



# GÖTEBORG UNIVERSITY

Faculty Board of Science

## **MSF400 Martingale Theory**

### **7.5 higher education credits**

#### *Second Cycle*

This syllabus is a binding document.

#### **1. Confirmation**

The syllabus was confirmed by the Department of Mathematical Sciences on June 1, 2009 to be valid from July 1, 2009.

Field of education: Science. Responsible department: Mathematical Sciences.

#### **2. Position in the educational system**

The course MSF400, 7.5 higher education credits, is one of several single subject courses included in the two-year Masters Program in Mathematical Sciences. The course is also open for eligible students outside the program. It is further one of the courses in the post-graduate program in Mathematical statistics.

#### **3. Entrance qualifications**

The prerequisite for the course MSF400 is the equivalent of the course MSF300 Probabilities and Expectations.

#### **4. Course content**

The course is intended for students of the second year of master studies. Its purpose is to provide knowledge of the basic results in martingale theory and an insight into its many applications, and prepare for graduate studies. Main topics of the course:

- conditional expectation,
- Doob's optional-stopping theorem,
- convergence of martingales,
- Kolmogorov's strong law of large numbers,

- uniform integrability,
- discrete Black-Scholes formula.

## **5. Learning outcomes**

After completing the course, the student will be able to explain and apply the concepts and theorems mentioned in the course content above.

## **6. Required reading**

David Williams, Probability with Martingales, Cambridge University Press, Chapters 0, 9-15 and relevant parts of the appendices.

## **7. Assessment**

An examination will be given at the end of the course. A student who has failed a test twice has the right to change examiner, unless weighty arguments can be invoked. For this, the student must send a written request to the board of the department.

Each student shall give at least one oral presentation of an assigned topic.

## **8. Grading scale**

The grades are Fail (U), Pass (G), and Pass with Distinction (VG).

Students who are contractually entitled to ECTS grades should inform the examiner about this no later than one week after the start of the course.

Students without such entitlement will not be awarded ECTS grades. Grades will be converted into ECTS terminology according to a standard model approved by the University President.

## **9. Course evaluation**

Oral and/or written course evaluation will be performed. The results of the evaluation will be communicated to the students and will serve as a guide for the development of the course.

## **10. Additional information**

The language of instruction is English unless all involved are Swedish speakers.