



## Finance (MSc)

Vrije Universiteit Amsterdam - Fac. der Economische Wet. en Bedrijfsk. - M Finance - 2013-2014

The Master's programme in Finance is an intensive yet flexible programme which is geared towards corporate, institutional and governmental financial management, focusing on the functioning of international financial markets. After an advanced and comprehensive introduction to the various areas of finance, the student can specialise in his own field of interest, ranging from corporate financial management to quantitative asset management. After completion, the student will have developed into an academic financial specialist with a keen interest in financial economics, solid analytical skills, and a multidisciplinary outlook.

Read the full description of the programme or use the schedule below for information on the individual courses in the programme.

## Inhoudsopgave

ABRI Honours Programme	1
M Finance	1
M Finance - Quantitative Finance	1
M Finance - Quant. Fin. Electives A	1
M Finance - Quant. Fin. Electives B	2
M Finance - Quant. Fin. Obligatory	2
Vak: Adv Corporate Finance 4.1 (Periode 1)	3
Vak: Advanced Econometrics (Periode 1+2)	3
Vak: Advanced Financial Reporting (Periode 1)	5
Vak: Advanced Macroeconomics (Periode 2)	7
Vak: Asset Pricing (Periode 1)	7
Vak: Asymptotic Statistics (Periode 1+2)	9
Vak: Behavioral Corporate Finance (Periode 4)	9
Vak: Caput Operation Research (Periode 1)	10
Vak: Corporate Governance, Risk Management and Control (Periode 5)	11
Vak: Corporate Law (Periode 4)	13
Vak: Data Mining Techniques (Periode 5)	14
Vak: Derivatives (Periode 2)	15
Vak: Empirical Finance (Periode 2)	17
Vak: Empirical Research in Accounting (Periode 1)	19
Vak: Evolutionary Computing (Periode 1)	20
Vak: Financial Markets and Institutions (Periode 4)	21
Vak: Globalization, Growth and Development (Periode 4)	22
Vak: Institutional Investments and ALM for Finance (Periode 4)	23
Vak: Mathematical Systems and Control Theory (Periode 1+2)	25
Vak: Quantitative Financial Risk Management (Periode 5)	26
Vak: Real Estate Management (Periode 5)	27
Vak: Research Project Finance (Periode 3)	28
Vak: Simulation and Stochastic Systems (Periode 4)	29
Vak: Stochastic Optimization (Periode 1+2)	30
Vak: Stochastic Processes for Finance (Periode 1+2)	31
Vak: Strategic and Cooperative Decision Making (Periode 2)	33
Vak: Thesis (Ac. Jaar (september))	34
Vak: Thesis (Ac. Jaar (september))	34
Vak: Time Series Econometrics (Periode 4)	34
Vak: Valuation and Corporate Governance for Finance (Periode 2)	35

# ABRI Honours Programme

## M Finance

Vakken:

Naam	Periode	Credits	Code
<a href="#">Adv Corporate Finance 4.1</a>	Periode 1	6.0	E_FIN_ACF
<a href="#">Asset Pricing</a>	Periode 1	6.0	E_FIN_AP
<a href="#">Behavioral Corporate Finance</a>	Periode 4	6.0	E_FIN_BCF
<a href="#">Derivatives</a>	Periode 2	6.0	E_FIN_DER
<a href="#">Empirical Finance</a>	Periode 2	6.0	E_FIN_EF
<a href="#">Financial Markets and Institutions</a>	Periode 4	6.0	E_FIN_FMI
<a href="#">Institutional Investments and ALM for Finance</a>	Periode 4	6.0	E_FIN_IIALMF
<a href="#">Quantitative Financial Risk Management</a>	Periode 5	6.0	E_FIN_QFRM
<a href="#">Real Estate Management</a>	Periode 5	6.0	E_BA_REM
<a href="#">Research Project Finance</a>	Periode 3	6.0	E_FIN_RPFIN
<a href="#">Thesis</a>	Ac. Jaar (september)	18.0	E_FIN_THS
<a href="#">Valuation and Corporate Governance for Finance</a>	Periode 2	6.0	E_FIN_VCGF

## M Finance - Quantitative Finance

Opleidingsdelen:

- [M Finance - Quant. Fin. Electives A](#)
- [M Finance - Quant. Fin. Electives B](#)
- [M Finance - Quant. Fin. Obligatory](#)

## M Finance - Quant. Fin. Electives A

Vakken:

Naam	Periode	Credits	Code
<a href="#">Adv Corporate Finance 4.1</a>	Periode 1	6.0	E_FIN_ACF
<a href="#">Behavioral Corporate Finance</a>	Periode 4	6.0	E_FIN_BCF
<a href="#">Financial Markets and Institutions</a>	Periode 4	6.0	E_FIN_FMI

Institutional Investments and ALM for Finance	Periode 4	6.0	E_FIN_IIALMF
Real Estate Management	Periode 5	6.0	E_BA_REM
Valuation and Corporate Governance for Finance	Periode 2	6.0	E_FIN_VCGF

## M Finance - Quant. Fin. Electives B

Vakken:

Naam	Periode	Credits	Code
Advanced Financial Reporting	Periode 1	6.0	E_ACC_AFR
Advanced Macroeconomics	Periode 2	6.0	E_EC_AMAEC
Asymptotic Statistics	Periode 1+2	8.0	X_400323
Caput Operation Research	Periode 1	6.0	E_EORM_COR
Corporate Governance, Risk Management and Control	Periode 5	6.0	E_ACC_CGRMC
Corporate Law	Periode 4	6.0	E_ACC_CL
Data Mining Techniques	Periode 5	6.0	X_400108
Empirical Research in Accounting	Periode 1	6.0	E_ACC_ERA
Evolutionary Computing	Periode 1	6.0	X_400111
Globalization, Growth and Development	Periode 4	6.0	E_EC_GGD
Mathematical Systems and Control Theory	Periode 1+2	6.0	X_400180
Simulation and Stochastic Systems	Periode 4	6.0	E_EORM_SSS
Stochastic Optimization	Periode 1+2	6.0	X_400336
Strategic and Cooperative Decision Making	Periode 2	6.0	E_EORM_SCDM

## M Finance - Quant. Fin. Obligatory

Vakken:

Naam	Periode	Credits	Code
Advanced Econometrics	Periode 1+2	6.0	E_EORM_AECTR
Asset Pricing	Periode 1	6.0	E_FIN_AP
Derivatives	Periode 2	6.0	E_FIN_DER
Quantitative Financial Risk Management	Periode 5	6.0	E_FIN_QFRM
Research Project Finance	Periode 3	6.0	E_FIN_RPFIN

Stochastic Processes for Finance	Periode 1+2	6.0	X_400352
Thesis	Ac. Jaar (september)	24.0	E_FIN_QFTHSS
Time Series Econometrics	Periode 4	6.0	E_EORM_TSE
Valuation and Corporate Governance for Finance	Periode 2	6.0	E_FIN_VCGF

## Adv Corporate Finance 4.1

<b>Vakcode</b>	E_FIN_ACF ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Economische Wet. en Bedrijfsk.
<b>Coördinator</b>	prof. dr. ir. H.A. Rijken
<b>Docent(en)</b>	prof. dr. ir. H.A. Rijken
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	400

### Doel vak

Achieve advanced knowledge in the theory and practice of corporate finance. The main objective is to fully understand theoretical concepts (their strengths and limitations) and to use these theoretical frameworks to solve in an effective way practical issues in corporate finance. After following this course, you:

- understand basic Corporate Finance concepts, including their strengths and limitations
- have the quantitative skills to apply these basic concepts
- understand the interrelationship between various concepts and link them in a general framework
- are able to apply this framework in real life cases

## Advanced Econometrics

<b>Vakcode</b>	E_EORM_AECTR (64412001)
<b>Periode</b>	Periode 1+2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Economische Wet. en Bedrijfsk.
<b>Coördinator</b>	dr. M. Massmann
<b>Docent(en)</b>	prof. dr. S.J. Koopman
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	400

### Doel vak

To gain a profound and detailed understanding of advanced econometric theory and methods. By the end of this course, participants will:

have detailed knowledge of

- principles of econometric theory and practical methods at the graduate level
- advanced statistical concepts used in econometric theory and their application in econometric modelling

know how to

- estimate and test both cross-section and time-series models
- evaluate econometric procedures by means of simulation experiments
- solve theoretical econometric exercises

understand

- the interplay between econometric techniques and modelling assumptions
- the proofs of asymptotic properties of important estimators and test statistics

have gained experience in

- solving an econometric research questions as part of a group
- presenting the solution to the class
- discussing other groups' presentations

### **Inhoud vak**

#### Advanced Econometrics I

The three main topics of this course are:

- Nonlinear regression and generalised least squares,
- Instrumental variable estimation,
- Generalized methods of moments.

