ISyE 6785 Syllabus
Practice of Quantitative & Computational Finance

Instructor: Dr. Shi-Jie Deng
Time and Classroom: 2pm Mon/Wed
Office: GT Shenzhen Campus, China **Office Phone:** (404) 894-2300
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Office Hour: 1pm – 2pm Mondays or by appointment.

Course Materials: There is no required textbook for this course. The course will be mainly based on journal papers, research reports, and recommended texts. **Important:** all papers and other course materials will be posted at **Canvas (https://gatech.instructure.com)** for you to download.

Recommended textbooks: *MONTE CARLO METHODS IN FINANCIAL ENGINEERING* (by P. Glasserman), *Value at Risk: The New Benchmark for Managing Financial Risk* (by Philippe Jorion), *and Numerical Methods in Finance: A MATLAB-Based Introduction* (by Paolo Brandimarte).
Background readings include: *Options, Futures and Other Derivative Securities* by Hull, 3rd edition, Prentice Hall, 1997.

Course Topics:
Part I will describe the theory and application of discrete-time lattice approach in financial asset pricing. Topics include: implied binomial/trinomial lattice, multinomial-lattice construction, and applications of stochastic volatility modeling and exotic options pricing. Part II will introduce common techniques and models in simulation and machine learning. Specific applications and implementations of these models in quantitative finance problems will be discussed. Topics include: variance reduction, importance sampling, machines learning models, and their applications in path-dependent securities pricing and quantitative trading. Part III will cover specific portfolio optimization and risk management applications in financial markets.

Course Projects:
There will be **two interim**-projects related to class lectures and problems arising from the financial industry. Students are required to do a final project on a financial problem in the quantitative portfolio trading, algorithmic trading, and energy market domain or of their own choice, and approved by the instructor. The programming language for interim projects and the final project can be either Python or Matlab. A write-up in Word or Latex and the corresponding workable computer code(s) need to be submitted as both hardcopies and e-mail attachments for the interim-projects and the final project.

Final project report write-up is due on July 23 and project presentations will be scheduled.
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Grading:
No exams. Grade will be based on a class presentation (20%) interim-projects (20%+25%) and the final project (35%). **Interim-projects may involve a team of no more than 2 members.**