The programme information in this document is based on the selection criteria that you entered in the online prospectus (www.maastrichtuniversity.nl/web/Faculties/SBE/TargetGroup/Education/MastersProgrammes/ActuarialSciences/Courses).

Should it not contain the information that you were looking for, we recommend that you try again using different selection criteria.

Please bear in mind that the programme information is continuously updated. It is therefore wise to check the online prospectus regularly.

The information for current and prospective students on the Maastricht University (UM) website has been compiled with the utmost care, and efforts have been made to make it as up to date as possible. Should there be inaccuracies in spite of this, neither UM nor the faculties involved can be held liable. No rights can be derived from any inaccurate or incomplete information.

In the event of doubt or uncertainty about specific information, please contact the School of Business and Economics.
# Table of content

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stochastic Processes</td>
<td>3</td>
</tr>
<tr>
<td>Game Theory and Optimisation</td>
<td>5</td>
</tr>
<tr>
<td>Time Series Methods and Dynamic E-metric</td>
<td>6</td>
</tr>
<tr>
<td>E-metric Method Cross-sect. + Panel Data</td>
<td>8</td>
</tr>
<tr>
<td>Empirical Analysis of Financial Markets</td>
<td>10</td>
</tr>
<tr>
<td>Stochastic Processes</td>
<td>12</td>
</tr>
<tr>
<td>Game Theory and Optimisation</td>
<td>14</td>
</tr>
<tr>
<td>Social Choice Theory</td>
<td>15</td>
</tr>
<tr>
<td>Industrial Economics</td>
<td>17</td>
</tr>
<tr>
<td>Equilibrium Theory and Financial Markets</td>
<td>19</td>
</tr>
<tr>
<td>Stochastic Processes</td>
<td>21</td>
</tr>
<tr>
<td>Game Theory and Optimisation</td>
<td>23</td>
</tr>
<tr>
<td>Time Series Methods and Dynamic E-metric</td>
<td>24</td>
</tr>
<tr>
<td>Life Insurance I</td>
<td>26</td>
</tr>
<tr>
<td>Mathematical Finance</td>
<td>28</td>
</tr>
<tr>
<td>Life Insurance II</td>
<td>30</td>
</tr>
<tr>
<td>Stochastic Processes</td>
<td>32</td>
</tr>
<tr>
<td>Game Theory and Optimisation</td>
<td>34</td>
</tr>
<tr>
<td>Algorithms and Optimisation</td>
<td>35</td>
</tr>
<tr>
<td>Modelling and Solver Technology</td>
<td>37</td>
</tr>
<tr>
<td>Operations Research Applications</td>
<td>39</td>
</tr>
<tr>
<td>Master's Thesis (Variable credits)</td>
<td>40</td>
</tr>
</tbody>
</table>
Stochastic Processes

Academic year 2012-13

Date last modified
20-4-2013 1:29

Period
Period 1 Startdate: 03-Sep-12 Enddate: 26-Oct-12

Code
EBC4004

ECTS credits
6.5

Organisational unit
School of Business and Economics

Coordinator
M.B. Eichler

Description
Deterministic dynamic systems are usually not well suited for modelling real world dynamics in economics, finance and business. Allowing for random components in dynamics systems leads to stochastic dynamic modelling, which is based on stochastic processes. This course covers models of stochastic processes in discrete and continuous time. This includes Markov chains, Poisson processes and Brownian motion. We introduce various tools that are very useful for deriving and understanding the asymptotic properties of modern econometric techniques. They include the functional central limit theorem and stochastic integrals. Finally, we discuss stochastic differential equations and their applications in finance and related fields, e.g. for pricing financial derivatives.

Goals
The purpose of the course is to introduce students to the study of stochastic processes in discrete and continuous time. Students will have learned the essentials of the subject and should be able to apply the acquired theoretical tools to problems in econometrics, economics, finance, and other fields.