This course recaps and extends undergraduate knowledge of econometric theory and methods at the graduate level, focussing on a number of selected methods and models. Estimators for both linear and non-linear models will be examined, including least-squares, and generalized methods of moments.. Point estimation as well as confidence interval estimation will be considered. For different estimators and test statistics the question is addressed of how exact, bootstrap or asymptotic inference can be conducted.

Note: the econometrics programme is currently under revision. Some topics may change. Please consult the latest version of the online study guide.

#### Advanced Econometrics II

The three main topics in Advanced Econometrics II are maximum likelihood estimation, multivariate regression analysis and multivariate time series analysis.

The course recaps and extends undergraduate knowledge of econometric theory and methods at the graduate level, focussing on a number of selected methods and models. Estimators for both linear and non-linear models will be examined. Testing procedures that will take centre stage include Lagrange multiplier test as well as conditional moment tests. For all estimators and test statistics the question is addressed of how exact, bootstrap or asymptotic inference can be conducted.

Note: the econometrics programme is currently under revision. Some topics may change. Please consult the latest version of the online study guide.

## Onderwijsvorm

lecture and tutorial

Some lectures can be used for students to give presentations on selected topics.

## Toetsvorm

Written examination.

There are two separate written exams for Advanced Econometrics I (period 1) and for Advanced Econometrics II (period 2). Minimum required result for Advanced Econometrics I is 5.5 and for Advanced Econometrics II is 5.0. Total grade for the combined 6 ECTS version is the average of the two grades and must be at least 5.5 for a pass. The two partial grades are measured in one decimal point; the total grade is the rounded average of the two grades.

Starting September 2010, the first part can be taken as a single elective course for 3 ECTS.

Note: the econometrics programme is under revision. The examination format may change slightly. Please consult the latest version of the online study guide.

## Literatuur

Advanced Econometrics I and II:

Davidson, R & J G. MacKinnon, *Econometric Theory and Methods*. OUP 2004, (compulsory).

Advanced Econometrics II:

Tsay, R., *Analysis of Financial Time Series*, John Wiley and Sons, 2005, Chapter 8 (parts).

Other references:

- Ruud, P A., *An Introduction to Classical Econometric Theory*. OUP, 2000.

- Hansen, B E, *Econometrics*. Manuscript, University of Wisconsin.2009.

Current URL: [www.ssc.wisc.edu/~bhansen/econometrics/](http://www.ssc.wisc.edu/~bhansen/econometrics/)

## Advanced Financial Reporting

<b>Vakcode</b>	E_ACC_AFR (60412050)
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Economische Wet. en Bedrijfsk.
<b>Coördinator</b>	prof. dr. C. Camfferman RA
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	400

## Doel vak

An understanding of International Financial Reporting Standards (IFRS) is essential for anyone who needs to work with the financial statements of major enterprises, or data drawn from these financial statements.

This course provides students who already have a good grounding in financial accounting with a level of general understanding of IFRS that will make them informed users of financial statements, or that will prepare them for the more advanced specialist training required of preparers and auditors of financial statements. After following this course, you will:

- understand the general structure of current IFRS, the main concepts underlying all standards and the key features of selected standards
- have learned to view IFRS as an evolving set of standards, and to evaluate existing or proposed standards in terms of their consistency with other standards or with underlying general concepts
- be able to conceptualize a given accounting problem in terms that allow you to identify the appropriate treatment under current IFRS
- be able to explain the meaning of specific numbers and other information in actual company financial statements by reference to the underlying standards.

### **Inhoud vak**

Apart from a brief introduction to the work and status of the International Accounting Standards Board, the course consists of a review of a substantial part of the extant International Financial Reporting Standards. The course concentrates on issues of (de) recognition and measurement, not on disclosure and presentation requirements. Topics covered include:

- The IASBs Conceptual Framework, the asset/liability approach, fair value, and the IASBs evolving views on performance measurement
- Tangible and intangible assets and impairment
- Revenue recognition and accounting for income taxes
- Share-based payments and accounting for retirement benefits
- Business combinations and group accounting (including currency translation)
- Financial instruments.

### **Onderwijsvorm**

Lectures and discussion classes. Students are expected to study some standards, or parts of standards by themselves. More complex topics or topics that will be less familiar will be the subject of lectures and/or assignments.

### **Toetsvorm**

Written interim examination with the option to earn a small bonus by preparing assignments on an individual basis.

### **Literatuur**

Required: International Financial Reporting Standards as issued at 1 January 2013 (London: International Accounting Standards Board, 2013). (IFRS Bound Volume, 'Red' edition).

### **Vereiste voorkennis**

Financial Accounting 3.1., or equivalent.

### **Aanbevolen voorkennis**

A knowledge of financial accounting equivalent to Financial Accounting 3.1 will be assumed. Detailed information about assumed entry-level knowledge is provided in the course manual.

## Advanced Macroeconomics

<b>Vakcode</b>	E_EC_AMAEC (60422010)
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Economische Wet. en Bedrijfsk.
<b>Coördinator</b>	prof. dr. P.A. Gautier
<b>Examinator</b>	prof. dr. P.A. Gautier
<b>Docent(en)</b>	prof. dr. E.J. Bartelsman, prof. dr. B. Hobijn
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	400

### Doel vak

The students will be able to actively read current literature and embark on their own research projects using the knowledge gained about the analytical, mathematical, and statistical tools of modern macroeconomics. The tools include dynamic optimization, signal extraction, Nash bargaining, and the basic building blocks of DSGE models.

### Inhoud vak

This course provides coverage at an advanced level of the building blocks of macro economics. Models of economic growth will be built up from inter- temporal optimisation decisions of firms and households. The basic model will be extended to take into account the effects on growth of investment in knowledge (R& D, education). Next, the course will present the tools of Real Business Cycle analysis and recent applications. Finally, the course will present the current state of work in New Keynesian economics and its implications for cyclical fluctuations, the functioning of the labor market and the conduct of monetary policy.

### Onderwijsvorm

lecture

### Toetsvorm

written interim examination  
plus problem sets.

### Literatuur

Romer, David Advanced Macro Economics. 3rd edition, McGraw Hill.

## Asset Pricing

<b>Vakcode</b>	E_FIN_AP ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Economische Wet. en Bedrijfsk.
<b>Coördinator</b>	dr. F. Brevik

<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	400

### **Doel vak**

This course aims to deepen your knowledge in the field of asset pricing and asset allocation. After completion of the course, you should:

- Have a thorough understanding of how security prices are determined in financial markets, including equity and fixed income.
- Understand and be able to apply optimal asset allocations for both individual and institutional investors.
- Acquire an academic and critical attitude towards competing technique in investment problems.
- Be comfortable with doing advanced analyses in Software such as Microsoft Excel.

### **Inhoud vak**

Starting from basic (undergraduate) Investments knowledge, this course centers around the issues of asset pricing and asset allocation. In the first week we revisit the well known mean-variance framework and derive the standard CAPM in this set-up. In the second week we explore empirical deviations from the CAPM and discuss how these can be exploited. Here we also touch upon some issues related to behavioral finance. In the third week we study dynamic optimization. Dynamic programming is introduced by the example of pricing American options. We then use the same technique to solve for the optimal dynamic asset-allocation policy when investment opportunities are constant. In the fourth week, we study variations in expected returns and link these to fundamental ratios. In the fifth week we explore how investors should exploit variations in expected returns and introduce the I-CAPM. Consumption based asset pricing is covered in the last week.

### **Onderwijsvorm**

Each of the 6 weeks of the course feature 4 hours of formal lectures and 2 hours of recitations. During recitations we will go through exercises to the topics covered in that week. The exercises are at the end of the relevant chapter of the lecture notes. Draft solutions will be posted on Blackboard after the recitations. In addition there are 3 group work assignments. The focus of these assignments is to apply the theoretical knowledge from class to real world problems using Excel or other software. In addition to gaining a deeper understanding of the topics in the course, the assignments will train you in quantitative computer skills you will need later in their career and prepare you for similar assignments in other courses and your thesis. For each assignment, you work in groups of three students. Assignments will be due at the end of the weeks 1, 3, and 5 of the term.

