

General information

INSTRUCTOR:	Carole Bernard	MC6112 - ext 35505 - email: c3bernar@uwaterloo.ca
	OFFICE HOURS:	Tuesday 2:30-3:30
TA	Chengguo Weng	email: c2weng@math, office: MC 6149, ext: 36009
	OFFICE HOURS:	Will be posted on Angel or by appointment.
LECTURES:	MC4041,	TTh 10:00am-11:20pm

Course description

This course is a graduate course in mathematical finance. It is an advanced course to the modelling of financial markets, a field known as financial engineering, mathematical finance, quantitative finance, financial mathematics, etc. A first part of the course is dedicated to the pricing and hedging of exotic financial derivatives. The second part deals with stochastic interest rates and term structure modeling. We introduce the economic principles that underline the main term structure models. We will examine both no-arbitrage and equilibrium approach of the term structure modeling. We will then show how to implement them in practice and proceed with pricing and hedging financial derivatives in the presence of stochastic interest rates. The last part of the course will be an introduction to the modelling of behaviors, the measurement of performance and the valuation of stock options.

Tentative outline

- Part I: Pricing and hedging of exotic financial derivatives in Black and Scholes framework.
 - Part II: Stochastic interest rates - Implementation of term structure models
- Change of Numeraire - Pricing and hedging with stochastic interest rates.
 - Part III: Behavioral finance and performance measurement
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References

BJORK, *Arbitrage Theory in Continuous Time*, 2nd edition.
DANA AND JEANBLANC, *Financial Market in Continuous Time*, Springer.
FABOZZI *The Handbook of Fixed Income Securities*, sixth edition published by McGraw Hill
HULL, *Options, Futures and Other Derivatives*, sixth or seventh edition, Prentice-Hall
MCDONALD, *Derivatives Markets*, second edition, Addison-Wesley, 2006

Evaluation

1 Midterm in class on Part I:	25% – on February 12th
First Project (due date: 26th of February) :	25%
Final Project (due date: 13th of April):	50%
Oral presentation on the 14th of April.	

Both projects will be prepared by group of 3 to 5 students. For the first project, you may choose your group. For the final project, groups may be imposed.

There will be two types of assignments:

- Some practice questions to be prepared for the lectures. You could work on these questions with friends or with the TA. They will be solved in class and one of you (picked randomly) may have to present a solution. No grade will be assigned. If you are not sure of your method (different from the one presented in class), you may hand your assignment in. It will be corrected but not graded.
- About 4 research challenges will be posted during the term. None of them will be compulsory. If you complete some of them, you may hand them in and receive some bonus marks, up to 10% throughout the term. However these assignments are not standard assignments: They are research questions. There exists no unique solution and no solution will be posted online. They must be prepared *individually* and you will not be penalized if you do not prepare them.