Instruction language
EN

Prerequisites
Only Master students can take Econometrics Master courses. Students require a solid background in mathematical statistics and probability theory on the level of the BSc Econometrics programme.

Recommended literature

**Teaching methods**

PBL

ASSIGNMENT(S)

LECTURE(S)

**Assessment methods**

WRITTEN EXAM

**Key words**
Game Theory and Optimisation

Academic year 2012-13

Date last modified
20-4-2013 1:29

Period
Period 1  Startdate: 03-Sep-12  Enddate: 26-Oct-12

Code
EBC4188

ECTS credits
6.5

Organisational unit
School of Business and Economics

Coordinator
H.J.M. Peters

Description

Goals

Instruction language

Prerequisites

Recommended literature

Teaching methods
PBL
LECTURE(S)

Assessment methods
WRITTEN EXAM

Key words
Time Series Methods and Dynamic E-metric

Academic year 2012-13

Date last modified
1-5-2012 1:21

Period
Period 2  Startdate: 29-Oct-12  Enddate: 21-Dec-12

Code
EBC4008

ECTS credits
6.5

Organisational unit
School of Business and Economics

Coordinator
J.R.Y.J. Urbain

Description
The emphasis of this course is on the study of methods for the analysis of possibly nonstationary economic time series. We consider both theoretical and practical aspects. We cover and discuss issues related to exogeneity and causality in dynamic econometric models, modelling univariate and multivariate nonstationary processes, unit roots, cointegration as well as the asymptotic theory for integrated processes. Empirical applications are also considered so that the course will provide students with practical experience in analysing univariate and multivariate time series from economics or business.

Goals
The objectives of this course are to provide students with an understanding of the concepts of modern time series methods as well as practical experience in analysing time series from economics or business. Students will have learned recent econometric methods to study multivariate economic time series. Students should be able to apply these methods to economic data.

Instruction language
EN

Prerequisites
"- Econometric methods, Stochastic Processes. - Exchange students need to have a solid background in econometric methods, probability theory and some knowledge in stochastic processes (some familiarity with Brownian Motion theory is important). Exchange students need to have obtained a Bachelor degree and an advanced level in mathematics and probability and statistics."
**Recommended literature**


**Teaching methods**

PBL
PRESENTATION(S)
LECTURE(S)
WORK IN SUBGROUPS
PAPER(S)

**Assessment methods**

WRITTEN EXAM

**Key words**
E-metric Method Cross-sect. + Panel Data

Academic year 2012-13

Date last modified
1-5-2012 1:21

Period
Period 4  Startdate: 04-Feb-13  Enddate: 05-Apr-13

Code
EBC4006

ECTS credits
6.5

Organisational unit
School of Business and Economics

Coordinator
D.P.I. de Crombrugghe

Description
The main topics of the course are (1) unobserved effects models for panel data, (2) probit and logit models for binary choice, (3) tobit and related censored regression models, (4) models dealing with sample selectivity, and (5) the estimation of average treatment effects (a.k.a. policy impact evaluation). Dynamic extensions of the models are considered when feasible. Estimation and testing methods are applied in a number of empirical assignments and their properties are investigated.

Goals
- Thorough understanding of the most frequently used econometric models and methods for the analysis of panel data, categorical choice and limited dependent variables. - Some practice in the application of the methods, the interpretation of the models, and the evaluation of inferences. - The experience of conducting a theoretical, experimental and/or empirical investigation of the methods.

