Master of Science in Finance and Investments – Program details – 1st semester

**Quantitative Methods** 7.5 ECTS, 33h lectures/exercises + supporting online lectures

**Contents:** This course develops the quantitative skills necessary for analysing problems related to finance and investments. The teaching method is case-oriented with walked-through problems and exercises in Excel and a suitable programming language. More detailed explanations of the necessary quantitative theory are available as online lectures. The topics of the course include differentiation and integration, optimization, linear algebra and linear systems of equations, non-linear equation solving, probability theory, Monte Carlo simulations, as well as estimation and inference in time series, cross section, and panel data models using least squares and maximum likelihood. All topics are explained within the context of concrete financial problems. The course further teaches students how to access databases to obtain financial data relevant for statistical analyses.

**Literature:** Alexander: Market Risk Analysis - Quantitative Methods in Finance vol. 1; 2008, Wiley (or similar).

**Exam:** 4h open-book pc-based exam. No external examiner.

**Corporate Finance** 7.5 ECTS, 33h lectures + 14h exercises

**Contents:** Analysing decisions of corporations regarding capital budgeting (investments), financing, and pay-out policies. The capital budgeting part includes issues related to risk-adjusted discount rates, taxes, leverage, and embedded options in investment opportunities. The financing part covers theories of how debt and equity are combined into an optimal capital structure without and with frictions, but also discusses practical issues in raising debt or equity capital. The potential conflicts of interest between management, owners, and creditors are also addressed. Other topics covered are mergers and acquisitions, corporate governance, and corporate risk management.

**Literature:** Berk and DeMarzo: Corporate Finance; Global 3rd ed., 2014, Pearson.

**Exam:** 4h open-book pc-based exam with external examiner.

**Investments** 7.5 ECTS, 33h lectures + 14h exercises

**Contents:** Covers financial markets and the investment process, risk and return, portfolio theory, mean-variance analysis including techniques for estimating inputs and consequences for practical implementations, simple strategies such as the 1/N strategy, index/factor models and consequences for portfolio choice, introduction to multi-period portfolio decisions, the Capital Asset Pricing Model in various forms, the Arbitrage Pricing Theory, market efficiency, behaviourial finance, investment performance evaluation, as well as the basics of fixed income (bonds, yields, duration, convexity, immunization) and derivatives (forwards, futures, options, hedging, binomial model). Excel is used throughout the course.

**Literature:** Bodie, Kane, and Marcus: Investments and Portfolio Management; Global 9th ed., 2011, McGraw-Hill (or similar). Supplementary lecture notes and maybe a few articles

**Exam:** 4h open-book pc-based exam. No external examiner.
Financial Statement Analysis  7.5 ECTS, 33h lectures + 14h exercises

Contents: The aim of the course is to enable the students to analyse a firm’s profitability, growth and risks, calculate and interpret financial ratios that describe a firm’s economic well-being and demonstrate the ability to value firms using different valuation techniques.


Master of Science in Finance and Investments – Program details – 2\textsuperscript{nd} semester

Empirical Finance  7.5 ECTS, 33h lectures + voluntary assignments

Contents: The course gives the student the ability to apply statistical methods in analysis of quantitative financial models. This involves deriving the empirical implications of a model and testing those using actual data. This provides the student a thorough understanding of financial data as well as the advantages and limits of financial models. Topics include, but are not limited to, efficient markets and asset return predictability, event studies, testing linear factor models CAPM/APT, measuring and managing risk, and nonlinear phenomena. The course includes two voluntary assignments to be solved in groups of 3-4 students. The lecturer offers feedback on the assignments. The assignments include programming (in R supplemented by Excel), working with real financial data, and writing a report.

Literature: The syllabus draws upon the following material:
- Lecture notes written by the lecturer.

Exam: 72 hour take-home exam solved in groups of 3-4 students resulting in a report of 15 pages per group, followed by an individual oral examination of 20 minutes duration. An external examiner participates both in the evaluation of the take-home and the oral exams.

