IE 525 Numerical Methods in finance

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Lectures: MW 1:00 – 2:20pm in EH 106B1
Office Hours: MW 2:30 – 3:30pm or by appointment
Course Website: On Compass2g.
TA: Qi Zhao (qiz2@illinois.edu)
TA’s Office Hours: TBD

Course Description.

The course focuses on numerical methods for modeling, pricing and risk management of financial instruments, including derivatives. Specifically, it covers:

- **Lattice Methods:** Order of convergence and round-off error of lattice schemes; pricing American options using lattices; multi-asset options; multinomial models.

- **PDE Methods:** Black-Scholes PDE; Finite-difference methods: Explicit, implicit, Crank-Nicolson, SOR; Free-boundary problems / finite-difference methods for American options: Projected SOR; PDE methods for path-dependent and exotic options.

- **Simulation Methods:** Option pricing via plain Monte Carlo; Stock/Path generation; Variance reduction techniques; Monte Carlo methods for path-dependent and American options.

Course Objectives.

- **Learn** the basic numerical analysis methods.

- **Understand** how to apply these in option pricing.

- **Implement** the corresponding algorithms in C++.

Textbooks.


Additional Readings.

Coursework.

- **Homework Assignments:** There will be 5 – 6 (mathematical) homework assignments accounting for 20% of the overall grade.

- **Computational Assignments:** Throughout the semester there will be 3 – 4 computational assignments where coding in C++ will be required, accounting for 20% of the overall grade.

- **Exams:** There will be one in-class midterm, accounting for 25% of the overall grade and a final exam, accounting for 35% of the overall grade. The tentative date for the midterm is Monday, March 11 2019.

All assignments will be posted and submitted on Compass2g. Late submissions will not be accepted.

Regrading.

If you want to dispute your work’s grade, all requests should be made in writing (email is ok) within a week, after receiving your graded work. Please note that when you ask for a question to be re-graded, the entire assignment may be re-graded, and there is a possibility of losing points.

Grading Scheme.

Your grade is based upon your performance only. The grading scale is as follows:

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<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>90.00 – 100.00</td>
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<tr>
<td>B</td>
<td>80.00 – 89.99</td>
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<td>C</td>
<td>70.00 – 79.99</td>
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<td>D</td>
<td>60.00 – 69.99</td>
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<tr>
<td>F</td>
<td>0.00 – 59.99</td>
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Academic Integrity.

It is expected that all students will support the idea of academic integrity and be responsible for the integrity of their work. The university has a published policy on academic integrity that may be found at: [http://www.library.illinois.edu/learn/research/academicintegrity.html](http://www.library.illinois.edu/learn/research/academicintegrity.html)

Special Accommodation.

In compliance with the University of Illinois policy and equal access laws, appropriate academic accommodations are offered for students with disabilities.