### **Toetsvorm**

To pass this course, you need a minimum final grade of 6.0 and a minimum grade on the written exam of 5.0. If you score less than 5.0 on the written exam, your final grade is equal to that grade. If you score 5.0 or higher, the final grade is given by:

$$\text{Final grade} = 0.7 \cdot (\text{Written exam grade}) + 0.3 \cdot (\text{Average assignment grade})$$

### **Literatuur**

- Lecture notes.
- Selected research articles and news clippings.
- [For background reading] Bodie, Kane, Markus: Investments (2008);

MacGraw-Hill)

### Vereiste voorkennis

You should be familiar with investments at the level of Bodie, Kane & Marcus, Investments. Undergraduate level knowledge of statistics and mathematics is also required (e.g., Berenson, Levine, Krehbiel: Basic Business Statistics; and Sydsaeter and Hammond (2006; Prentice Hall): Essential Mathematics for Economic Analysis, Sydsaeter, Hammond, Seierstad, and Strom (2005; Prentice Hall): Further mathematics for Economic Analysis (chapters 4 and 11)).

### Aanbevolen voorkennis

You are expected to be very versatile in a relevant software package, such as Microsoft Excel (or any other similarly advance package) and use it to perform estimation and optimization. Core texts here are Benninga, Financial Modeling, or (more advanced) Jackson and Staunton, Advanced modeling in Finance using excel and VBA.

### Overige informatie

This course may have an in-depth empirical follow-up by choosing an appropriate Investments team-research-project during the January / February period.

## Asymptotic Statistics

<b>Vakcode</b>	X_400323 (400323)
<b>Periode</b>	Periode 1+2
<b>Credits</b>	8.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Niveau</b>	500

### Inhoud vak

This course is part of the joint national master programme in mathematics. For schedules, course locations and course descriptions see <http://www.mastermath.nl>. Registration required via <http://www.mastermath.nl>.

### Doelgroep

mMath

## Behavioral Corporate Finance

<b>Vakcode</b>	E_FIN_BCF ()
<b>Periode</b>	Periode 4
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Economische Wet. en Bedrijfsk.
<b>Coördinator</b>	E.C. Wipplinger MSc
<b>Docent(en)</b>	E.C. Wipplinger MSc
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	400

### Doel vak

The objective of this course is to introduce students to key behavioral phenomena that influence decision making of investors, managers and corporations.

Upon completion of this course, students will

- have gained substantial knowledge of behavioral factors relevant to economic activities;
- understand the possible influence on company operations, financing and investment.

Students will also be able to

- apply their knowledge of human economic behavior to real-world scenarios;
- avoid some clearly suboptimal decisions due to behavioral biases.

### Inhoud vak

Traditional finance assumes that market participants are rational, that is, they have the ability to process information correctly and make choices that are in their own interests. However, real-world experience and empirical studies suggest that these assumptions do not always hold. Behavioral finance draws upon insights from psychology to describe human behavior. Individuals base their decisions on heuristics and are affected by biased beliefs as well as framing effects such as overconfidence, loss aversion, anchoring or mental accounting. We explore how individuals' beliefs and preferences affect their own financial decisions, corporations, and the financial markets overall. We will discuss behavioral anomalies and how they can be persistent due to limits of arbitrage. When we focus on corporations, we will examine two, not necessarily mutually exclusive, channels. First, managers themselves are subject to behavior that is not fully rational. Second, managers may cater to or game investors whose behavior is less than fully rational.

### Onderwijsvorm

Lectures

### Toetsvorm

Exam (80%)

Assignment (20%)

### Literatuur

Lecture slides

Journal publications

### Aanbevolen voorkennis

Sound knowledge of corporate finance and investments.

### Overige informatie

For students MSc Finance.

For students MSc Business Administration, Financial Management track.

## Caput Operation Research

<b>Vakcode</b>	E_EORM_COR ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels

<b>Faculteit</b>	Fac. der Economische Wet. en Bedrijfsk.
<b>Coördinator</b>	dr. ir. R.A. Sitters
<b>Docent(en)</b>	dr. ir. R.A. Sitters, prof. dr. G. Schäfer
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	400

### Doel vak

In this course we will learn how to develop efficient algorithms for solving fundamental optimization problems with applications in routing, network design and scheduling. The objectives of the course are:

- get to know models to capture different types of optimization problems (offline, online, distributed)
- learn basic and advanced techniques to solve such optimization problems (primal-dual schema, randomized rounding, iterative rounding, potential functions, local search, etc.)
- use these techniques to design efficient algorithms
- study the computational complexity of optimization problems

### Inhoud vak

Topics that will (probably) be covered in the course are:

- Steiner network, facility location, scheduling problems, network routing, congestion games, network design
- online algorithms, randomized algorithms, approximation algorithms, local search algorithms
- computational complexity and hardness of approximation

### Onderwijsvorm

Lectures and tutorials; take-home assignments will be discussed bi-weekly

### Toetsvorm

written exam

### Literatuur

The material to be covered in class is based on the following books.

Book [1] will be used the most and is freely available for download (you may consider buying it though)

- [1] D.P. Williamson and D.B. Shmoys, The Design of Approximation Algorithms, Cambridge University Press, 2011
- [2] Kleinberg and E. Tardos, Algorithm Design, Addison Wesley, 2005.
- [3] V. V. Vazirani, Approximation Algorithms, Springer, 1998
- [4] N. Nisan, T. Roughgarden, E. Tardos, and V. V. Vazirani (Editors), Algorithmic Game Theory, Cambridge University Press, 2007
- [5] C. H. Papadimitriou and K. Steiglitz, Combinatorial Optimization; Algorithms and Complexity, Prentice-Hall, 1982.

### Vereiste voorkennis

none

### Aanbevolen voorkennis

Basic knowledge on algorithms, computational complexity and combinatorial optimization is advantageous (see, e.g., material covered in the bachelor course Combinatorial Optimization and Appendix A+B of book [1] .

## Corporate Governance, Risk Management and Control

<b>Vakcode</b>	E_ACC_CGRMC (60452000)
<b>Periode</b>	Periode 5
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Economische Wet. en Bedrijfsk.
<b>Coördinator</b>	drs. P.A. Kelder RC
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	400

### Doel vak

It is usually in the interest of everybody that organizations continue to exist as an entity. Given that statement, we can wonder why we have seen so many cases of failing corporate governance over the last decade.

Greed, accounting fraud and plain mismanagement have led to the dismantlement of several large corporations, and with that the disappearance of significant amounts of shareholders' money, pension money, jobs, and the trust in our economic system.

As many of the shareholders are also voters, many countries have as a result strengthened their legislation on corporate governance, stressing in particular management's responsibility to have in place an adequate internal control system for financial reporting. This focus on being in control has led to massive investments in control systems and procedures.

One might wonder if this focus on internal control over financial reporting needs to be brought back in balance with the basics of entrepreneurship, where corporate governance is seen as the strategic response to taking risk. The challenge for corporations in the coming years is to continue to take risks - leading to innovation, growth and prosperity - and manage them in such a way that internal control, especially over financial reporting, is never weakened. Information systems play a key role in reaching this goal.

After attending this course, students should:

- Understand the concepts Corporate Governance, Internal Control and Risk Management and their relationship;
- Understand the roles and responsibilities of the various stakeholders of a private or public organization;
- Have insight in the content of the most important Corporate Governance codes;
- Be able to form an opinion on real life cases of alleged mismanagement and fraud;
- Be able to communicate about these cases and indicate what improvements in risk management and information systems are needed to solve the problems at hand.

### Inhoud vak

Lectures: The theory and scientific literature around CG will be discussed during the lectures. Students are encouraged to ask questions and participate actively to discuss the topics. So-called inflight assignments will be discussed during the lectures. Each student will need to prepare and present one inflight assignment.

Seminar: Students need to prepare a full report on one specific case and present their findings during the mini-seminar at the end of the course.

The presentations and participation during the lectures and the seminars are components of the overall grade for this course.

**Onderwijsvorm**

A combination of lectures, literature study, discussion and seminars.

**Toetsvorm**

The grade for this course is a combination of participation and a written examination.

