

Syllabus Lecture on « Stochastic Control and applications »

This lecture is motivated by the conviction that stochastic control methods should be part of the set of technical tools available to financial economists to study modern corporate finance. This course requires a taste for mathematical rigor and asks for skills in probability theory.

It will be divided in two parts: an introduction to stochastic calculus taught by Fabien Gensbittel and a stochastic control part taught by Stéphane Villeneuve.

Contents

- Mathematical Preliminaries: Brownian motion and continuous martingales, Itô's calculus and stochastic integral.
- Examples of Stochastic Optimization problems: Portfolio Allocation, Optimal Investment timing, Optimal liquidity Management
- Solving Problems: Dynamic Programming and HJB equations.
- A primer on dynamic Moral Hazard.

References

Mathematics:

- Karatzas and Shreve: Brownian Motion and Stochastic Calculus (Graduate Texts in Mathematics), Springer.
- Oksendal: Stochastic Differential Equations: An Introduction with Applications, Springer
- Pham: Continuous-time Stochastic Control and Optimization with Financial Applications (Stochastic Modelling and Applied Probability), Springer

Economics:

- Stockey and Lucas: Recursive Methods in Economics Dynamics, Harvard University Press
- Moreno-Bromberg and Rochet: Continuous-Time Models in Corporate Finance: A User's Guide, Princeton University Press.
- Dixit and Pyndick: Investment under uncertainty, Princeton University Press.