Instruction language
EN

Prerequisites
- Calculus, matrix algebra, probability, mathematical statistics, asymptotic theory, linear statistical models. - Familiarity with statistical software like Stata and Gauss or Matlab. - Econometric methods at the level of Greene (2008) or Davidson & MacKinnon (2004), as in course Econometric Methods (EBC2111) The course is intended for students in the Econometrics Master programme as well as PhD or exchange students with a comparable background and motivation. Fluency in matrix algebra and in asymptotic theory is assumed..
**Recommended literature**

**Teaching methods**
PBL
PRESENTATION(S)
LECTURE(S)
ASSIGNMENT(S)
PAPER(S)

**Assessment methods**
FINAL PAPER
ATTENDANCE
PARTICIPATION
WRITTEN EXAM
ORAL EXAM

**Key words**
Empirical Analysis of Financial Markets

Academic year 2012-13

Date last modified
19-4-2013 1:30

Period
Period 5  Startdate: 08-Apr-13  Enddate: 31-May-13

Code
EBC4010

ECTS credits
6.5

Organisational unit
School of Business and Economics

Coordinator
S.F.J.A. Laurent

Description
In this course we consider in depth the fluctuations of stock prices and the performance of trading strategies.

Goals
The purpose of the course is to provide students with sufficient background and some practical experience, so that they can make their own assessment of events on financial markets.

Instruction language
EN

Prerequisites
This block can only be chosen as part of the 2 year Mphil education (BR or EFR).

Recommended literature
- recent research papers  - recent journal articles

Teaching methods
PBL
PRESENTATION(S)
LECTURE(S)
ASSIGNMENT(S)
PAPER(S)
Assessment methods
FINAL PAPER
PARTICIPATION
WRITTEN EXAM

Key words
Stochastic Processes

Academic year 2012-13

Date last modified
20-4-2013 1:29

Period
Period 1  Startdate: 03-Sep-12  Enddate: 26-Oct-12

Code
EBC4004

ECTS credits
6.5

Organisational unit
School of Business and Economics

Coordinator
M.B. Eichler

Description
Deterministic dynamic systems are usually not well suited for modelling real world dynamics in economics, finance and business. Allowing for random components in dynamics systems leads to stochastic dynamic modelling, which is based on stochastic processes. This course covers models of stochastic processes in discrete and continuous time. This includes Markov chains, Poisson processes and Brownian motion. We introduce various tools that are very useful for deriving and understanding the asymptotic properties of modern econometric techniques. They include the functional central limit theorem and stochastic integrals. Finally, we discuss stochastic differential equations and their applications in finance and related fields, e.g. for pricing financial derivatives.

Goals
The purpose of the course is to introduce students to the study of stochastic processes in discrete and continuous time. Students will have learned the essentials of the subject and should be able to apply the acquired theoretical tools to problems in econometrics, economics, finance, and other fields.

Instruction language
EN

Prerequisites
Only Master students can take Econometrics Master courses. Students require a solid background in mathematical statistics and probability theory on the level of the BSc Econometrics programme.

Recommended literature

**Teaching methods**

PBL
ASSIGNMENT(S)
LECTURE(S)

**Assessment methods**

WRITTEN EXAM

**Key words**
Game Theory and Optimisation

Academic year 2012-13

Date last modified
20-4-2013 1:29

Period
Period 1  Startdate: 03-Sep-12  Enddate: 26-Oct-12

Code
EBC4188

ECTS credits
6.5

Organisational unit
School of Business and Economics

Coordinator
H.J.M. Peters

Description

Goals

Instruction language

Prerequisites

Recommended literature

Teaching methods
PBL
LECTURE(S)

Assessment methods
WRITTEN EXAM

Key words
Social Choice Theory

Academic year 2012-13

Date last modified
26-9-2012 1:36

Period
Period 2  Startdate: 29-Oct-12  Enddate: 21-Dec-12

Code
EBC4005

ECTS credits
6.5

Organisational unit
School of Business and Economics

Coordinator
A.J.A. Storcken

Description
In collective decision-making (e.g., elections) the rules and procedures used to arrive at a decision may have a considerable impact on the final result. Different rules may lead to different decisions. In this course such rules are studied. In particular, desirable properties like Pareto-optimality and non-manipulability are investigated. Some topics are: · voting schemes for two alternatives, theorem of May; · voting schemes for more than two alternatives, score rules, veto rules; · Condorcet winners, dictatorial rules, anonymity, neutrality, positive association, impossibility theorems of Arrow, Gibbard and Satterthwaite; · location problems; · strategy-proof division.