**Literatuur**

Donald Nordberg, Corporate Governance. Principles and Issues.2010, Sage Publications Ltd.

**Vereiste voorkennis**

Knowledge of the course Accounting Information Systems is assumed.

**Aanbevolen voorkennis**

Knowledge of the course Accounting Information Systems is assumed.

## Corporate Law

<b>Vakcode</b>	E_ACC_CL (60422000)
<b>Periode</b>	Periode 4
<b>Credits</b>	6.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Fac. der Economische Wet. en Bedrijfsk.
<b>Coördinator</b>	mr. J.E. Brink-van der Meer
<b>Examinator</b>	mr. J.E. Brink-van der Meer
<b>Docent(en)</b>	mr. J.E. Brink-van der Meer
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	400

**Doel vak**

Corporate Law is taught in Dutch. International exchange students attend an English version of this course. See below at remarks. The Dutch-taught course deals with the key issues of Dutch company law, mainly concentrating on corporations (BV's and NV's). The objective of this course is to deepen the participants' knowledge and insight of how Dutch corporations work and problems related to Dutch corporations.

After following this course, you:

- have knowledge and insight of how Dutch corporations are organized
- have insight of problems related to Dutch corporations
- have knowledge of the 12 subjects listed below
- have worked with and discussed (real life) cases concerning Dutch corporations
- are informed on current affairs of the NV and BV, including recent case law of the Dutch Supreme Court

**Inhoud vak**

The course is organized around 12 subjects:

- Introduction and basics of Dutch company law
- European company law
- Concern law
- Internal governance of companies
- Corporate governance

- Capital protection
- Liability of (supervisory) directors and shareholders
- Listed and non-listed companies
- Protective devices
- Mergers and acquisitions
- Law regarding annual accounts
- Disputes

### Onderwijsvorm

Lectures, study group

### Toetsvorm

Written examination and one assignment. The written exam accounts for 80 percent of the final mark and the assignment accounts for 20 percent of the final mark.

### Literatuur

- Rechtspersoon, vennootschap en onderneming, prof. mr. J.B. Huizink, Kluwer, most recent edition
- Wettenbundel Rechtspersonen, inclusief ondernemings- en handelsrecht met toekomstige wetgeving. Kluwer, most recent edition
- Documents placed on Blackboard, including but not limited to syllabus J.E. Brink- van der Meer

### Overige informatie

International students follow an English version of this course instead. Please contact Annelies Brink at [jebrink@feweb.vu.nl](mailto:jebrink@feweb.vu.nl) for further details regarding lectures and literature. The Dutch-taught version of Corporate law is mandatory for all Dutch speaking full-time students and all part-time students from the MSc Programme Accounting and Control. The Dutch-taught course is recommended to students from other Master programs who aspire to a career in which elements of law play an important role (for instance corporate finance and banking).

## Data Mining Techniques

<b>Vakcode</b>	X_400108 (400108)
<b>Periode</b>	Periode 5
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. M. Hoogendoorn
<b>Docent(en)</b>	dr. M. Hoogendoorn
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	500

### Doel vak

The aim of the course is that students acquire data mining knowledge and skills that they can apply in a business environment. How the aims are to be achieved: Students will acquire knowledge and skills mainly through the following: an overview of the most common data mining algorithms and techniques (in lectures), a survey of typical and interesting data mining applications, and practical assignments to gain "hands on" experience. The application of skills in a business environment will be simulated through various assignments of the course.

### **Inhoud vak**

The course will provide a survey of basic data mining techniques and their applications for solving real life problems. After a general introduction to Data Mining we will discuss some "classical" algorithms like Naive Bayes, Decision Trees, Association Rules, etc., and some recently discovered methods such as boosting, Support Vector Machines, and co-learning. A number of successful applications of data mining will also be discussed: marketing, fraud detection, text and Web mining, possibly bioinformatics. In addition to lectures, there will be an extensive practical part, where students will experiment with various data mining algorithms and data sets. The grade for the course will be based on these practical assignments (i.e., there will be no final examination).

### **Onderwijsvorm**

Lectures and compulsory practical work. Lectures are planned to be interactive: there will be small questions, one-minute discussions, etc.

### **Toetsvorm**

Practical assignments (i.e. there is no exam). There will be three assignments mostly done in groups of three. There is a possibility to get a grade without doing these assignments: to do a real research project instead (which will most likely to involve more work, but it can also be more rewarding).

### **Literatuur**

Ian H. Witten, Eibe Frank, Mark A. Hall, Data Mining: Practical Machine Learning Tools and Techniques (Third Edition). Morgan Kaufmann, January 2011  
ISBN 978-0-12-374856-0

### **Aanbevolen voorkennis**

Kansrekening en Statistiek of Algemene Statistiek (knowledge of statistics and probabilities) or equivalent. Recommended: Machine Learning.

### **Doelgroep**

mBA, mCS, mAI, mBio

## **Derivatives**

<b>Vakcode</b>	E_FIN_DER (60442060)
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Economische Wet. en Bedrijfsk.
<b>Coördinator</b>	dr. N.J. Seeger
<b>Docent(en)</b>	dr. N.J. Seeger
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	400

### **Doel vak**

The primary objective of this course is to provide students with an advanced introduction to derivative instruments. By the end of the

course students should have a sound understanding of the pricing concepts, practical applicability, operational complexity, and risks of several linear and non-linear derivatives.

### **Inhoud vak**

In today's financial world, the role of derivatives gets increasingly important. Banks and pension funds use derivatives to manage their balance sheet risk, corporate treasuries need derivatives for mitigation of international trade risk, insurance companies actively apply derivatives strategically in order to hedge long term interest rate exposures. Worldwide derivatives trading has exploded to unprecedented levels in the last decades. Therefore, a sound understanding of derivatives is indispensable for anyone pursuing a job in finance.

The course aims to help students in developing a general understanding of the fundamental principles related to derivative instruments. When we try to understand derivative instruments we will ask questions like:

1. How do derivative instruments work?
2. Is it possible to decompose derivatives in basic assets?
3. How to determine the fair value of derivative instruments?
4. What are the risks of using derivative instruments?
5. How are derivative instruments applied in practice and are there any relevant operational issues in the real world?

Hence, the course focuses on facilitating conceptual understanding of derivative instruments and of the methods that are needed to apply derivatives in different settings of finance applications; whether it is for trading purposes, structuring products, risk management, etc.

The field of derivatives is one of the most mathematically sophisticated in finance. Therefore, to understand derivatives it is inevitable to deal with mathematical methods. However, we want to emphasize that in the course mathematical methods are primarily used as tools to understand derivatives. We intend to serve a balanced mix of theory, intuition and practical aspects.

The course will treat the following subjects:

- Why derivatives?
- Forwards, futures and options
- Pricing concepts of derivative instruments
- Discrete and continuous time option pricing models
- Understanding Black-Scholes formula
- Beyond Black-Scholes (stochastic volatility and jumps)
- Hedging strategies
- Estimating model parameters
- Credit derivatives / Financial Crisis

### **Onderwijsvorm**

The course spans a period of six weeks. There will be 12 lecture sessions of 2 x 45 minutes each (for dates and times see course schedule), in which the course material is presented. Based on demand there is the possibility of having two more tutorial sessions, each 2 x 45 minutes, in which assignment solutions and open questions can be discussed. Students can hand in two assignments. The assignments make up for 30 percent of the total result. The remaining 70 percent can be achieved via the written final exam. In case of failing the final exam, the assignment grades are not transferable to a future attendance of the

course.

### Toetsvorm

1. Written exam: 70 percent
2. Assignments: 30 percent

The final grade of the course is the grade of the written exam if this grade is less or equal to 5.0. Otherwise, it is 70% of the written exam grade + 30% of the assignment grades.

The assignments will be a mixture of word problems, which are in style and structure similar to the questions that will be asked in the final exam, and programming problems that are preferably implemented in VBA.

### Literatuur

- John Hull: Options, Futures and other Derivatives, 8th Edition, 2011
- Lecture slides

### Further References:

- Das, R.K. and S.R. Sundaram: Derivatives: Principles and Practice, McGRAW-Hill International Edition, 2010
- Jarrow, R. and A. Chatterjea: An Introduction to Derivative Securities, Financial Markets, and Risk Management, W. W. Norton & Company, 2013
- Baxter/Rennie: Financial Calculus, Cambridge, 1996. - Neftci: Principles of Financial Engineering, Elsevier, 2nd edition, 2008.
- Bingham/Kiesel: Risk-Neutral Valuation: Pricing and Hedging of Financial Derivatives, Springer, 2004.
- Björk, T.: Arbitrage Theory in Continuous Time, Oxford University Press, 2004.

