Queens College, CUNY, Department of Computer Science

Numerical Methods

CSCI 361 / 761

Fall 2018

Instructor: Dr. Sateesh Mane

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

Classes: Mon/Wed 6:30 – 7:45 pm, KY 431; 3 hr., 3 cr.

Office & Hours: SB A201; Mon/Wed 12.30 – 1.30 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.
- Applied Linear Algebra (matrix operations).
- Numerical solutions of ordinary differential equations.
- *(Optional, if time permits)* Fourier Series and Digital Fourier Transforms, additional topic(s).
- **Students will be required to write working programs to implement the above algorithms.**
- **All coding will be in C++.**
- **Students will be required to carry out basic mathematical computations in class, using a calculator and/or spreadsheet, including questions for in-class exams.**

Grade Policy: The grading policy is as follows.

- The exams will consist of a set of in-class quizzes. Some questions may be take-home. Some exam questions will be mandatory for graduate students and optional for undergraduates.
- The dates of the quizzes may not necessarily be announced in advance.
- Homework is not officially graded. Good quality homework solutions may be counted for a grade boost.
- **Any question for which a student submits two or more different answers automatically receives a score of zero for that question.**

Academic Policy: Academic dishonesty such as plagiarism or cheating will be dealt with seriously in accord with the University's policy on academic integrity.
A student caught cheating on any question in an exam will fail the entire course.