Goals
In this course the student will learn to formally analyse collective decision rules w.r.t. various aspects such as anonymity, Pareto-optimality, neutrality, and strategy-proofness.

Instruction language
EN

Prerequisites
A mathematic level comparable to a Bsc Econometrics & Operations Research meets the prerequisites. Exchange students need to have obtained a Bachelor degree and an advanced level in mathematics.

Recommended literature
Coursebook.
Teaching methods
PBL
LECTURE(S)

Assessment methods
WRITTEN EXAM

Key words
Industrial Economics

Academic year 2012-13

Date last modified
22-1-2013 1:27

Period
Period 4  Startdate: 04-Feb-13   Enddate: 05-Apr-13

Code
EBC4007

ECTS credits
6.5

Organisational unit
School of Business and Economics

Coordinator
G. Valletta

Description
This advanced course provides theoretical insights of new industrial economics; using modern economic tools as optimising behaviour and strategic behaviour (game theory). This field of economics is concerned with the structure, conduct and performance of firms and markets. Moreover, in a partial equilibrium setting, attention is paid to a normative evaluation of market performance and to the potential role for government intervention. In oligopolistic markets the topics are: price or quantity competition, collusion, product selection, entry and exit, strategic behaviour under uncertainty, and research and development.

Goals
As an advanced course in industrial economics it provides a comprehensive summary of some of the most advanced models of strategic interaction among firms. It is the ideal basis for research in industrial economics or a related field and a must for those planning a career in an (economic) consulting firm.

Instruction language
EN

Prerequisites
Intermediate microeconomics, some game theory or some industrial organisation (at least two of the three), such as: · Varian, 1999, Intermediate microeconomics, A Modern Approach, Norton, New York · Gibbons, R., 1992, A Primer in Game Theory, Harvetser Wheatsheaf, New York · Martin, S., 1994, Industrial Economics, Economic Analysis and Public Policy, Prentice Hall, New Jerseyas covered, for example, in 2.3 micro economics: · Choices, markets and welfare · Game Theory, basic concepts, practice and applications · Game Theory and economics · Strategic Firm Behaviour and Public
Policy. Exchange students need to have obtained a bachelor degree with a major in Business, Economics or Econometrics/Quantitative Economics.

**Recommended literature**

**Teaching methods**
PBL
ASSIGNMENT(S)

**Assessment methods**
WRITTEN EXAM

**Key words**
Equilibrium Theory and Financial Markets

Academic year 2012-13

Date last modified
1-5-2012 1:21

Period
Period 5  Startdate: 08-Apr-13  Enddate: 31-May-13

Code
EBC4009

ECTS credits
6.5

Organisational unit
School of Business and Economics

Coordinator
E. Tsakas

Description
After introducing the necessary mathematical preliminaries and extending our knowledge on selected ingredients from consumer theory, the course focuses on general equilibrium models with complete markets, in particular classical exchange and production economies. Central concepts to be studied are the competitive equilibrium and the core. Next, the model is extended to include time and uncertainty, and the strong assumption of complete markets is relaxed. This makes it possible to incorporate financial markets in a satisfactory way. We study the relationships between equilibrium and arbitrage opportunities, and the valuation of financial securities. The well-known CAPM is a special case of the model studied. A rigorous derivation of the CAPM is provided.

Goals
Learn about the notion of competition in a setting with many households, firms, and commodities. Understand the notions of competitive equilibrium, the first and second fundamental welfare theorem, and the core. Understand the role of financial markets in reshuffling income across time and states of the world. Learn about the consequences of market incompleteness. Understand the Capital Asset Pricing Model.