### Vereiste voorkennis

Students entering this course should be familiar with the basic corporate finance principles and techniques (e. g. Berk/DeMarzo, Corporate Finance. 2013) and investment management concepts (e. g. Bodie, Investments. 2010). In order to follow the course material right from the start it is recommended to review the derivatives material that has been covered in the courses: Financiering 2.5 and Investments 3.4. For solving the assignments, programming experience with Excel/VBA is required. A very good introduction to Excel/VBA can be found on the homepage <http://xlvu.weebly.com>; provided by Dr. Arjen Siegmann.

## Empirical Finance

<b>Vakcode</b>	E_FIN_EF (60442070)
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Economische Wet. en Bedrijfsk.
<b>Coördinator</b>	prof. dr. A. Lucas
<b>Examinator</b>	prof. dr. A. Lucas
<b>Docent(en)</b>	prof. dr. A. Lucas
<b>Lesmethode(n)</b>	Hoorcollege, Casecollege
<b>Niveau</b>	400

## **Doel vak**

Upon successful completion, students should

- have a thorough understanding of empirical research methodology in finance (including (non-linear) regression, endogeneity, instrumental variables, time series, event studies, volatility models);
- be able to select the appropriate methodology for an empirical research question;
- be able to set up an empirical analysis and gather and clean the data for this analysis;
- be able to use a statistical package to obtain empirical results;
- be able to critically interpret and assess the results obtained;
- be able to report the results concisely.

In this way students should be well prepared for the team research project in Block 3, and for the academic thesis in Block 5/6.

## **Inhoud vak**

This course offers students the opportunity to study advanced empirical research methods in finance. The objective is to increase the students' ability to understand and to apply empirical methods in finance. The course represents an integration of theory, methods and examples. We use EViews as our standard software, but students are free to choose any package or programming language they like. The aim of the course is to enable students to undertake their own quantitative research projects in practice.

The course concentrates on the following issues: regression model, endogeneity and instrumental variables, time series models, tests for information efficiency, market microstructure, credit risk, event study analysis, portfolio valuation, fixed income, volatility models (GARCH), switching models.

## **Onderwijsvorm**

There are three lecture sessions each week for six weeks.

One of these sessions may be a Q&A sessions and case discussion, if needed.

Teaching consists of lectures and both classroom discussions and computer exercises.

Students are expected to actively participate in all classroom discussions. The purpose of the compulsory computer exercises is to give students the practical skills for solving empirical finance problems.

## **Toetsvorm**

There is a final written exam (70 percent).

There is case work during the course (30 percent).

## **Literatuur**

Slides and lecture notes.

Relevant academic papers (to be indicated at the start of the course).

Book: Introductory Econometrics for Finance, 2nd Edition, Chris Brooks, Cambridge University Press

## **Vereiste voorkennis**

Students should have a sound knowledge of introductory econometrics and statistics at the bachelor level and be familiar with key concepts of corporate finance, investments and financial markets.

## Aanbevolen voorkennis

Core courses Advanced Corporate Finance (4.1) and Asset Pricing (4.1).

Further, the entry level texts of the MSc Finance programme:

Sydsaeter and Hammond (2006, Prentice Hall): Essential Mathematics for Economic Analysis.

Business Statistics Berenson, Levine, Krehbiel (2002): Basic Business Statistics.

Brealey and Myers (2002): Principles of Corporate Finance, 7th ed.

Bodie, Kane, and Marcus (1996): Investments.

## Empirical Research in Accounting

<b>Vakcode</b>	E_ACC_ERA (60412000)
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Economische Wet. en Bedrijfsk.
<b>Coördinator</b>	dr. M. Schoute
<b>Docent(en)</b>	dr. M. Schoute, dr. E. Wiersma
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	400

### Doel vak

The objective of this course is to explore and provide an understanding of the different research methods employed in empirical accounting research. At the end of the course the student should have a strong enough understanding of the different methods discussed to be able to interpret and critically evaluate empirical accounting studies, and to be able to use these methods to conduct an empirical accounting study him/herself. More specifically, after following this course, the student:

- will have a better understanding of the main research methods used in empirical accounting research, and their strengths and weaknesses;
- will be better able to interpret and critically evaluate empirical accounting research; and
- will be better able to him/herself conduct empirical accounting research.

### Inhoud vak

Empirical research in accounting relates to financial accounting, management accounting and auditing. In this accounting research a wide variety of research methods is used. This variety stems from the diversity of theories used, topics and questions studied and the research methods researchers have at hand. Some general patterns can be observed though. For instance, while financial accounting research often builds on publicly available data archives, management accounting research often builds on company specific data. This difference partly stems from the difference in questions these domains of accounting are interested in, but also to the availability of data. The course starts with an overview of the types of questions studied in empirical financial and managerial accounting research and the types of methods and data used for analysis. After this overview the remainder of the course is structured following the research methods most frequently employed in accounting research. Each method will be studied in depth in

relation to the type of question it is suitable for. In this analysis, the focus will lie on both the use of the method and the (accounting) domain it is being used in.

### Onderwijsvorm

Lectures

### Toetsvorm

Written interim examination

Students' evaluation will be based on two parts:

- 1) a written exam at the end of the course; and
- 2) an assignment in the form of a (limited) empirical study.

### Literatuur

To be announced

## Evolutionary Computing

<b>Vakcode</b>	X_400111 (400111)
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	prof. dr. A.E. Eiben
<b>Docent(en)</b>	prof. dr. A.E. Eiben
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	400

### Doel vak

To learn about computational methods based on Darwinian principles of evolution. To illustrate the usage of such methods as problem solvers and as simulation, respectively modelling tools. To gain hands-on experience in performing experiments.

### Inhoud vak

The course is treating various algorithms based on the Darwinian evolution theory. Driven by natural selection (survival of the fittest), an evolution process is being emulated and solutions for a given problem are being "bred". During this course all "dialects" within evolutionary computing are treated (genetic algorithms, evolutiestrategieën, evolutionary programming, genetic programming, and classifier systems). Applications in optimisation, constraint handling and machine learning are discussed. Specific subjects handled include: various genetic structures (representations), selection techniques, sexual and asexual genetic operators, (self-)adaptivity. If time permits, subjects in Artificial Life and Evolutionary Robotics will be handled. Hands-on-experience is gained by a compulsory programming assignment.

### Onderwijsvorm

Oral lectures and compulsory programming assignment.

### Toetsvorm

Written exam and programming assignment (weighted average).

### Literatuur

Eiben, A.E., Smith, J.E., Introduction to Evolutionary Computing.

Springer, 2003 ISBN 3-540-40184-9.

Slides available from <http://www.cs.vu.nl/~gusz/ecbook/ecbook.html> .

### Doelgroep

mBA, mAI, mCS, mPDCS

## Financial Markets and Institutions

<b>Vakcode</b>	E_FIN_FMI (60442080)
<b>Periode</b>	Periode 4
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Economische Wet. en Bedrijfsk.
<b>Coördinator</b>	prof. dr. A.F.P. Bakker
<b>Docent(en)</b>	prof. dr. A.F.P. Bakker
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	400

### Doel vak

Well-functioning financial markets and sound and stable financial institutions are key to the well-being of the economy. However, recent episodes of financial crisis have shown that this cannot be taken for granted. Proper risk management and adequate regulation and supervision are necessary for maintaining financial stability. International coordination is needed because of the linkages between global financial markets.

After the course you should be able to apply theoretical and analytical concepts to topical financial market issues. You should be able to formulate recommendations for financial institutions and regulators, such as: how financial institutions and policymakers should cope with systemic risk; how central bankers should maintain monetary and financial stability; how international institutions as the IMF can help prevent and resolve financial crises; the role of credit rating agencies and hedge funds in financial markets.

### Inhoud vak

The course takes as a starting point the financial crisis of 2008, which unlike most earlier financial crises originated in advanced countries and had a global impact. There is not a single factor that caused the crisis and we can learn from the many failings in the financial system that became apparent. We then turn to the European sovereign debt crisis and the challenges this poses for financial and monetary stability.

