Queens College, CUNY, Department of Computer Science

Computational Finance

CSCI 365 / 765

Summer 2018

Instructor: Dr. Sateesh Mane

Course Website: `http://venus.cs.qc.cuny.edu/~smane/cs365/`

Classes: Mo/Tu/We/Th 4:30 – 6:04 pm, SB B141; 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 313 and MATH 241; or CSCI 314 and ECON 249 for Finance students.

Textbook: no required text.

Reference texts (optional):

- John Hull, *Options, Futures and Other Derivatives*, 10^{th} ed.
- Daniel. J. Duffy, *Financial Instrument Pricing Using C++*.

Learning Goals:

- The emphasis of the course will be on computation, not abstract mathematics.
- **Prior knowledge of finance is not a prerequisite.**
- **Advanced mathematics such as stochastic calculus is not required.**

Course Description: Valuation of derivatives as a family of algorithmic computations, with analysis of the underlying financial model and hands-on implementation practice. Topics to be covered will include:

- time value of money (interest rates, yield curves)
- arbitrage based pricing and hedging, including risk neutral pricing and risk free portfolio
- options and Black-Scholes-Merton model
- path-dependent and 'exotic' derivatives
- volatility smiles
- **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.