Instruction language
EN

Prerequisites
Intermediate microeconomics course, e.g. Microeconomics, or Information, Markets and Organisation. Exchange students need to have obtained a Bachelor degree with a major in Economics or Econometrics and have an advanced level in mathematics.
**Recommended literature**

**Teaching methods**
PBL
ASSIGNMENT(S)

**Assessment methods**
WRITTEN EXAM

**Key words**
Stochastic Processes

Academic year 2012-13

Date last modified
20-4-2013 1:29

Period
Period 1  Startdate: 03-Sep-12  Enddate: 26-Oct-12

Code
EBC4004

ECTS credits
6.5

Organisational unit
School of Business and Economics

Coordinator
M.B. Eichler

Description
Deterministic dynamic systems are usually not well suited for modelling real world dynamics in economics, finance and business. Allowing for random components in dynamics systems leads to stochastic dynamic modelling, which is based on stochastic processes. This course covers models of stochastic processes in discrete and continuous time. This includes Markov chains, Poisson processes and Brownian motion. We introduce various tools that are very useful for deriving and understanding the asymptotic properties of modern econometric techniques. They include the functional central limit theorem and stochastic integrals. Finally, we discuss stochastic differential equations and their applications in finance and related fields, e.g. for pricing financial derivatives.

Goals
The purpose of the course is to introduce students to the study of stochastic processes in discrete and continuous time. Students will have learned the essentials of the subject and should be able to apply the acquired theoretical tools to problems in econometrics, economics, finance, and other fields.

Instruction language
EN

Prerequisites
Only Master students can take Econometrics Master courses. Students require a solid background in mathematical statistics and probability theory on the level of the BSc Econometrics programme.

Recommended literature

**Teaching methods**

- PBL
- ASSIGNMENT(S)
- LECTURE(S)

**Assessment methods**

- WRITTEN EXAM

**Key words**
Game Theory and Optimisation

Academic year 2012-13

Date last modified
20-4-2013 1:29

Period
Period 1  Startdate: 03-Sep-12  Enddate: 26-Oct-12

Code
EBC4188

ECTS credits
6.5

Organisational unit
School of Business and Economics

Coordinator
H.J.M. Peters

Description

Goals

Instruction language

Prerequisites

Recommended literature

Teaching methods
PBL
LECTURE(S)

Assessment methods
WRITTEN EXAM

Key words
Time Series Methods and Dynamic E-metric

Academic year 2012-13

Date last modified
1-5-2012 1:21

Period
Period 2  Startdate: 29-Oct-12  Enddate: 21-Dec-12

Code
EBC4008

ECTS credits
6.5

Organisational unit
School of Business and Economics

Coordinator
J.R.Y.J. Urbain

Description
The emphasis of this course is on the study of methods for the analysis of possibly nonstationary economic time series. We consider both theoretical and practical aspects. We cover and discuss issues related to exogeneity and causality in dynamic econometric models, modelling univariate and multivariate nonstationary processes, unit roots, cointegration as well as the asymptotic theory for integrated processes. Empirical applications are also considered so that the course will provide students with practical experience in analysing univariate and multivariate time series from economics or business.

Goals
The objectives of this course are to provide students with an understanding of the concepts of modern time series methods as well as practical experience in analysing time series from economics or business. Students will have learned recent econometric methods to study multivariate economic time series. Students should be able to apply these methods to economic data.

