EPFL

MATH-560 **Stochastic epidemic models**

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Cursus	Sem.	Type
Ing.-math	MA1, MA3	Opt.
Mathématicien	MA1, MA3	Opt.

Language of teaching	English
Credits	5
Session	Winter
Semester	Fall
Exam	Written
Workload	150h
Weeks	14
Hours	**4 weekly**
Lecture	2 weekly
Exercises	2 weekly
Number of positions	

Summary

This course is an introduction to some classical models of epidemics involving random mechanisms.

Content

1. **Basics on Branching processes and Poisson process**
2. **Stochastic compartment model:** basic reproduction number, probability of a major outbreak, final size of the epidemic, vaccination
3. **Markovian compartment models:** functional law of large numbers and central limit theorem, diffusion approximation
4. **(Non-markovian) closed models:** final size of the epidemic, duration of the epidemic
5. **Epidemic models with two levels of mixing:** probability of a major outbreak, final size of the epidemic

Keywords

Stochastic epidemic, basic reproduction number, branching processes, limit theorems

Learning Prerequisites

Required courses

MATH-330 : Martingales et mouvement Brownien
MATH-332 : Stochastic processes
MATH-432 : Probability theory

Important concepts to start the course

Students are expected to be familiar â## at least able to catch up quickly â## with (discrete) martingales, Markov chains and convergence of random variables. Recalls will be made during the first lectures and exercise sessions.

Teaching methods

Lectures followed by exercise sessions

Assessment methods

Written

Resources

Bibliography

Stochastic Epidemic Models with Inference â## Tom Britton and Etienne Pardoux
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Ressources en bibliothèque

- Stochastic Epidemic Models with Inference / Britton & Pardoux