MATH-432 **Probability theory**

Junnila Janne Matias

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**
Courses	2 weekly
Exercises	2 weekly
Number of positions	

Summary

The course provides a measure-theoretic introduction to probability theory.

Content

- probability measures, random variables and expectation
- convergence in law, probability, L^p and almost surely
- concentration inequalities
- Borel-Cantelli lemmas, Kolmogorov 0-1 law
- weak and strong laws of large numbers
- characteristic functions
- central limit theorem
- various examples

Learning Prerequisites

Required courses

Analyse I/II/IV, Probabilités

Recommended courses

Measure and Integration

Learning Outcomes

By the end of the course, the student must be able to:

- Apply Borel-Cantelli lemmas and Kolmogorov 0-1 law to study tail events
- Apply characteristic functions to study probability distributions
- Analyze distributions of random variables using concentration inequalities
- Prove simple convergence results for sequences of random variables

Teaching methods

Lectures and exercise classes.

Assessment methods

Written exam.
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	No
Assistants	Yes
Forum	No

Resources

Bibliography

R. Durrett. *Probability: theory and examples*.

Ressources en bibliothèque

- Probability: Theory and Examples / Durret

Prerequisite for

Probabilities, Stochastic process