Derivatives and Fixed Income  7.5 ECTS, 33h lectures + 14h exercises

Contents: Properties, applications, and pricing of forwards, futures, swaps, and options; option strategies; review and refinements of binomial models; introduction to Brownian motions; Black-Scholes model; Black 76 model for options on forwards/futures; the Greeks; volatility smiles; multinomial tree models of interest rates; continuous-time models of interest rates; pricing of interest rate derivatives; Value-at-Risk; pricing by Monte Carlo simulation

Literature: Hull: Options, Futures, and Other Derivatives; 8\textsuperscript{th} global ed., 2011, Pearson.

Financial Intermediation 7.5 ECTS, 33h lectures + mandatory assignments

Contents: The course covers many forms of financial intermediation, but the primary focus is on banks. The main topics – all of which are central to understanding the recent financial crisis - are: Types of financial intermediaries (banks, mortgage institutions, insurance companies, pension funds, and investment banks) and their composition of assets and liabilities. Measuring and managing credit risk, interest rate risk and liquidity risk. Off-balance sheet activities. Risk transfers using derivatives and securitization. Banks as liquidity providers. Bank runs and the role of deposit insurance. Bank regulation, including capital requirements, liquidity coverage ratios and net stable funding ratios. Capital requirements and the business cycle. Capital requirements and bank lending. The interaction of banks and central banks. The students are given two assignments during the course and have to hand in individual reports of 6 pages per assignment. The reports are evaluated by the teacher on a pass/fail basis. Each student has to pass two assignments in order to be allowed to participate in the final exam. If necessary, a third assignment is offered to students who did not pass the first two assignments.

Literature: The syllabus draws upon the following material:
- Lecture notes by David Lando
- Descriptions of the Danish mortgage system as provided for example by Nykredit.
- Annual reports of major banks

Exam: Mandatory assignments during the course (see above) and a final 4h open-book pc-based exam. No external examiner.

Business Project 7.5 ECTS, self-study under supervision + written report

Contents: The students work in groups of 3-4 students on a financial problem or topic relevant for the financial industry using the analytical skills acquired in the courses taken so far. Based on the analysis, the students write a report of at most 15 pages per student. CBS appoints an academic supervisor who can assist the group in the exact problem formulation, in the problem analysis, and in ensuring that the report lives up to academic standards. The problem can be formulated by a company in which case the report resembles a consulting report, researched and written by a team of junior consultants (students), but the analysis and report still have to meet academic standards. Alternatively the problem can be formulated by the students in corporation with the academic supervisor without involving a company. The business project provides the students with an in-depth knowledge on a specific financial topic and trains students in writing a report within a limited time period based on teamwork. The business project is written in the course of 5 weeks. The report is evaluated by the academic supervisor. If a company is involved in the project, the students must also prepare an executive summary for the company.
Master of Science in Finance and Investments – Program details – 3rd semester

Take 30 ECTS of electives. At CBS, this typically means 4 courses.
Possible to take courses outside CBS if they fit the topics and the level of the program.

Suggestions of elective courses at CBS (must be in English):
Advanced Corporate Finance (possible future PhD-level course)
Advanced Derivatives and Fixed Income
Asset Allocation (existing)
Advanced Asset Pricing (possible future PhD-level course)
Behavioural Economics and Finance (existing – econ)
Corporate Governance (existing)
Credit risk (merc-mat – Spring)
Energy Finance (existing – econ)
Hedge Fund Strategies (offered in earlier years)
Mergers and Acquisitions (offered in earlier years)
Venture Capital and Private Equity (existing)

Master of Science in Finance and Investments – Program details – 4th semester

The fourth semester of the program is devoted to the master thesis which has a weight of 30 ECTS points. Here the student is expected to apply some of the scientific theories and methods introduced in the courses to a specific financial problem. The problem must be of practical interest and must have a sufficient degree of complexity. The outcome of the analysis is documented by a written report followed by an oral defence. Students can write the thesis individually or in groups of two. The thesis should be approximately 80 pages long if written by one student and 120 pages long if written by two students. The thesis work is supervised by an academic advisor from the CBS and possibly an external advisor working with similar problems in real life.