

MATH-519

Topics in probability

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

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

Remark

pas donné en 2022-23

Summary

This year we will be looking into probabilistic study of some models of mathematical physics.

Content

We will consider some probabilistic models of mathematical physics and try to understand them as deeply as we can. The prime example will be the lattice Yang-Mills model, but we will have to also look at other models like the Ising model or Brownian motion to develop some tools.

Keywords

High-dimensional probability, concentration of measure, Gaussian processes, phase transitions, universality

Learning Prerequisites**Required courses**

Mathematics Bachelor's level knowledge of analysis, linear algebra and probability.

Recommended courses

Knowledge of basic measure theory will simplify your life a lot. Interest in mathematical physics, combinatorics and geometry is of use.

Important concepts to start the course

Probability space, random variable and random vector, expectation, Gaussian random variables.

Teaching methods

Lectures, exercise classes. Maybe on some topics we also try a flipped format, where you can give a presentation.

Assessment methods

Most likely an oral exam, but in case of presentations, these would also count towards the final grade.

Resources**Bibliography**

Will be discussed in class

Notes/Handbook

There might be partial notes, though the book is excellent.

Moodle Link

- <https://go.epfl.ch/MATH-519>