Instruction language
EN

Prerequisites
“- Econometric methods, Stochastic Processes. - Exchange students need to have a solid background in econometric methods, probability theory and some knowledge in stochastic processes (some familiarity with Brownian Motion theory is important). Exchange students need to have obtained a Bachelor degree and an advanced level in mathematics and probability and statistics.”
Recommended literature

Teaching methods
PBL
PRESENTATION(S)
LECTURE(S)
WORK IN SUBGROUPS
PAPER(S)

Assessment methods
WRITTEN EXAM

Key words
Life Insurance I

Academic year 2012-13

Date last modified
1-5-2012 1:21

Period
Period 2  Startdate: 29-Oct-12  Enddate: 21-Dec-12

Code
EBC4119

ECTS credits
6.5

Organisational unit
School of Business and Economics

Coordinator
A.A.J. Pelsser

Description
"1. Pricing by Replication: Role of the actuary; Basic idea fair value; Duration; Inflation Risk. 2. Non-Financial Risks: Non hedgegable risks; Cost-of-Capital Method; Utility-based Pricing. 3. Equity Options: Unit linked insurance; Intro to option theory; With-Profit Policies. 4. Interest Rate Options: Interest rate swaps; Swaptions; Profit sharing; Approximation Formulas. 5. Pricing in Incomplete Markets: Cost-of-Capital Approach, Good-Deal-Bound Approach, Robustness Approach; Portfolio Replication. 6. Risk Management: Risk measures; Calculation of VaR; Solvency II; Quantitative Impact Studies. 7. Market-Consistent Embedded Value: From Measurement to Management; Pricing New Contracts: MCEV(0); Transfer Pricing."

Goals
"In this course we aim to teach students the basic principles of product pricing and measuring value creation (Embedded Value) on a market-consistent basis. The underlying principle for this course is the notion that the market-consistent value of an insurance contract is based on the market-value of the Replicating Portfolio plus an “add-on” for the remaining (unhedgegable) portions of the risk that are not covered by the Replicating Portfolio."

Instruction language
EN

Prerequisites
Bachelor Level Econometrics and Operations Research, including preparatory courses Actuarial Sciences.

Recommended literature
To be announced

**Teaching methods**
PBL
LECTURE(S)
ASSIGNMENT(S)

**Assessment methods**
PARTICIPATION
WRITTEN EXAM

**Key words**
Mathematical Finance

Academic year 2012-13

Date last modified
1-5-2012 1:21

Period
Period 4  Startdate: 04-Feb-13  Enddate: 05-Apr-13

Code
EBC4121

ECTS credits
6.5

Organisational unit
School of Business and Economics

Coordinator
E.A. Beutner

Description
The principal aim of this course is to provide students with an appreciation and understanding of how the application of mathematics, particularly stochastic mathematics, to the field of finance may be used to illuminate this field and model its randomness, resulting in greater understanding and quantification of investment returns and security prices. In particular, the course describes how to mix risky assets in order to achieve optimal trade-off between investment return and risk, and how to price or hedge a derivative security, that is, one whose value depends on that of an underlying risky asset or random variable. Following an initial discussion of the assessment and measurement of investment risk, mean-variance portfolio theory is introduced and used to determine the risk and return for a portfolio of risky assets, the composition of the optimal such portfolio, and the location of the efficient frontier. Single- and multi-factor models of asset returns are then introduced and, in conjunction with concepts from mean-variance portfolio theory, lead to the establishment of equilibrium asset pricing models, such as the Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Theory (APT). The various forms of the Efficient Markets Hypothesis are discussed against this background. Attention then turns to stochastic models for security prices, such as geometric Brownian motion, and to the essential mathematical tool required for analysis and solution of the underlying stochastic differential equations, namely the Ito calculus, and, in particular, the Ito integral and the Ito formula. With such a stochastic model for the underlying random variable, it is possible to develop a model for the valuation of a derivative security whose price is contingent on this underlying random variable, and this is a central aspect of the course. The approach to derivative security pricing, and, in particular, option pricing, is built up in stages: first, the discrete-time binomial lattice approach is used; next, the continuous-time Black-Scholes approach is used; and finally, following the introduction of concepts such as martingales and risk-neutral measures, the martingale approach, or, equivalently, the state-price deflator approach is used. Calculations of option prices are extended to the partial derivatives of such prices, the so-called Greeks, and the role of such partial derivatives in the risk management of a portfolio of derivative securities is described. Finally, the risk-neutral and state-price
deflator approaches are applied to the pricing of zero-coupon bonds and interest rate derivatives for general single-factor diffusion models of the risk-free rate of interest, such as those of Vasicek, Coss, Ingersoll, and Ross, and Hull and White.

