University of St.Gallen

Course and Examination Fact Sheet: Spring Semester 2019

4,252: Stochastic Methods in Finance

ECTS credits: 3

Overview examination/s

(binding regulations see below)
Decentral - Oral examination (individual) (100%, 20 mins.)

Attached courses

Timetable -- Language -- Lecturer
4,252,1.00 Stochastic Methods in Finance -- Englisch -- Ortega Juan-Pablo

Course information

Course prerequisites

Some previous exposure to probability and statistics will help in the learning process. The course is nevertheless fully self contained.

Course content

The course introduces the fundamental stochastic tools for derivative asset pricing and portfolio theory.

The ability to price and hedge derivative products and to properly manage asset portfolios is of paramount importance in the financial industry. The existing techniques to carry this out require a good command of the concepts in stochastic calculus that will be presented in this course.

Qualifications associated to the course:

The material that will be presented is the first step that needs to be taken by any student interested in quantitative finance. This course is a good educational block both for future practitioners in the financial industry and also for those who want to pursuit further studies in the applications of stochastic methods in finance and in financial econometrics.

Methods applied in the course:

The two main mathematical methods used in this course are probability theory and stochastic calculus. These tools allow for a mathematically rigorous formulation of the hypotheses underlying the no-arbitrage approach to asset pricing and that yield explicit quantitative results that can be easily used in practice.

Learning goals of the course:

After this course, the student will be familiar with...

... the basics of probability theory and stochastic calculus**...**no-arbitrage pricing techniques**...**elementary portfolio optimization techniques.

Course structure

1. Probability Theory

- Introduction

- Distribution functions

- Normal distribution

- Multivariate normal distribution

- Lognormal distribution

- Binomial distribution

2. Pricing and No-arbitrage

- Binomial model

- Fundamental asset pricing theorem

3. Ito's lemma and Stochastic Integrals

- Random walk and Brownian motion

- Ito processes and Ito lemma

- Derivative pricing

- Partial differential equations

- Stochastic differential equations

4. Risk Neutral Valuation

- Discrete model

- Lognormal model

- Extensions

5. Markowitz Portfolio Theory

- Markowitz approach

- Asset liability approach

- Shortfall constraint

6. Arbitrage Pricing Theory Model

- Discussion of the model

- Mathematics properties of the model

7. Portfolio Theory in Continuous Time

- Definition

- Extensions

Course literature

Lamberton, D. and Lapeyre, B. "Introduction to stochastic calculus applied to finance". Chapman and Hall/CRC, 2008.
Neftci, S. N. "An Introduction to the Mathematics of Financial Derivatives". Academic Press, 2000.Watsham, T. J. and Parramore, K. "Quantitative Methods in Finance". International. Thomson Business Press, 1997.

Additional course information

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Examination information

University of St.Gallen

Examination sub part/s

1. Examination sub part (1/1)

Examination time and form
Decentral - Oral examination (individual) (100%, 20 mins.)

Remark
20 minutes

Examination-aid rule
Extended Closed Book
The use of aids is limited; any additional aids permitted are exhaustively listed under "Supplementary aids". Basically, the following is applicable:

- At such examinations, all the pocket calculators of the Texas Instruments TI-30 series and mono- or bilingual dictionaries (no subject-specific dictionaries) without hand-written notes are admissible. Any other pocket calculator models and any electronic dictionaries are inadmissible.
- In addition, any type of communication, as well as any electronic devices that can be programmed and are capable of communication such as notebooks, tablets, PDAs, mobile telephones and others, are inadmissible.
- Students are themselves responsible for the procurement of examination aids.

Supplementary aids
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Examination languages
Question language: English
Answer language: English

Examination content
Contents presented in the lectures and reading assignments.

Examination relevant literature
Lecture slides and reading assignments.

Please note
We would like to point out to you that this fact sheet has absolute priority over other information such as StudyNet, faculty members' personal databases, information provided in lectures, etc.When will the fact sheets become binding?

- Information about courses and examination time (central/decentral and grading form): from the start of the bidding process on 24 January 2019
- Information about decentral examinations (examination-aid rule, examination content, examination relevant literature): after the 4th semester week on 18 March 2019
- Information about central examinations (examination-aid rule, examination content, examination relevant literature): from the start of the enrolment period for the examinations on 08 April 2019

Please look at the fact sheet once more after these deadlines have expired.