

FE 621: Computational Methods in Finance

School of Business

Spring 2024

Instructor: Sveinn Ólafsson

Course Schedule: W 6:30-9pm in McLean 114 / Zoom

Contact Info: [solafsso@stevens.edu](mailto:solafsso@stevens.edu)

TA/Grader: Dong Woo Kim

Office Hours: TBA in Babbio 514 / Zoom

Prerequisites: Stochastic calculus at the level of FE543/FE610. Familiarity with a

programming language such as Matlab, R, or Python.

# COURSE OBJECTIVE

Provide students with understanding of essential computational tools used by quantitative analysts in the financial industry, and the ability to apply these tools to forecasting, asset pricing, hedging, risk management, and other financial applications. Students should have a strong mathematical background (FE543/FE610) and be familiar with derivatives terminology and concepts at the level of Hull's textbook (FE620).

1. Review of financial modeling and numerical analysis (root-finding, numerical integration and differentiation, error analysis, etc.)
2. Lattice/tree methods
3. Monte Carlo simulation
4. Finite-difference methods
5. Other topics as time permits (calibration and optimization, machine learning techniques, applications in asset allocation, risk management, HFT, …)

# COURSE MATERIALS

Lecture notes will be posted on Canvas, along with textbook references.

GRADING PROCEDURES

The course grade will be determined in the following manner:

90% Homework assignments

10% Class participation (attendance is mandatory)

**Homework Assignments:**

-There will be at least five individual homework assignments

-You have 5 “late days” over the semester. Beyond that, late homework will not be accepted.

**Homework solution guidelines:**

1. Present your homework solutions in a clear and readable manner (write complete and grammatically correct sentences, highlight your final answers, explain your reasoning, etc.).

2. Make sure the grader does not have to search through multiple pages of code in order to find your results.

4. You can discuss homework problems with other students, but you must write, submit, and understand your own solution.

5. You are not allowed to use solutions of former students, or “mindlessly” copy from online sources.

## Academic Integrity

### **Graduate Student Code of Academic Integrity**

All Stevens graduate students promise to be fully truthful and avoid dishonesty, fraud, misrepresentation, and deceit of any type in relation to their academic work. A student’s submission of work for academic credit indicates that the work is the student's own. All outside assistance must be acknowledged. Any student who violates this code or who knowingly assists another student in violating this code shall be subject to discipline.

All graduate students are bound to the Graduate Student Code of Academic Integrity by enrollment in graduate coursework at Stevens. It is the responsibility of each graduate student to understand and adhere to the Graduate Student Code of Academic Integrity. More information including types of violations, the process for handling perceived violations, and types of sanctions can be found at [www.stevens.edu/provost/graduate-academics](http://www.stevens.edu/provost/graduate-academics).

### **Special Provisions for Undergraduate Students in 500-level Courses**

The general provisions of the Stevens Honor System do not apply fully to graduate courses, 500 level or otherwise. Any student who wishes to report an undergraduate for a violation in a 500-level course shall submit the report to the Honor Board following the protocol for undergraduate courses, and an investigation will be conducted following the same process for an appeal on false accusation described in Section 8.04 of the Bylaws of the Honor System. Any student who wishes to report a graduate student may submit the report to the Dean of Graduate Academics or to the Honor Board, who will refer the report to the Dean. The Honor Board Chairman will give the Dean of Graduate Academics weekly updates on the progress of any casework relating to 500-level courses. For more information about the scope, penalties, and procedures pertaining to undergraduate students in 500-level courses, see Section 9 of the Bylaws of the Honor System document, located on the Honor Board website.

# LEARNING ACCOMODATIONS

Stevens Institute of Technology is dedicated to providing appropriate accommodations to students with documented disabilities. The Office of Disability Services (ODS) works with undergraduate and graduate students with learning disabilities, attention deficit-hyperactivity disorders, physical disabilities, sensory impairments, psychiatric disorders, and other such disabilities in order to help students achieve their academic and personal potential. They facilitate equal access to the educational programs and opportunities offered at Stevens and coordinate reasonable accommodations for eligible students. These services are designed to encourage independence and self-advocacy with support from the ODS staff. The ODS staff will facilitate the provision of accommodations on a case-by-case basis.

For more information about Disability Services and the process to receive accommodations, visit <https://www.stevens.edu/office-disability-services>. If you have any questions please contact: Phillip Gehman, the Director of Disability Services Coordinator at Stevens Institute of Technology at [pgehman@stevens.edu](mailto:pgehman@stevens.edu) or by phone 201-216-3748.

## Disability Services Confidentiality Policy

Student Disability Files are kept separate from academic files and are stored in a secure location within the Office of Disability Services. The Family Educational Rights Privacy Act (FERPA, 20 U.S.C. 1232g; 34CFR, Part 99) regulates disclosure of disability documentation and records maintained by Stevens Disability Services. According to this act, prior written consent by the student is required before our Disability Services office may release disability documentation or records to anyone. An exception is made in unusual circumstances, such as the case of health and safety emergencies.

# INCLUSIVITY

## Name and Pronoun Usage

As this course includes group work and class discussion, it is vitally important for us to create an educational environment of inclusion and mutual respect. This includes the ability for all students to have their chosen gender pronoun(s) and chosen name affirmed. If the class roster does not align with your name and/or pronouns, please inform the instructor of the necessary changes.

## Inclusion Statement

Stevens Institute of Technology believes that diversity and inclusiveness are essential to excellence in academic discourse and innovation. In this class, the perspective of people of all races, ethnicities, gender expressions and gender identities, religions, sexual orientations, disabilities, socioeconomic backgrounds, and nationalities will be respected and viewed as a resource and benefit throughout the semester. Suggestions to further diversify class materials and assignments are encouraged. If any course meetings conflict with your religious events, please do not hesitate to reach out to your instructor to make alternative arrangements.

You are expected to treat your instructor and all other participants in the course with courtesy and respect. Disrespectful conduct and harassing statements will not be tolerated and may result in disciplinary actions.

# MENTAL HEALTH RESOURCES

Part of being successful in the classroom involves a focus on your whole self, including your mental health.  While you are at Stevens, there are many resources to promote and support mental health.  The Office of Counseling and Psychological Services (CAPS) offers free and confidential services to all enrolled students who are struggling to cope with personal issues (e.g., difficulty adjusting to college or trouble managing stress) or psychological difficulties (e.g., anxiety and depression).  Appointments are can be made by phone (201-216-5177).

# EMERGENCY INFORMATION

In the event of an urgent or emergent concern about the safety of yourself or someone else in the Stevens community, please immediately call the Stevens Campus Police at 201-216-5105 or on their emergency line at 201-216-3911.  These phone lines are staffed 24/7, year round.  For students who do not reside near the campus and require emergency support, please contact your local emergency response providers at 911 or via your local police precinct.  Other 24/7 national resources for students dealing with mental health crises include the National Suicide Prevention Lifeline (1-800-273-8255) and the Crisis Text Line (text “Home” to 741-741). If you are concerned about the wellbeing of another Stevens student, and the matter is *not* urgent or time sensitive, please email the CARE Team at [care@stevens.edu](mailto:care@stevens.edu). A member of the CARE Team will respond to your concern as soon as possible.