

# Numerical Methods in Finance (FE531)

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**2nd Fall, 2014**

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**Office Hour :** Thur. 2-3:30 PM

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## 1. Required Text

No required book

## 2. Recommended Text

Wilmot Paul, Jeff Dewynne, and Sam Howison, Option Pricing: Mathematical models and computation, 1993, Oxford Financial Press

Shreve E. Steven, Stochastic Calculus for finance II, Continuous-Time Models, 2005, Springer.

Brandimarte Paolo, Numerical Methods in Finance and Economics, 2006, John Wiley and Sons, Inc.

## 3. Course Description

The objective of this course is to provide an introduction to the numerical solution of partial differential

equations (PDEs) which are often encountered in pricing financial derivatives. Two basic approaches have been used in financial economics literature to solve PDEs, i) numerical integration and ii) finite difference methods (FDM). We will only look at the more widely used FMD. Also tree methods, simple application of FDM, will be covered too.

#### 4. Grade Composition

One exam will be held at the end of module. The grade of the course will be determined according to the following tentative weighting scheme.

- Exam	40%
- Homework	50%
- Class participation	10%

#### 5. Homeworks

The homework is to be done in groups of two to four students. You are responsible for forming your own groups. About three homework will be given in class.

#### 5. Tentative Course Schedule

Class	Lecture	reference
10/28	Introduction	Brandimarte – 3.1
10/30	Solving systems of linear equations	Brandimarte – 3.2
11/4	Convergence	Brandimarte – 3.2
11/6	Approximation and Interpolation	Brandimarte – 3.3
11/11	Solving nonlinear equations	Brandimarte – 3.4
11/13	Numerical integration	Brandimarte – 4.1
11/18	Partial Differential Equations and Feynman-Kac Theorem	Hand-out
11/20	PDE and ordinary differential equations	Hand-out

11/25	Finite difference methods(FDM)	WDH – chapter 17
11/27	Solving ordinary differential equations	Hand-out
12/2	Explicit FDM	WDH – chapter 18
12/4	No class	
12/9	Implicit FDM	WDH – chapter 19
12/11	FDM for exotic options	WDH – chapter 22
Last week	Final exam	