Summary
This course gives an introduction to the valuation of interest rate securities with and without credit risk, the management and hedging of bond portfolios and the valuation and usage of interest rate and credit derivatives.

Content
Topics include:
• Introduction to interest rate and credit markets
• Estimating the term structure
• Short rate models
• Heath-Jarrow-Morton (HJM) framework
• Forward measures
• Forwards and futures
• Structural credit risk models
• Reduced-form credit risk models
• Credit default swaps (CDS)

Keywords
interest rate risk, credit risk, term structure, bonds, interest rate swaps, caps and floors, short rate models, HJM models, bankruptcy, ratings, CDS, structural models, reduced-form models

Learning Prerequisites
Required courses
• Derivatives
• Econometrics
• Introduction to finance
• Stochastic calculus

Learning Outcomes
By the end of the course, the student must be able to:
• Describe the various notions of interest rates and related basic products
• Apply the basic tools duration and convexity for interest rate risk management
• Derive an estimated term structure from market data
• Reconstruct the implied volatility surface for caps, floors, and swaptions from market data
• Implement some basic stochastic interest rate models, including the Vasicek and CIR short rate models
• Apply the industry standard Black and Bachelier models for pricing and quoting caps, floors, and swaptions
• Differentiate between structural and reduced-form models
• Assess / Evaluate Credit Default Swaps (CDS)

Transversal skills
• Use a work methodology appropriate to the task.

Teaching methods
Lectures, exercises, homework

Expected student activities
attendance at lectures, completing exercises

Assessment methods
• 20% Homework assignments
• 30% Midterm examination
• 50% Final examination

Supervision
Office hours No
Assistants Yes
Forum No

Resources
Virtual desktop infrastructure (VDI)
No

Bibliography

Ressources en bibliothèque
• Interest Rate Modeling / Andersen
• Interest rate models: Theory and practice / Brigo
• Term-Structure Models / Filipovic
• Credit Risk Modeling: Theory and Applications / Lando