**Goals**
The principal aim of this course is to provide students with an appreciation and understanding of how the application of mathematics, particularly stochastic mathematics, to the field of finance may be used to illuminate this field and model its randomness, resulting in greater understanding and quantification of investment returns and security prices.

**Instruction language**
EN

**Prerequisites**
Students should have knowledge of stochastic processes, in particular Brownian motion, geometric Brownian motion and the underlying stochastic differential equations. Moreover, students should be familiar with the Ito integral and the Ito formula. Knowledge of the Girsanov transformation is helpful, but not required.

**Recommended literature**

**Teaching methods**
PBL
LECTURE(S)
ASSIGNMENT(S)

**Assessment methods**
PARTICIPATION
WRITTEN EXAM

**Key words**
Life Insurance II

Academic year 2012-13

Date last modified
18-1-2013 1:28

Period
Period 5  Startdate: 08-Apr-13  Enddate: 31-May-13

Code
EBC4120

ECTS credits
6.5

Organisational unit
School of Business and Economics

Coordinator
E.A. Beutner

Description
We analyze one of the most common life insurance products – the so- called participating (or with profits) policy. The participating policies are typically equipped with an interest rate guarantee and possibly also an option to surrender (sell-back) the policy before maturity. The typical participating policy can be decomposed into a risk free bond element, a bonus option, and a surrender option. A dynamic model is constructed in which these elements can be valued separately using contingent claims analysis. The impact of various bonus policies and various levels of the guaranteed interest rate is analyzed numerically.

Goals
To get acquainted with the basic methods in life insurance and their

Instruction language
EN

Prerequisites
-

Recommended literature
To be announced

Teaching methods
PBL
Assessment methods
PARTICIPATION
WRITTEN EXAM

Key words
Stochastic Processes

Academic year 2012-13

Date last modified
20-4-2013 1:29

Period
Period 1  Startdate: 03-Sep-12  Enddate: 26-Oct-12

Code
EBC4004

ECTS credits
6.5

Organisational unit
School of Business and Economics

Coordinator
M.B. Eichler

Description
Deterministic dynamic systems are usually not well suited for modelling real world dynamics in economics, finance and business. Allowing for random components in dynamics systems leads to stochastic dynamic modelling, which is based on stochastic processes. This course covers models of stochastic processes in discrete and continuous time. This includes Markov chains, Poisson processes and Brownian motion. We introduce various tools that are very useful for deriving and understanding the asymptotic properties of modern econometric techniques. They include the functional central limit theorem and stochastic integrals. Finally, we discuss stochastic differential equations and their applications in finance and related fields, e.g. for pricing financial derivatives.

Goals
The purpose of the course is to introduce students to the study of stochastic processes in discrete and continuous time. Students will have learned the essentials of the subject and should be able to apply the acquired theoretical tools to problems in econometrics, economics, finance, and other fields.

Instruction language
EN

Prerequisites
Only Master students can take Econometrics Master courses. Students require a solid background in mathematical statistics and probability theory on the level of the BSc Econometrics programme.

