

NUMERICAL METHODS FOR FINANCE

MMF 2021

Course Description

Fall 2011

This course is an introduction to numerical methods for mathematical finance. We will begin with a quick review of floating-point computation. The main focus of the course is the use of Monte Carlo Methods and Numerical Methods for PDEs applied to problems that arise in mathematical finance.

Instructor: Ken Jackson, BA 4228, 416-978-7075 or krj@cs.toronto.edu

TA: Duy Minh Dang, dmdang@cs.toronto.edu

Web Page: <http://www.cs.toronto.edu/~krj/courses/2021/>

Office Hours: by appointment

Lectures: Thursdays 2 to 5 PM

Tutorials : Mondays 10:00 to 11:00 AM

Course Textbook: Paolo Brandimarte, *Numerical Methods in Finance: A MatLab-Based Introduction*, second edition, John Wiley & Sons, 2006.

Other References:

1. Paul Glasserman, *Monte Carlo Methods in Financial Engineering*, Springer-Verlag, 2004.
2. Peter Jackel, *Monte Carlo Methods in Finance*, John Wiley & Sons, 2002.
3. Yves Achdou and Olivier Pironneau, *Computational Methods for Option Pricing*, SIAM, 2005.
4. Daniel J. Duffy, *Finite Difference Methods in Financial Engineering*, John Wiley & Sons, 2002.
5. Domingo A. Tavella, *Quantitative Methods in Derivatives Pricing: An Introduction to Computational Finance*, John Wiley & Sons, 2002.
6. Domingo A. Tavella and Curt Randall, *Pricing Financial Instruments: the Finite Difference Method*, John Wiley & Sons, 2000.
7. Paul Wilmott, Sam Howison and Jeff Dewynne, *The Mathematics of Financial Derivatives: A Student Introduction*, Cambridge University Press, 1995.
8. Desmond J. Higham, *An Introduction to Financial Option Valuation*, Cambridge University Press, 2004.
9. Michael T. Heath, *Scientific Computing: An Introductory Survey*, 2nd edition, McGraw Hill, 2002.

10. W. H. Press, S. A. Teukolsky, W. T. Vetterling and B. P. Flannery, *Numerical Recipes*, Cambridge University Press, (many different versions).
11. K. Atkinson, *Elementary Numerical Analysis*, John Wiley & Sons, 2nd edition, 1993.
12. R. L. Burden and J. D. Faires, *Numerical Analysis*, 7th edition, Brooks/Cole, 2001.
13. S. D. Conte and Carl de Boor, *Elementary Numerical Analysis: An Algorithmic Approach*, 3rd edition, McGraw Hill, 1980.
14. G. Dahlquist and A. Bjorck, *Numerical Methods*, Prentice Hall, 1974.
15. G. E. Forsythe, M. A. Malcolm and C. B. Moler, *Computer Methods for Mathematical Computations*, Prentice Hall, 1977.
16. D. Kincaid and W. Cheney, *Numerical Analysis: Mathematics of Scientific Computing*, Brooks/Cole, 1996.
17. J. Stoer and R. Bulirsch, *Introduction to Numerical Analysis*, Springer-Verlag, 1993.
18. Arieh Iserles, *A First Course in the Numerical Analysis of Differential Equations*, Cambridge University Press, second edition, 2009.

Grading:

1. Term assignments: 30%.
2. Midterm Test: 30%.
3. Final Exam: 40%.

Plagiarism: Please read

<http://www.cs.toronto.edu/~fpitt/documents/plagiarism.html>

<http://www.cs.toronto.edu/~clarke/acoffences/>