Courses Descriptions

Masters in Computational Finance
University of the Peloponnese

Contents

1 Masters program outline

The program lasts 3 semesters. The first two semesters involve four mandatory courses each. The third semester involves 2 elective courses and the masters thesis.

All courses will be offered in English. Also the master thesis will be written in English.

First semester

Mandatory courses	ECTS credits
Data management	7
Programming languages for finance	8
Financial products and markets	8
Probability and statistical inference	7

More details about the courses of this semester are given in Section 2.

Second semester

Mandatory courses	ECTS credits
Advanced data management	7
Advanced programming languages for finance	8
Advanced time series analysis	8
Asset management	7

More details about the courses of this semester are given in Section 3.

Third semester

Mandatory course	ECTS credits
Diploma thesis	20
Elective courses (choose any two)	**ECTS credits**
Advanced technologies for fast financial computations	5
Financial information systems	5
Financial security and anonymity	5
Risk management	5
Macroeconomics for computational finance	5

More details about the courses of this semester are given in Section 4.

2 First semester

2.1 Data management

General

Academic unit	Department of Informatics and Telecommunications
Level of studies	Postgraduate
Course code	dat-man
Semester	1
Independent teaching activities	Lectures, Project
ECTS credits	7
Type	Specialized general knowledge
Prerequisite	–
Language	English
Offered to ERASMUS students	No
Website	TBA

Learning outcomes

Students that succeed in this course should be able to:

- Design all stages of a database.
- Express simple queries.
- Express complex and aggregate queries.
- Implement applications using database management systems.

General competences

- Search for, analysis and synthesis of data and information, with the use of the necessary technology.
- Team work.
- Adapting to new situations.
- Decision-making.

Syllabus

Introduction. The entity relation model (E/R). The relational model, relational algebra and other query languages (relational calculus, Datalog, QBE). SQL. Data constraints, functional dependencies, relational database design, canonical forms. Algorithms for database design, moving from E/R to relational model. Query evaluation.

Teaching and learning methods - Evaluation

Delivery	Face-to-face
Use of information and communications technology	• Use of ICT teaching. • Communication with students.
Teaching methods	Activity semester workload: 26 Hours for Lectures. 26 Hours for Laboratory practice – Tutorials – Interactive teaching. 30 Hours for Project. 43 Hours for Studying. 125 Course total.
Student performance evaluation	Final examination (∼50%) consisting of: • Problem solving questions. • Open-ended questions. • Theory understanding short questions. Project examination and presentation (∼50%).

Attached bibliography

- Database systems: The complete book. H. Garcia-Molina, J.D. Ullman, J. Widom.
- Fundamentals of database systems. R. Elmasri and S.B. Navathe.
- Database management systems. R. Ramakrishnan and J. Gehrke.
- Database system concepts. A. Silberschatz, H.F. Korth, S. Sudarshan.

2.2 Programming languages for finance

General

Academic unit	Department of Informatics and Telecommunications
Level of studies	Postgraduate
Course code	pro-lan-fin
Semester	1
Independent teaching activities	Lectures, Project
ECTS credits	8
Type	Specialized general knowledge
Prerequisite	
Language	English
Offered to ERASMUS students	No
Website	TBA

Learning outcomes

Students that succeed in this course should be able to:

- Identify, create, and execute a program in R.
- Identify and use appropriate variables and data types.
- Control the flow of a program using conditional and repetitive execution.
- Create and handle appropriate data structures like arrays, matrices and vectors depending on the problem at hand.
- Divide the problem at hand into sub-problems and implement functions to address these sub-problems.
- Handle data input and output from various sources and in various formats.
- Implement simple statistical analysis in R.

General competences

- Search for, analysis and synthesis of data and information, with the use of the necessary technology.
- Team work.
- Adapting to new situations.
- Decision-making.

Syllabus

Introduction. Programming concepts and practices. Data types and variables. Operators and operands. Grouped expressions. Program flow control and iterations. Character and string operations. Simple data structures (vectors, arrays, matrices). Functions and scripts. Data input and output. Programming introductory statistical analyses.

Teaching and learning methods - Evaluation

Delivery	Face-to-face
Use of information and communications technology	• Use of ICT teaching. • Communication with students.
Teaching methods	Activity semester workload: 26 Hours for Lectures 13 Hours for Laboratory practice – Tutorials – Interactive teaching 36 Hours for Project 50 Hours for Studying 125 Course total
Student performance evaluation	Final examination (∼50%) consisting of: • Problem solving questions. • Open-ended questions. • Theory understanding short questions. Project examination and presentation (∼50%).

