UNIVERSITY OF GOTHENBURG

GRADUATE SCHOOL

GM1048 Quantitative Finance, 7.5 credits

Kvantitativ finans, 7,5 högskolepoäng

Second Cycle

Confirmation

This course syllabus was confirmed by Graduate School on 2022-03-18 and was last revised on 2023-04-12 to be valid from 2023-08-28, autumn semester of 2023.

Field of education: Social Sciences 100%
Department: Graduate School

Position in the educational system

The course Quantitative Finance is a course within the Master of Science programmes at the Graduate School, School of Business, Economics and Law, University of Gothenburg.

Main field of studies	*Specialization*
Economics	A1F, Second cycle, has second-cycle course/s as entry requirements

Entry requirements

To be eligible for the course Quantitative Finance the participant must fulfil the entrance qualifications for the Master of Science programme in Finance or Economics. For programme specific entrance requirements, see programme syllabus.

The courses “Investments”, "Financial Econometrics" and “Derivatives securities”, or equivalent, as well as basic knowledge of Matlab are strongly recommended. It is taken for granted that students feel comfortable with standard mathematics such as integrals, derivatives, matrices, basic probability theory, densities, expectations etc.

Learning outcomes

After completion of the course, the student shall be able to:

1. show knowledge of the main concepts underlying modern asset pricing theory
2. evaluate the performance of asset pricing models and understand why different financial assets have different returns
3. show kowledge of the main concepts underlying the theory and practice of financial risk management
4. calculate risk measures such as Value-at-Risk (VaR) and Expected shortfall (ES) and implement solutions of realistic risk management problems
5. solve complex numerical problems and study various empirical questions using the computer software Matlab.

Course content

The course will be made up of two parts. The first part focuses on asset pricing. We try to understand what underlying factors determine the prices and returns of different financial assets. This part covers the following topics:

- Mean-Variance analysis and its extensions
- Factor pricing models (CAPM and various multifactor asset pricing models)
- Empirical performance of different asset pricing models.

The second part focuses on the basic concepts of financial risk management and covers the following topics:

- Understanding different sources of risk
- Measuring risks: Value-at-Risk (VaR) and Expected shortfall (ES)
- Different methods for computing VaR and ES (e.g., analytical approximations, Monte Carlo simulations)
- How to reduce risks: implementing solutions of realistic risk management problems.

Form of teaching

Forms of teaching include lectures and computer lab sessions. The goal of the computer lab sessions is that the students acquire the necessary knowledge to implement calculations related to the course content using the computer software Matlab. The course also relies on written assignments that require extensive group work

Language of instruction: English

Assessment

Learning outcomes 1 - 5 will be assessed through a written individual exam.

Learning outcomes 2, 4 and 5 will be assessed through written group assignments.

Exams shall be written individually, cooperation in formulating text, tables, figures etc. is not allowed.

A failed assignment can be supplemented to a Pass grade.

A student who has taken two exams in a course or part of a course without obtaining a pass grade is entitled to the nomination of another examiner. The student needs to contact the department for a new examiner, preferably in writing, and this should be approved by the department unless there are special reasons to the contrary (Chapter 6 Section 22 of the Higher Education Ordinance).

If a student has received a recommendation from the University of Gothenburg for special educational support, where it is compatible with the learning outcomes of the course and provided that no unreasonable resources are required, the examiner may decide to allow the student to sit an adjusted exam or alternative form of assessment.

In the event that a course has ceased or undergone major changes, students are to be guaranteed at least three examination sessions (including the ordinary examination session) over a period of at least one year, but no more than two years, after the course has ceased/been changed.

The number of examinations is limited to five.

Grades

The grading scale comprises: Excellent (A), Very good (B), Good (C), Satisfactory (D), Sufficient (E) and Fail (F).

Pass is required on both the exam and the total achievement on the assignments. The grade (A-E) corresponds to the total score a student obtains on the exam and the group assignments. To receive a pass grade (A-E) >= 50% points is required.

Course evaluation

The course will be evaluated upon completion. The results of and possible changes to the course will be shared with students who participated in the evaluation and students who are starting the course.