Queens College, CUNY, Department of Computer Science

Numerical Methods

CSCI 361 / 761

Summer 2018

Instructor: Dr. Sateesh Mane

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

Classes: Mo/Tu/We/Th 2:00 – 3:34 pm, SB C205; 3 hr., 3 cr.

Office & Hours: SB A201; Mo/Tu/We/Th 1.15 – 1.45 pm and 3.45 – 4.15 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.
- If time permits, additional topic(s) may be included.
- **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 will consist of:

- Midterm 1, Midterm 2, Final.
- Projects (tentatively three projects, details to be fixed).
  Students who form teams to collaborate on projects *must inform the lecturer of the names of all team members* ahead of time, else the submissions will be classified as cheating and will receive a failing grade.
- Some exam/project questions will be mandatory for graduate students and optional for undergraduates.
- Homework is not officially graded. Good quality homework solutions may be counted for a grade boost.
- All exam and project questions will be scored from 0 to 1 and the final score for the course is multiplicative:

$$\text{overall score} = 100 \times \prod (\text{score on each graded question}) .$$

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.
A student caught cheating on any question in an exam or project will fail the entire course.