We analyze how lessons learned are turned into strengthened regulation, such as Basel III and Solvency II, and discuss whether this will lead to changed behavior of market participants. We learn how macroprudential supervision tries to deal with systemic risk. We will examine proposals to improve the risk management of banks. We will also deal with non-bank financial institutions such as hedge funds, private equity and institutional investors. A special course is devoted to the issues which

pension systems face, including increased longevity, historically low interest rates, disappointing investment results and fiscal problems. We will finish the course with a discussion of the characteristics of a more sustainable and robust financial landscape.

Each course will start off with a discussion of topical issues in the financial press.

### Onderwijsvorm

Lectures. Students will be required to follow the financial press during the course and prepare the lectures by studying the literature in advance.

### Toetsvorm

Written examination with 15 open questions. You also have to write, in small groups, a paper on an assigned subject. The paper will be judged and a fail or pass grade will be awarded. The pass grade implies a bonus of 1 point to the examination result.

### Literatuur

Required reading material consists of a textbook, articles and slides of the lecture. Textbook: Jakob de Haan, Sander Oosterloo and Dirk Schoenmaker, Financial Markets and Institutions, A European Perspective, 2nd edition, Cambridge University Press, 2012

### Vereiste voorkennis

Students should have followed a bachelor course in Money and Banking

### Aanbevolen voorkennis

The following book indicates the level of knowledge which is required: F.S. Mishkin, The Economics of Money, Banking and Financial Markets, 7th Edition, Addison Wesley.

## Globalization, Growth and Development

<b>Vakcode</b>	E_EC_GGD (60442050)
<b>Periode</b>	Periode 4
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Economische Wet. en Bedrijfsk.
<b>Coördinator</b>	prof. dr. C.T.M. Elbers
<b>Docent(en)</b>	prof. dr. C.T.M. Elbers
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	400

### Doel vak

Aim of the course is to study aspects of globalization, growth and development that are fruitfully studied from the perspective of the economics discipline. After following the course the student will

- know the basic facts concerning the topics discussed in the course
- have a thorough understanding of these topics, in particular their economic dimension
- have learnt various empirical research techniques that can be applied within this field of economics

- be able to present and discuss current journal articles and book chapters on globalization

### **Inhoud vak**

Globalization poses both challenges and offers opportunities to rich and poor countries. The course focuses on a number of themes that have been central in the academic and public discussion of recent trends in the world economy. Among them are:

- Relationship between growth, trade and poverty
- Trends in inequality within and between countries
- Intellectual property rights
- Environmental and labour standards
- Volatility of terms- of- trade
- Financial stability

More topics in globalization are introduced in the course in the form of student presentations. The course stresses the importance of empirical research and devotes significant time to the empirical strategies that have been used by researchers in studying globalization.

### **Onderwijsvorm**

lecture

lectures, student presentations and discussions.

### **Literatuur**

Selected articles

### **Vereiste voorkennis**

Advanced Macroeconomics 4.2 and International Economics 3.2

## **Institutional Investments and ALM for Finance**

<b>Vakcode</b>	E_FIN_IIALMF ()
<b>Periode</b>	Periode 4
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Economische Wet. en Bedrijfsk.
<b>Coördinator</b>	dr. M. Boes
<b>Docent(en)</b>	prof. dr. C.G.E. Boender, dr. M. Boes
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	400

### **Doel vak**

This course has a dual objective.

First, students should achieve advanced knowledge of the investment process of institutional investors, like pension funds, and the concept of balance sheet management (Asset Liability Management).

Second, students should acquire a thorough knowledge of the developments in fixed income space, in particular the recent advances in the pricing of fixed income derivatives instruments like swaps and swaptions.

The course not only develops the theoretical background, but also

discusses the way these concepts are used in practice.

After following the course, you:

- Have a thorough understanding of the theory of strategic dynamic asset allocation (SAA) and Asset Liability Management (ALM) and its implementation by institutional investors.

- Have a thorough understanding of basic fixed income derivatives such as (inflation) swaps and swaptions and their strategic use by institutional investors.

- Have an overview of the practical implementation of ALM studies in the financial industry.

- Have an up-to-date knowledge of the recent developments in regulations.

- Have a sound understanding on how linear and non-linear derivatives can be used by pension funds in their balance sheet management.

- Have knowledge on how pension funds decide on issues like currency hedging and benchmark choice for investment portfolios.

### **Inhoud vak**

The first week gives a broad introduction to pension funds.

Specifically, the course starts with an overview of the Dutch pension system, the basic definition, and the regulatory framework (including UFR). In addition to that the investment problem of a pension fund is explained and subsequently linked to the investment decision problems that were treated in earlier courses.

In weeks 2 and 3 we will focus on fixed income derivatives. The approach taken won't be purely theoretical as the practical usage of these derivatives will be shown by means of a real-life investment portfolio of a large Dutch pension fund.

In weeks 4 and 5 the ideas and theories treated so far are translated into practical balance sheet management of pension funds. We won't focus solely on fixed income but will also look at the practical consequences of strategic choices on equity investing and currency hedging.

We intend to finish the course in the sixth week by a guest lecture and by some exam preparation.

### **Onderwijsvorm**

Lectures (2 times 2 hours per week); plus cases and assignments.

### **Toetsvorm**

Written exam and two cases.

### **Literatuur**

- Zvi Bodie, Alex Kane and Alan J. Marcus: Investments and Portfolio Management, McGraw Hill (9th edition)

- Additional course material (academic papers, etc.) will be provided on Blackboard

### **Overige informatie**

The course brings students up to date with the recent developments in the field of fixed income derivatives and institutional investing. To do

so efficiently, the course builds on earlier courses.

In particular for the fixed income derivatives part, the course presumes students are familiar with the material from the course Derivatives (period 2), including the programming assignments of that course.

Students should also master basic Asset Pricing (period 1) theory, and simple time series models such as the vector autoregression (VAR, e.g., Empirical Finance in period 2).

## Mathematical Systems and Control Theory

<b>Vakcode</b>	X_400180 (400180)
<b>Periode</b>	Periode 1+2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	prof. dr. A.C.M. Ran
<b>Docent(en)</b>	prof. dr. A.C.M. Ran
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	400

### Doel vak

The course aims to introduce the student to the mathematical theory of control systems.

### Inhoud vak

Many phenomena are characterized by dynamic behaviour where we are interested in a certain input/output behaviour. Examples are to be found in the exact and natural sciences (mechanics, biology, ecology), in engineering (air- and spacecraft design, mechanical engineering) as well as in economics and econometrics (macro- economical models, conjuncture, trend and seasonal influences in demand and supply, production systems). Systems theory is concerned with modeling, estimation and control of dynamical phenomena. During the course the following subjects will be treated: models and representations (linear systems, input-output, state space, transfer function, stochastic systems, spectrum), control (stabilisation, feedback, pole placement, dynamic programming, the LQ problem), and identification and prediction (parameter estimation, spectral analysis, Kalman- filter, model reduction). Applications are in the area of optimal control and prediction.

### Onderwijsvorm

There is a lecture of two hours each week. In addition, there is another session which will be half lecture and half practicum, in which there is the possibility to ask questions about the compulsory computerpracticum. The practicum makes use of the Matlab package.

### Toetsvorm

The computerpracticum counts for 70 %, the oral examination concerns the theory and counts for 30 %.

### Literatuur

Chr. Heij, A.C.M. Ran and F. van Schagen, Introduction to Mathematical Systems Theory, Birkhauser Verlag.

**Aanbevolen voorkennis**

Analysis, probability theory, statistics.

Complex analysis and Fourier theory would be useful, but are not absolutely necessary.

**Doelgroep**

3W, mBA, mMath

**Quantitative Financial Risk Management**

<b>Vakcode</b>	E_FIN_QFRM (60422110)
<b>Periode</b>	Periode 5
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Economische Wet. en Bedrijfsk.
<b>Coördinator</b>	dr. S.A. Borovkova
<b>Docent(en)</b>	dr. S.A. Borovkova, dr. A. van Haastrecht
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	400

**Doel vak**

Deep understanding and ability to implement modern quantitative risk measurement and management techniques.

