**Numerical integration of stochastic differential equations**

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### 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
- Itô 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 Itô 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
Office hours: Yes
Assistants: Yes
Forum: No

Resources

Ressources en bibliothèque

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

Notes/Handbook


Websites

- http://anmc.epfl.ch