

## **NUMERICAL METHODS FOR FINANCE**

### TOPICS OF THE COURSE:

- The MATLAB environment
- Basic issues in numerical computing: finite precision arithmetic; rounding and truncation errors; numerical stability.
- Systems of linear equations (direct and iterative methods); nonlinear equations; interpolation; numerical integration.
- Finite difference methods for parabolic PDEs.
- Application of finite differences to option pricing.
- Monte Carlo simulation (generating random numbers and random variates; determining the number of replications; variance reduction techniques).
- Low discrepancy sequences and quasi-Monte Carlo integration.
- Option pricing by Monte Carlo methods.

### READING LIST:

- P. Brandimarte. "Numerical Methods in Finance and Economics: a MATLAB based Introduction (2nd edition)". Wiley, 2005.
- P. Glasserman. "Monte Carlo Methods in Financial Engineering". Springer- Verlag, 2003.
- D.J. Higham. "An Algorithmic Introduction to Numerical Simulation of Stochastic Differential Equations". SIAM Review, Vol. 43, 2001, pp. 525-546.
- D.J. Higham. "Nine Ways to Implement the Binomial Method for Option Valuation in MATLAB". SIAM Review, Vol. 44, 2002, pp. 661-677.
- J.C. Hull. "Options, Futures, and other Derivatives" (5th ed.). Prentice-Hall, 2002.
- L. Clewlow, C. Strickland. "Implementing Derivatives Models". Wiley, 1999.
- M.J. Miranda, P.L. Fackler. "Applied Computational Economics and Finance". MIT Press, 2002.