



1. Syllabus

2DF40 study guide – 2017-2018

This is an introductory course in financial math; we start by introducing the concept of pricing of financial derivatives by the so-called no-arbitrage arguments. We first explain the fundamental underlying economic ideas by considering the basic example of the pricing of a forward contract. Then, we introduce the concept of tactical asset allocation of capital over the various asset classes (stock, bonds, commodities, real estate, currency). We discuss the classical ideas about the trade-off between risk and return, and the famous model of the Nobel laureate Markowitz. After that, we consider the pricing problem in more detail for two fundamental models in stochastic finance: the binomial tree model and the Black-Scholes model. Among other things, we derive the celebrated Black-Scholes formula for the price of European call and put options. The course is designed to help you master this material. The homework and the assignments should help you towards this goal. To this purpose, the course material is divided into theory and exercises/instructions.

Responsible lecturer:

Dr. Stella Kapodistria	
Department of Mathematics and Computer Science	email: s.kapodistria@tue.nl
Eindhoven University of Technology	tel: (+31) 40 247 5825
P.O. Box 513	fax: (+31) 40 243 6685
5600 MB Eindhoven	
The Netherlands	office: MF 4.071b
Office hours: Tuesday 12:30–13:30 (weeks 6, 8–9, 11–14)	

Co-lecturer:

Dr. Robert Fitzner	
Department of Mathematics and Computer Science	email: r.j.fitzner@tue.nl
Eindhoven University of Technology	tel: (+31) 40 247 2250
P.O. Box 513	fax: (+31) 40 243 6685
5600 MB Eindhoven	
The Netherlands	office: MF 4.070

Course material:

1. "Investment Science", written by David G. Luenberger. There is no difference between the 1998 (green hardcover) and the 2010 edition (red paperback).
2. Slides/Notes will be distributed in CANVAS.
3. Short solutions to the exercises will be distributed in CANVAS.

Tentative class schedule (will be submitted to changes and will be updated weekly):

We tried (for your convenience) to separate the course to fixed hours of instructions and fixed hours of theory. However, in practice all contact hours might include both theory and exercises (i.e., during "theory hours" we might perform software demonstrations, or during "instruction hours" we might explicitly solve questions on exercises you have problems with, or go deeper into theory, or solve properly an exercise on the board, have expert guest lecturers, etc.). We will also try each time to make sure than not more than 2 hours (out of the 4) have theory and that you also have the time to work on your own. The schedule below is only a draft to be updated every week once the course starts.

Lecture 1: Chapter 2

Exercises from the book Chapter 2: 1-9,12 + Exercises in notes

Lecture 2: Chapter 3 + mortgages

Exercises from the book Chapter 3:1-5,7,9-14 + Exercises in notes

Lecture 3: Chapter 4

Exercises from the book Chapter 4: 1-3, 5-9, 11-15 + Exercises in notes

Assignment 1 – Deadline March 2, 2018, at 23:59**Lecture 4:** Chapter 6 Sections 1-6

Exercises from the book Chapter 6: 1-10 + Exercises in notes

Lecture 5: Chapter 6 Sections 7-9, Chapter 7 Sections 1-5

Exercises from the book Chapter 7: 1-5 + Exercises in notes

Lecture 6: Chapter 7 Sections 6-7, Chapter 8 Sections 5-6

Exercises from the book Chapter 7: 6-9 + Exercises from the book Chapter 8: 1, 2, 4-5 + Exercises in notes

Assignment 2 – Deadline March 16, 2018, at 23:59**Lecture 7:** Recap**Lecture 8:** Chapter 11 Sections 1-8

Exercises from the book Chapter 11: 1-6, 9 + Exercises in notes

Lecture 9: Chapter 12 Sections 1-6

Exercises from the book Chapter 12: 3, 4, 6, 7 + Exercises in notes

Lecture 10: Chapter 13 Sections 1-3, 5

Exercises from the book Chapter 12: 1-2, 10 + Exercises from the book chapter 13: 1-3, 5-7
+ Exercises in notes

Lecture 11: Recap

Assignment 3 – Deadline April 6, 2018, at 23:59

Lecture 12: Trading options & implied volatility

Exercises in notes

Lecture 13: The Greeks & hedging

Exercises in notes

Lecture 14: Dividends, trinomial model, time dependent parameters, credit risk

Exercises in notes

Lecture 15: Cancelled

Lecture 16: Old exams and Q&A

Exams & Grading:

Final exam: April 10, 2018, 09:00–12:00.

Material from the book: Ch2, Ch3, Ch4:1-9, Ch6, Ch7:1-7, CH8:5-6, CH11: 1-8, CH12:
1-6, CH13: 1-5, 8.

Plus the material treated in classroom: slides + notes

Resit exam: July 3, 2018, 18:00–21:00.

For this course, we will give you three assignments. These assignments will require implementation of some of the notions and models discussed during the course. The assignments can be made in groups of three, and it is also required to handle in a report. The assignments will count for 30% of the final grade. There will be also a final exam that counts for 70% of the final grade. All rules of the Bachelor College are applicable: a minimum of 5 out of 10 at the final exam is needed to pass the course.

The exams have an open book policy. Namely, you may use the following sources:

1. The book (new or old edition or printout in case you have an electronic version) without any notes (i.e., no solved exercises on the empty pages or glued pages with solutions are not accepted.).
2. A printed version of the slides without any notes nor extra material (i.e., no solved exercises on the empty pages or glued pages with solutions are not accepted.). For convenience and control we will provide you with a single pdf file of the slides.
3. A simple pocket calculator.
4. Statistical compendium.
5. One-sided A4 page with hand written notes.

Anything else (notes, exercise solutions, old exams & their solutions, solutions of homework/assignments, etc) is NOT allowed. The proctors will control during the examination that you have complied with

these regulations. Any irregularities noticed at the end of the examination could result to your disqualification.

Useful tips:

- For this class, you need basic probability, basic calculus, basic algebraic computational skills, such as solving equations, inequalities, first degree linear differential equations, power series, limits and continuity, etc. We will briefly revise these notions when needed.
- Slides and brief solutions to the exercises are available online. The slides will be uploaded before the lectures, while the solutions will be posted with a delay on Canvas, so as to help people who wish to see the solutions after they have tried to solve the exercises on their own.
- All announcements will be posted on Canvas.
- Students are expected to:
 - contribute to a positive, respectful, and engaged academic environment inside and outside the classroom;
 - appear regularly for class meetings in a timely fashion;
 - appear at a mutually convenient appointment for official matters of academic concern;
 - full attendance at examination, midterms, presentations, with the exception of formal pre-approved excused absences or emergency situations;
 - be prepared for class, appearing with appropriate materials and having completed assigned readings and homework;
 - full engagement within the classroom, including meaningful focus during lectures, appropriate and relevant questions, and class participation;
 - act with integrity and to adhere to the formal university policies (read: no cheating!).