

# MMAT 5340 - Probability and Stochastic Analysis

# Course Description

**Course Description:** This course is designed for the M.Sc. Programme in Mathematics. This course focusses on the rigorous foundation in probability, martingale and Markov chains theory with applications in different areas. No prior knowledge of measure theory is assumed.

**Course prerequisite:** Most fundamental: advanced calculus, linear algebra, basic probability theory.

**Grade policies:**

- Homework: 10%;
- Mid-Exam: 25%;
- Final Exam: 65%.

## *Probability theory review*

- Basic probability theory review
- Conditional expectation

## *Martingale*

- Definition of martingale
- Optional stopping theorem
- Convergence of martingale

## *Markov chain*

- Definition of the Markov chain
- Transience and recurrence
- Invariant measure, ergodicity

PETER OLOFSSON, MIKAEL ANDERSSON, *Probability, Statistics, and Stochastic Processes*, Wiley, 2012, 2nd Edition.

LECTURE NOTES BY GORDAN ŽITKOVIĆ,

- *Introduction to Stochastic Processes - Lecture Notes (with 33 illustrations).*
- *Discrete Martingales.*

*The lecture notes will be provided progressively.*