Recommended literature

**Teaching methods**

PBL
ASSIGNMENT(S)
LECTURE(S)

**Assessment methods**

WRITTEN EXAM

**Key words**
Game Theory and Optimisation

Academic year 2012-13

Date last modified
20-4-2013 1:29

Period
Period 1  Startdate: 03-Sep-12  Enddate: 26-Oct-12

Code
EBC4188

ECTS credits
6.5

Organisational unit
School of Business and Economics

Coordinator
H.J.M. Peters

Description

Goals

Instruction language

Prerequisites

Recommended literature

Teaching methods
PBL
LECTURE(S)

Assessment methods
WRITTEN EXAM

Key words
Algorithms and Optimisation

Academic year 2012-13

Date last modified
1-5-2012 1:21

Period
Period 2   Startdate: 29-Oct-12   Enddate: 21-Dec-12

Code
EBC4049

ECTS credits
6.5

Organisational unit
School of Business and Economics

Coordinator
A. Grigoriev

Description
This course is devoted to mathematical models and solution methods for hard optimization problems. First, we study the theory of computational complexity, including the concept of P versus NP. In particular, we prove that some problems are computationally intractable. Given the complexity insights, solving such problems is a challenge. Therefore, we study the design and analysis of approximation algorithms and approximation schemes, as well as the derivation of inapproximability results. We also discuss local search frameworks such as Simulated Annealing, Genetic Algorithms and Tabu Search. The course is open ended, in the sense that some topics can be chosen according to student interests. Classical problems that will be covered are, among others, scheduling, coloring, set covering, and packing.

Goals
Mastering the theory of computational complexity, and the ability to design algorithms for hard optimization problems.

Instruction language
EN

Prerequisites
Students need to have obtained a Bachelor degree in Econometrics, Operations Research, Mathematics, or Computer Science. Knowledge in optimization (Linear Programming) and basic graph theory is highly recommended. Familiarity with basic algorithms and the analysis of algorithms (runtime complexity) is certainly helpful. C++ skills are also prerequisites as there will be a practical programming case.

Recommended literature
“Algorithms” by Dasgupta, Papadimitriou and Vazirani (Mc Graw-Hill) Selected chapters from several books on combinatorial optimization Research papers

**Teaching methods**

PBL
LECTURE(S)
ASSIGNMENT(S)

**Assessment methods**

WRITTEN EXAM
PARTICIPATION

**Key words**
Modelling and Solver Technology

Academic year 2012-13

Date last modified
24-7-2012 1:24

Period
Period 4  Startdate: 04-Feb-13   Enddate: 05-Apr-13

Code
EBC4051

ECTS credits
6.5

Organisational unit
School of Business and Economics

Coordinator
T. Vredeveld - van der Schaft

Description
This course is devoted to mathematical modeling of hard optimization problems. We focus on integer programming
techniques to solve these optimization problems. During this course techniques as branch and bound, cutting planes and
column generation will be discussed as well as the theory needed to understand these techniques. Furthermore, partially
by using LP and ILP solvers, these techniques will be implemented in C++.

Goals
After this course, the student is able to model (hard) optimization problems as mathematical porgrams and knows several
techniques to solve these problems. Moreover, the student can use general purpose software tools to solve these
problems.

Instruction language
EN

Prerequisites
None

Recommended literature
lecture notes

Teaching methods
PBL
PRESENTATION(S)
LECTURE(S)

Assessment methods
PARTICIPATION
WRITTEN EXAM

Key words
Operations Research Applications

Academic year 2012-13

Date last modified
17-4-2013 1:29

Period
Period 5 Startdate: 08-Apr-13 Enddate: 31-May-13

Code
EBC4187

ECTS credits
6.5

Organisational unit
School of Business and Economics

Coordinator
A. Berger

Description
Goals
Instruction language
Prerequisites
Recommended literature
Teaching methods
PBL
PAPER(S)
ASSIGNMENT(S)
PRESENTATION(S)

Assessment methods
FINAL PAPER

Key words
Master's Thesis (Variable credits)

Academic year 2012-13

Date last modified
27-10-2012 1:23

Period
Year  Startdate: 01-Sep-12  Enddate: 31-Aug-13

Code
EMTH0003

ECTS credits
10.5

Organisational unit
School of Business and Economics

Coordinator

Description

Goals

Instruction language

Prerequisites

Recommended literature

Teaching methods

Assessment methods

Key words