**Inhoud vak**

The lecturers are Dr. S. Borovkova, an expert on derivatives, risk management and energy markets, and Dr. A. van Haastrecht, Senior Risk Manager of Aegon. In this course we will examine various types of financial risks facing corporations and financial institutions, such as market, credit and operational risks. The course will encompass both theoretical and applied aspects of risk management. This course will give you a solid fundamental for measurement and management of financial risks, knowledge of newest quantitative methods and the ability to apply your knowledge in corporate environment. The lectures are complemented by participants' presentations about recent financial disasters (Amaranth, Soci t  General, LTCM, Barings and others), credit crisis and by practical assignments designed to maximally match actual risk management applications in banking environment. For this course you need a strong quantitative focus and affiliation with statistics and probability as well as (some) affiliation with finance, or an intention to learn necessary concepts and vocabulary. For this course you need a strong quantitative focus and affiliation with statistics and probability as well as (some) affiliation with finance, or an intention to learn necessary concepts and vocabulary.

**Onderwijsvorm**

Lectures (6 hours per week)

**Toetsvorm**

2 cases (assignments) and written exam

**Literatuur**

Embrechts, Frey and McNeal "Quantitative Risk Management"

## Aanbevolen voorkennis

Introductory statistics and probability, implementation skills (Excel, Matlab, Eviews or any other computer package)

## Real Estate Management

<b>Vakcode</b>	E_BA_REM (61452040)
<b>Periode</b>	Periode 5
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Economische Wet. en Bedrijfsk.
<b>Coördinator</b>	prof. dr. J. Rouwendal
<b>Docent(en)</b>	prof. dr. J. Rouwendal, dr. F. Hamelink
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	400

### Doel vak

The course provides an introduction to the understanding and the analysis of real estate markets and the investment alternatives available to both debt and equity investors. A large part of the focus will be on residential real estate. We study both the owner occupied and rental markets and pay particular attention to financial aspects, in particular the mortgage market. The secondary market for mortgages, where institutional investors invest in "pools" of mortgages, is analyzed in detail, in particular in light of the recent financial crisis. The last part of the course deals with other forms of real estate that institutional investors may invest in. This part will cover other property types (offices, commercial real estate, etc.) and investment vehicles, such as REITS. Although the course takes an international perspective, special attention is given to the Dutch situation.

### Inhoud vak

We study the characteristics of mortgage loans used by households to finance the purchase of a house, the functioning of the Dutch housing market including the role of policy interventions (notably mortgage interest deductibility and spatial planning), and the role of housing corporations. The 'secondary market' for debt related to this financing is analyzed with a focus on the various instruments (such as CDO's and CMO's) that have played an important role in the current financial crisis. Finally, we also look at 'the other side' of the financing of real estate, namely, we take the perspective from an (institutional) investor, such as a pension fund, who considers real estate as one of many available asset classes. We will study the main characteristics in terms of risk and returns of the different forms of real estate available to the investor (such as investing in mortgage pools, investing in buildings, securitized real estate, etc), as well as by property type (such as residential versus commercial real estate).

After following this course you should be able to understand:

- the main characteristics of the most popular types of mortgage loans
- the pros and cons of fixed rate and adjustable rate mortgages
- the impact of fiscal measures on mortgage payments
- the role of the housing corporations on the Dutch rental housing market

- the importance of the secondary market in mortgages, as well as the available instruments for institutional investors such as pension funds
- the risk and returns characteristics of the main investments vehicles in real estate available to an institution investor.

Real Estate Management is a joint effort of the departments of Spatial Economics and Finance and Financial Sector Management.

### Toetsvorm

written examination

### Literatuur

- Andrew E. Baum, David Hartzell, "Global Property Investment: Strategies, Structures, Decisions", December 2011, Wiley-Blackwell, ISBN: 978-1-4443-3528-6, Paperback, 576 pages.
- Additional course material will be provided on Blackboard

## Research Project Finance

<b>Vakcode</b>	E_FIN_RPFIN (60432010)
<b>Periode</b>	Periode 3
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Economische Wet. en Bedrijfsk.
<b>Coördinator</b>	dr. D.G. Stefanova
<b>Docent(en)</b>	prof. dr. A.C.F. Vorst, dr. A. van Haastrecht
<b>Lesmethode(n)</b>	Werkgroep
<b>Niveau</b>	400

### Doel vak

This course will allow students to apply their knowledge acquired so far to applied research projects in various fields of finance. Working in teams of 3-4, students will investigate a well delimited area by reviewing relevant existing academic as well as practitioners oriented literature. They will empirically apply the theory to real life data. Students will be encouraged to gather information from various sources, including from practitioners in the industry via for example surveys. Students will have to draw upon the material taught both during their undergraduate degree and during their Master in Finance program. Upon completion, students should be able to:

- identify the relevant academic literature for their area of research
- formulate precise research questions and hypotheses in a specific field based on the academic literature - gather data to test their hypotheses
- choose appropriate (statistical) methodology for the research, implement this on the data, and interpret the findings
- communicate their research set-up and findings clearly, both orally and in writing
- carefully plan a demanding project on a tight time-line
- cooperate in a team to increase team output on a research project

### Inhoud vak

Before the end of Period 2, students will be requested to form groups and make a choice from a provided list of projects. This will be communicated via blackboard and VU-email. Each project includes a detailed description, allowing the students to have some understanding

of the implications of the topic. The projects will cover various areas in finance, both in the area of financial markets and corporate finance. A few projects requiring a strong background in econometrics will also be provided for participants of the Quantitative Finance Track. Starting references from the relevant academic literature will be provided, but students should actively look for additional relevant literature.

Between the end of Period 2 and the beginning of this course in January (period 3), students will prepare an initial set-up for their project and carry out a preliminary literature review on their subject. They will present this set-up to the other students in class during the start of period 3. The actual research can then go ahead at full speed during the actual four weeks of period 3. During this initial preparation period, as well as during period 3, individual meetings with the lecturer can be organized. During period 3, each group will be required to:

- make an concise initial, kick-off presentation
- make an intermediate presentation to all other groups
- make a final presentation to all other groups at the end of the period
- write up a research paper (usually 40 to 80 pages), written as a scientific paper, presenting their research, which includes the literature overview and the empirical findings.

Writing style and layout should follow those of one of the major academic Finance journals (Journal of Finance, Journal of Financial Economics, Review of Financial Studies).

Students are encouraged to strengthen their applied research outcomes by input from practitioners from the financial industry.

### **Onderwijsvorm**

- individual meetings with each group
- three plenary sessions for presentations of research set-up and (intermediate) results

### **Toetsvorm**

The course grade is based on the final report, the presentation of the results, and the student's discussion participation (as a discussant of one of the presented projects, as well as for his/her contribution to the discussion in the plenary sessions).

### **Literatuur**

A literature review is required for each project. Starting references from the relevant academic literature are provided by the supervisor.

### **Vereiste voorkennis**

Students should have a good overall knowledge of the various topics taught in the courses so far. For Finance students, this includes the material of Empirical Finance. For Quantitative Finance Track students, we require knowledge of Advanced Econometrics.

All projects require students to work with real life data, for which students may choose an appropriate software package of their liking (Excel, or more sophisticated econometric / statistical software) and appropriate available databases (Datastream, SDC, CRSP, Compustat, ...) or proprietary data sources.

## **Simulation and Stochastic Systems**

<b>Vakcode</b>	E_EORM_SSS (64412010)
<b>Periode</b>	Periode 4

<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Economische Wet. en Bedrijfsk.
<b>Coördinator</b>	dr. A.A.N. Ridder
<b>Docent(en)</b>	dr. A.A.N. Ridder
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	400

### Doel vak

The objective of this course is to learn how to develop and execute a simulation study of a stochastic system. This incorporates all aspects of an operations research study: data collecting, modeling, analyzing, programming, writing a report and presenting the results.

### Inhoud vak

The course gives a broad treatment of the important aspects of stochastic simulation and its applications to queuing, manufacturing and financial models. The topics covered include discrete-event simulation, random number generators, generating random variates, statistical output analysis, steady-state simulation, variance reduction techniques, rare-event simulation, Markov chain Monte Carlo, and stochastic optimization. The emphasis is on the mathematical analysis of properties of these simulation methods. There will be assignments in which the students apply simulation issues to problems either by theoretical analysis, or by programming. The simulation programs are written in C, C++, Java or Matlab. Towards the end of the course the student studies a scientific paper on a simulation topic and gives a presentation of it.

