Queens College, CUNY, Department of Computer Science

Numerical Methods

CSCI 361 / 761

Spring 2018

Instructor: Dr. Sateesh Mane

Course Website: `http://venus.cs.qc.cuny.edu/~smane/cs361/`

Classes: Mon & Wed 6:30 – 7:45 pm, SB B145; 3 hr., 3 cr.

Office & Hours: SB A201; Mon & Wed 2:00 – 3:00 pm (approx)

Prerequisites: CSCI 220 and 313; Math 152 and 231.

Textbook: no required text.

Reference texts (optional):

- Richard Burden, Douglas Faires, Annette Burden, *Numerical Analysis*, 10^{th} ed.
- Richard W. Hamming, *Numerical Methods for Scientists and Engineers*, 2^{nd} ed.
- W. H. Press, S. A. Teukolsky, W. T. Vetterling, B. P. Flannery, *Numerical Recipes*, 3^{rd} ed.
- Timothy Sauer, *Numerical Analysis*, 2^{nd} ed.

Learning Goals: There will be emphasis not only on computation but also ***analysis.*** Students will be expected to learn computational algorithms and also to understand the principles underlying the algorithms.

Course Description: Basic topics which will be covered are:

- Useful 'basic' techniques (Horner's rule, gcd calculator, Taylor series, etc.).
- Solution of non-linear equations (bisection, Newton-Raphson, secant, fixed point iteration).
- Numerical integration (trapezoid, Simpson, etc.), multi-dimensional integrals.
- Fourier Series and Digital Fourier Transforms.
- Applied Linear Algebra (matrix operations) — this may be skipped or abbreviated.
- Numerical methods for ordinary differential equations.
- If time permits, additional topic(s) may be included.
- **Students will be required to write working programs to implement the above algorithms.**
- **Students will be required to carry out basic mathematical computations in class.**
- **Examples are to compute the value of $x + \frac{1}{2}x^2$ for $x = 0.1$, or $\frac{\ln(y)}{z}$ for $y = 0.9$ and $z = 0.3$.**
- **Students who are unable to employ a calculator or program a spreadsheet to perform the above tasks may be unqualified for this course.**

Grade Policy: The grading policy will consist of:

- Midterm 1, Midterm 2, Final.
- Some exam questions will be mandatory for graduate students and optional for undergraduates.
- Homework is not officially graded. However, there is a strong connection between the homework assignments and the exam questions. Good quality work on homework assignments may be counted for a grade boost.

Exam Dates: There will be two midterms and a final. Dates to be decided.

Academic Policy: Academic dishonesty such as plagiarism or cheating will be dealt with seriously in accord with the University's policy on academic integrity.