MF 796
Computational Methods of Mathematical Finance
Spring 2014

Lectures: Mon & Wed, 8-9:30 am
SMG 406

Instructor: Professor Gustavo Schwenkler
Office: SMG 515E
Email: gas@bu.edu

Office hours: Mondays and Tuesdays, 5-6 pm

Course website: https://smgtools.bu.edu/portal/site/SPRG14MF796A1

Objectives & Prerequisites: This is a graduate level course on the computational methods commonly used in finance. We will deal with ordinary, partial, and stochastic differential equations. Because of this, I expect you to be familiar with advanced topics of stochastic calculus, real analysis, probability, and statistics. This includes: random variables, probability distributions and densities, characteristic function, Fourier inversion, measure changes, Taylor formula, and Ito’s formula.

Recommended literature: Monte Carlo Methods in Financial Engineering
By: Paul Glasserman
ISBN: 0387004513

Computational Methods in Finance
By: Ali Hirsa
ISBN: 1439829578

Topics: This course will focus on the computational methods used for pricing derivatives, measuring risks, and estimating / calibrating models. We will cover the following topics:
- Discretization of stochastic differential equations
- Monte-Carlo simulation
- Random number generation
- Bias and variance
- Variance reduction
- Exact simulation
- Finite differences for partial differential equations
- Quadrature methods
- Filtering (if time permits)

**Grading:**
- Homework: 30%
- Midterm: 30%
- Final project: 40%

**Midterm:**
There will be a midterm on Wednesday, March 5, 2014, in class 8-9:30 am. You are allowed to bring one cheat sheet of your own annotations to the midterm, but you have to hand in your cheat sheet with your midterm.

**Project:**
There will be a final project to be submitted on May 2, 2014. You will be required to build teams of 3-4 people to work with on a project of practical relevance. You will have two weeks to work on the project. The project will involve coding. You are required to submit a written summary of at most 10 pages containing your method and results. Also, your team will be required to give a 10-minute presentation of your results in class during the week of April 28, 2014. More details about the project will be announced in class.

**Rules:**
- There will be homework assignments due every second week.
- Homework is due in class by the end of the class on the due date
• You can work in teams on your homework, but you need to submit your own write-up of the solutions. Please give the names of your team members on your write-up.
• No late homework will be accepted. NO EXCEPTIONS!
• Calculators are allowed for the midterm, but unnecessary.
• Cellular phones and other devices with built-in memory must be turned off.
• If you cannot make it to the midterm, you need to let the instructor know by midnight on Tuesday, March 4, and you need to indicate verifiable reason.
• If you don’t agree with the grading of either your homework or your final, you need to submit a written objection to the Teaching Assistants.
• Cheating will be dealt with in accordance with University policy, and may result in failure of the course.