraged, but no credit will be given to copied homework or exam solutions. Exams must be an entirely individual work, more information comes on the exam books. All assignments must be turned in by the specified time; late works will not be graded. The principles of academic honesty apply.

Attending lectures is mandatory. An attendance sheet must be signed at each meeting. Students are expected to participate actively in class work by asking questions, making comments, carrying out short in-class calculations (pocket calculators are welcome.) Missing 3 weeks in a row or 50% or more of the classes with no acceptable excuse implies cancellation or F.

Exams will be take-home assignments for those students who regularly attend classes.

There are no make-up tests.

Students with disabilities

If you have a disability and need assistance, special arrangements can

be made to accommodate most needs. Contact the Director of Services for Students with Disabilities (Walb Union, Room 113, telephone number 481-6658) as soon as possible to work out the details. Once the Director has provided you with a letter attesting to your needs for modification, bring the letter to me. For more information, please visit the web site for SSD at <http://www.ipfw.edu/ssd/>

Tutoring help

(Information about CASA and the Writing Center)

Center for Academic Support and Advancement, www.ipfw.edu/casa
The place to go for concentrated study time!

The SPOT Course-Specific Tutoring: Make your study time not only more effective, but also more efficient by signing up for free tutoring available in the SPOT in Kettler G21 (next door to the Writing Center). You are entitled to 2 free hours per week of one-to-one, course-specific help in understanding concepts, practicing the application or explanation of material being learned, and developing effective test-taking strategies. Make all appointments online through TutorTrac at www.ipfw.edu/casa. If you don't see a tutor available for your class, contact us in Kettler G21!

Drop-in tutoring is also available for math (schedule on website) and a few other subjects. If you need help with study skills in general, drop by the SPOT to view our self-paced tutorials or make a one-to-one appointment. Information about STEPS (Student Technology Education ProgramS) classes can be found the CASA website. Also, check with your instructor about whether Supplemental Instruction (group study) is available for this class. Questions? Call 481-5419.
SPOT Hours Spring 2008: Monday-Thursday 8 a.m. to 8 p.m.; Friday 8 a.m. to 4 p.m.

The WRITING CENTER: Save time and write better papers or presentations for any class through free one-to-one or small group consultations in The Writing Center, Kettler G19 (next door to the SPOT). Bring assignments, questions, ideas, and a draft (if you have one). Consultants can help you get started, write more clearly, revise, edit, and cite sources responsibly. Come as you begin and as you revise. Drop-ins are welcome if time is available, but appointments, made online through TutorTrac, receive preference. For TutorTrac, online consulting, and resources to make your writing process easier, go to www.ipfw.edu/casa/writing. Questions? Call 481-5740.
Writing Center hours Spring 2008: M-Th 10 a.m. to 6 p.m.; F 10 a.m. to 2 p.m.; Su 1 to 5 p.m.

3) Material related to your rights and responsibilities may be found in the website for the Dean of Students at www.ipfw.edu/dos.

ABET program course outcomes

The ABET (Accreditation Board for Engineering and Technology) general guide for learning outcomes relevant to the entire Computer Science undergraduate program runs as follows:

- (a) An ability to apply knowledge of computing and mathematics appropriate to the discipline
- (b) An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
- (c) An ability to design, to implement, and evaluate a computer-based system, process, component, or program to meet desired needs
- (d) An ability to function effectively on teams to accomplish a common goal
- (e) An understanding of professional, ethical, legal, security and social issues and responsibilities
- (f) An ability to communicate effectively with a range of audiences

- (g) An ability to analyze the local and global impact of computing on individuals, organizations, and society
- (h) Recognition of the need for and an ability to engage in continuing professional development
- (i) An ability to use current techniques, skills, and tools necessary for computing practice.
- (j) An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices. [CS]
- (k) An ability to apply design and development principles in the construction of software systems of varying complexity.

Calendar

Lecture: TR 1:30 – 2:45 PM
ET 107

Week Of	
	TR
Jan 14	Course Overview Ch1
Jan 21	Ch 2
Jan 28	Ch 2
Feb 04	Ch 3
Feb 11	Ch 3
Feb 18	Ch 4
Feb 25	Ch 4
Mar 03	Ch 4 No class on Thursday, 03/13
Mar 10	Spring Break
Mar 17	Exam 1 due on Tuesday 03/18 Ch 5
Mar 24	Ch 5
Mar 31	Ch 5
Apr 07	Ch. 6
Apr 14	Ch. 6
Apr 21	Ch 7
Apr 28	Ch 7/Review
Apr 30	Final Exam due on Thursday, May 08