### Onderwijsvorm

lecture and tutorial

### Toetsvorm

1. homework problems
2. Paper presentation
3. Written exam

### Literatuur

R.Y. Rubinstein and D.P. Kroese. Simulation and the Monte Carlo Method, second edition, Wiley 2008.

### Vereiste voorkennis

Probability and Statistics, Stochastic models, Programming experience.

### Aanbevolen voorkennis

Probability and Statistics; Stochastic models; Programming skills

## Stochastic Optimization

<b>Vakcode</b>	X_400336 (400336)
<b>Periode</b>	Periode 1+2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. S. Bhulai

<b>Docent(en)</b>	dr. S. Bhulai
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	400

### Doel vak

The goal of the course is to discuss techniques from the field of stochastic optimization and their applications.

### Inhoud vak

This course deals with the theory and algorithms for stochastic optimization with an application to controlled stochastic systems (e.g., call center management, inventory control, optimal design of communication networks). We discuss aspects of semi-Markov decision theory and their applications in certain queueing systems. In a programming assignment, students learn to implement optimization algorithms and experiment with them. Experience with and insight into the more theoretical subject is obtained through homework exercises.

### Onderwijsvorm

Lectures.

### Toetsvorm

Programming and written exercises, final examination.

### Literatuur

Lecture notes will be posted on BlackBoard

### Vereiste voorkennis

Stochastische Methoden (400391) or equivalent and a programming language.

### Aanbevolen voorkennis

Stochastische Processen (X\_401026) and Wachtrijmodellen (X\_401061) or equivalent courses on Stochastic Processes en Queueing Theory and a programming language.

### Doelgroep

mBA, mBa-D, mMath, mSFM

## Stochastic Processes for Finance

<b>Vakcode</b>	X_400352 (400352)
<b>Periode</b>	Periode 1+2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	prof. dr. J. van den Berg
<b>Docent(en)</b>	prof. dr. J. van den Berg, dr. E.N. Belitser
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	400

### Doel vak

Learn basics of stochastic processes in continuous time, including the concepts of martingales and stochastic integration. Apply these concepts

to price options on stocks and interest rates by the no-arbitrage principle.

### **Inhoud vak**

Financial institutions trade in risk, and it is therefore essential to measure and control such risks. Financial instruments such as options, swaps, forwards, caps and floors, etc. play an important role in risk management, and to handle them one needs to be able to price them. This course gives an introduction to the mathematical tools and theory behind risk management.

A "stochastic process" is a collection of random variables, indexed by a set  $T$ . In financial applications the elements of  $T$  model time, and  $T$  is the set of natural numbers (discrete time), or an interval in the positive real line (continuous time). "Martingales" are processes whose increments over an interval in the future have zero expectation given knowledge of the past history of the process. They play an important role in financial calculus, because the price of an option (on a stock or an interest rate) can be expressed as an expectation under a so-called martingale measure. In this course we develop this theory in discrete and continuous time. Most models for financial processes in continuous time are based on a special Gaussian process, called Brownian motion. We discuss some properties of this process and introduce "stochastic integrals" with Brownian motion as the integrator. Financial processes can next be modeled as solutions to "stochastic differential equations". After developing these mathematical tools we turn to finance by applying the concepts and results to the pricing of derivative instruments and other matters. Foremost, we develop the theory of no-arbitrage pricing of derivatives, which are basic tools for risk management.

### **Onderwijsvorm**

Lectures and exercises.

### **Toetsvorm**

Homework assignments / written examination.

### **Literatuur**

Shreve, S.E., Stochastic Calculus for Finance I: The Binomial Asset Pricing Model. Springer.

Shreve, S.E., Stochastic Calculus for Finance II: Continuous-time models. Springer.

In addition, it is useful to have the following book:

Bjork, T., Arbitrage Theory in Continuous Time, third edition. Oxford University Press.

### **Vereiste voorkennis**

Introductory probability theory and statistics, calculus.

### **Aanbevolen voorkennis**

Introductory probability theory and statistics, calculus.

### **Doelgroep**

mBA, mBA-D, mMath, mSFM, master Econometrics, Quantitative Finance

### **Overige informatie**

A significant part of the course is used to introduce mathematical subjects and techniques like Brownian motion, stochastic integration and

Ito calculus. In view of this, the course is NOT meant for students who already followed the master course "Stochastic Integration". On the other hand, after following this course (Stochastic processes for finance), students may be motivated to follow the other one (Stochastic Integration) to study the above mentioned mathematical subjects in a deeper and more rigorous way.

## Strategic and Cooperative Decision Making

<b>Vakcode</b>	E_EORM_SCDM (64422010)
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Economische Wet. en Bedrijfsk.
<b>Coördinator</b>	dr. J.R. van den Brink
<b>Examinator</b>	dr. J.R. van den Brink
<b>Docent(en)</b>	prof. dr. ir. G. van der Laan, dr. J.R. van den Brink, dr. I.D. Lindner
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	400

### Doel vak

The aim of this course is to learn and apply methods and techniques from cooperative and noncooperative game theory to economic and managerial problems. Students should be able to understand and to apply results that recently appeared in the international journals.

### Inhoud vak

In this course we study strategic and cooperative decision making in situations where more than one party or agent is involved. In these situations the outcome is the result of the individual decisions made by the agents. In strategic decision theory we focus on the decisions made by the agents, where each agent takes account of the fact that its decision influences the outcome, and therefore the decision problem of the other agents. Agents behave strategically if each agent tries to behave in a way that is best for itself. In cooperative decision theory we focus on the outcome (and not on the individual decisions), taking into account the interests of all agents. We study different criteria that an outcome can satisfy, such as efficiency or equity, and look how to find a compromise between these criteria when they are conflicting. The methods we use to analyse and solve these problems borrow from (non- cooperative and cooperative) game theory, general equilibrium theory and social choice theory. The topics come from the field of economics and operations research and include: bargaining problems, auctions, cost sharing and allocation problems, operations research games, market games, assignment problems, profit distribution, voting problems, score rules, location problems and networks.

### Onderwijsvorm

lecture  
working group

### Toetsvorm

written interim examination  
and presentations.

## Literatuur

- Moulin, H., Fair Division and Collective Welfare. MIT Press, 2003.
- A reader including a selection of recent articles

## Vereiste voorkennis

- Mathematical Economics 1
- Recommended: Mathematical Economics 2

## Thesis

<b>Vakcode</b>	E_FIN_THS ()
<b>Periode</b>	Ac. Jaar (september)
<b>Credits</b>	18.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Economische Wet. en Bedrijfsk.
<b>Coördinator</b>	prof. dr. A.C.F. Vorst
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	500

## Thesis

<b>Vakcode</b>	E_FIN_QFTHSS ()
<b>Periode</b>	Ac. Jaar (september)
<b>Credits</b>	24.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Economische Wet. en Bedrijfsk.
<b>Coördinator</b>	prof. dr. M. van der Nat
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	500

## Time Series Econometrics

<b>Vakcode</b>	E_EORM_TSE (64432000)
<b>Periode</b>	Periode 4
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Economische Wet. en Bedrijfsk.
<b>Coördinator</b>	prof. dr. S.J. Koopman
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	400

## Doel vak

To gain insights in economic time series modelling with a focus on theory, methods and computations.

## Inhoud vak

This course focuses on the advances of theory and computational methods for time series econometrics. A methodology of econometric programming is explored for a number of selected topics in time series analysis. In particular, time series properties in time and frequency domains, different modeling strategies, likelihood evaluations, filtering methods and Monte Carlo simulation methods are studied. Theory and methods are studied thoroughly while some computer programs need to be developed for the implementation of the methods.

### Onderwijsvorm

lecture  
tutorial

### Toetsvorm

written interim examination  
50 percent  
written assignments  
50 percent

### Literatuur

Selection of literature:

- Brockwell, P.J. & R.A. Davis, Time Series: Theory and Methods. Springer-Verlag, 1991, 2nd edition.
- Durbin, J. & S.J. Koopman, Time Series Analysis by State Space Methods. Oxford University Press, 2001.
- Kim, C-J & C.R. Nelson, State-Space Models with Regime Switching. The MIT Press, 1999.

## Valuation and Corporate Governance for Finance

<b>Vakcode</b>	E_FIN_VCGF ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Economische Wet. en Bedrijfsk.
<b>Coördinator</b>	prof. dr. ir. H.A. Rijken
<b>Docent(en)</b>	prof. dr. ir. H.A. Rijken
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	400