Summary
In this course we will introduce and study numerical integrators for stochastic differential equations. These numerical methods are important for many applications.

Content
Introduction to stochastic processes
Ito calculus and stochastic differential equations
Numerical methods for stochastic differential equations (strong and weak convergence, stability, etc.)
Stochastic simulations and multi-level Monte-Carlo methods

Learning Prerequisites
Recommended courses
Numerical Analysis, Advanced probability

Learning Outcomes
By the end of the course, the student must be able to:
• Analyze the convergence and the stability properties of stochastic numerical methods
• Implement numerical methods for solving stochastic differential equations
• Identify and understand the mathematical modeling of stochastic processes
• Manipulate Ito calculus to be able to perform computation with stochastic differential equations
• Choose an appropriate numerical method to solve stochastic differential equations

Teaching methods
Ex cathedra lecture, exercises in classroom

Assessment methods
Written examination (in case of failure the second exam will be an oral examination).
Dans le cas de l’art. 3 al. 5 du Règlement de section, l’enseignant décide de la forme de l’examen qu’il communique aux étudiants concernés.

Supervision
Resources

Ressources en bibliothèque

- An Introduction to Stochastic Differential Equations / Evans
- Numerical Solution of Stochastic Differential Equations / Kloeden
- Stochastic Numerics for Mathematical Physics / Milstein

Notes/Handbook


Websites

- http://anmc.epfl.ch