



**LUND**  
UNIVERSITY

Faculty of Science

## **MATM30, Mathematics: Mathematical Foundations of Probability, 7.5 credits**

*Matematik: Sannolikheteorins matematiska grunder, 7,5 högskolepoäng*

Second Cycle / Avancerad nivå

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### **Details of approval**

The syllabus was approved by Study programmes board, Faculty of Science on 2018-02-12 to be valid from 2018-02-12, autumn semester 2018.

### **General Information**

The course is an elective course for second-cycle studies for a Master of Science in Mathematics or in Mathematical statistics.

*Language of instruction:* English

*Main field of studies*

Mathematical Statistics

Mathematics

*Depth of study relative to the degree requirements*

A1N, Second cycle, has only first-cycle course/s as entry requirements

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### **Learning outcomes**

The aim of the course is that students on completion shall have acquired the following knowledge and skills:

#### **Knowledge and understanding**

On completion of the course, the students shall be able to:

- explain the measure theoretic approach to probabilities and random variables;
- explain the construction of the Lebesgue-integral and the fundamental convergence theorem for this integral;
- explain how the concepts conditional expectation and weak convergence can be formalized through measure theory.

## Competence and skills

On completion of the course, the students shall be able to:

- use the fundamental theorems in integration theory to solve problems;
- choose an appropriate solution strategy for a problem within the course's range, and thereafter work out a detailed solution.

## Course content

The course deepens and extends basic knowledge in probability theory. A central part of the course is existence and uniqueness theorems about measures defined on sigma-algebras, integration theory, conditional expectation and weak convergence in metric spaces.

## Course design

Teaching consists of lectures and exercises which to a large extent depend on the active participation of the students. For this reason the students should be prepared to participate in discussions and problem solving.

## Assessment

The examination consists of an oral exam comprising both theoretical questions and problem solving. Students who fail the regular exam are offered a re-examination shortly afterwards.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

*Subcourses that are part of this course can be found in an appendix at the end of this document.*

## Grades

Marking scale: Fail, Pass, Pass with distinction.

To obtain the grade Pass it is required that the student displays good knowledge of the definitions and theorems treated in the course and is able to solve problems. To obtain the grade Pass with distinction it is required in addition that the student is able to prove the theorems that are part of the course.

## Entry requirements

For admission to the course, knowledge equivalent to English B/6 and 75 credits in mathematics and mathematical statistics are required.

## Subcourses in MATM30, Mathematics: Mathematical Foundations of Probability

Applies from V19

1901 Oral Examination, 7,5 hp  
Grading scale: Fail, Pass, Pass with distinction