

**MSA360, STOCHASTIC CALCULUS, PART II, 7.5 credit points**

*Level: advanced*

---

**1. Authorisation.**

The course plan has been authorised by the vice-dean of the Department of Mathematical Sciences on November 9, 2006, to be valid from July 1, 2007.

*Educational field:* Mathematical Sciences

**2. Educational context.**

The course is part of the Master Program in Mathematical Sciences and is also open for students outside the program who meet the course prerequisites. In addition, the course is intended to be suitable for graduate students in applied mathematical sciences as well as from other fields in science.

**3. Prerequisites.**

MSA350 Stochastic Calculus Part I, or the course MMA710 Financial Derivatives and Stochastic Analysis.

**4. Goals and learning outcomes.**

With MSA350 Stochastic Calculus Part I as a foundation, the course gives a significantly deepened knowledge about stochastic calculus. This deeper knowledge should be sufficient for all sorts of applications, even at a research level. At the same time, it serves as a basis for continued studies and theoretical development of the subject of stochastic calculus itself, as well as stochastic processes in general, in more theoretical research.

**5. Course description.**

Deepened studies of stochastic calculus, including diffusion processes, martingales, semimartingales, Markov processes, and changes of probability measure (Girsanov transformation). A quite thorough treatment of applications in engineering, mathematical finance, and natural sciences, including modeling issues and modeling skills.

**6. Literature.**

Fima C. Klebaner (2005). *Introduction to Stochastic Calculus with Applications, 2nd Edition*. Imperial College Press, London, Chapters 6-10 together with elements of Chapters 11-14. Hand-outs on applications.

**7. Assessment.**

Six home assignments that can be carried out individually or in groups of two students.

**8. Grades.**

The grade levels are Fail (U), Pass (G), and High Pass (VG). A wish for an ECTS grade should be reported to the examiner at the beginning of the course.

**9. Course evaluation.**

During the course the teachers arrange one or two get-togethers with the students, in order to get feedback on the results so far. At the end of the course the students will be asked to answer a questionnaire, the results of which will be processed by the teachers together with student representatives.

**10. Additional information.**

The course is given in English. Up on request to the examiner, the six home assignments can be replaced with a single larger individually designed project. There will be one or more guest lectures on applications.