Attached bibliography

- A beginner's guide to R. A. Zuur, E. Leno and E. Meesters.
- Statistics and data with R: An applied approach through examples. Y. Cohen and J.Y. Cohen
- Introductory statistics with R.P. Dalgaard.

2.3 Financial products and markets

General

Academic unit	Department of Economics
Level of studies	Postgraduate
Course code	fin-pro-mar
Semester	1
Independent teaching activities	Lectures, Project
ECTS credits	8
Type	Specialized general knowledge
Prerequisite	
Language	English
Offered to ERASMUS students	No
Website	TBA

Learning outcomes

Students that succeed in this course should be able to:

- Understand the financial system.
- Understand the role of interest rates, financial instruments, and financial markets.
- Understand the structure of financial institutions and the role of central banks.

General competences

- Analysis and synthesis of data and information.
- Decision-making.

Syllabus

Money and the financial system (money and the payments system, financial instruments, financial markets, and financial institutions). Interest rates, financial instruments, and financial markets (future and present value, interest rates,understanding risk, bonds, bond prices, and the determination of interest rates, risk and term structure of interest rates, stocks, stock markets, and market efficiency, derivatives, foreign exchange). Financial institutions (economics of financial intermediation, depository institutions, financial industry structure, regulating the financial system). Central banks, monetary policy, and financial stability (structure of central banks, central bank balance sheet and the money supply process, monetary policy, exchange-rate policy and the central bank).

Teaching and learning methods - Evaluation

Delivery	Face-to-face
Use of information and communications technology	• Use of ICT teaching • Communication with students
Teaching methods	Activity semester workload: 39 Hours for Lectures 39 Hours for Project 47 Hours for Studying 125 Course total
Student performance evaluation	Final examination (∼40%) consisting of: • Multiple questions. • Problem solving questions. • Open-ended questions Mid-term examination (∼40%) that consists of: • Multiple questions. • Problem solving questions. • Open-ended questions. Case study (∼20%).

Attached bibliography

- Money, banking and financial markets – Global edition. S.G. Cecchetti and K.L. Schoenholtz.

2.4 Probability and statistical inference

General

Academic unit	Department of Economics
Level of studies	Postgraduate
Course code	pro-sta-inf
Semester	1
Independent teaching activities	Lectures, Project
ECTS credits	7
Type	Specialized general knowledge
Prerequisite	
Language	English
Offered to ERASMUS students	No
Website	TBA

Learning outcomes

Students that succeed in this course should be able to:

- Understand the elements from probability that are required to perform statistical inference for financial computations.
- Have a very good working knowledge of the types of statistical inference that are mostly used in financial computations.
- Extend their course knowledge further by accessing more specialized statistical inference.
- Have an excellent understanding of why statistical inference must be part of the toolbox of a practitioner of computational finance.
- Perform computations on their own on various problems that relate to statistical inference for finance.

General competences

- Analysis and synthesis of data and information.
- Decision-making.

Syllabus

Introduction. Review of probability. Understanding the role of uncertainty in statistical decision making. Linking probability with statistics. Types of samples. Methods of estimation. Setting, testing and interpreting hypotheses. Introduction to the bootstrap and simulation. Empirical applications of statistical inference in finance.

Teaching and learning methods - Evaluation

Delivery	Face-to-face
Use of information and communications technology	• Use of ICT teaching • Communication with students
Teaching methods	Activity semester workload: 39 Hours for Lectures 39 Hours for Project 47 Hours for Studying 125 Course total
Student performance evaluation	Final examination (∼40%) consisting of: • Multiple questions. • Problem solving questions. • Open-ended questions. Mid-term examination (∼40%) that consists of: • Multiple questions. • Problem solving questions. • Open-ended questions. Case study (∼20%).

Attached bibliography

- Statistics and data analysis for financial engineering. D. Ruppert.
- Optimal statistical inference for financial engineering. M. Taniguchi, J. Hirukawa and K. Tamaki.

3 Second semester

3.1 Advanced data management

General

Academic unit	Department of Informatics and Telecommunications
Level of studies	Postgraduate
Course code	adv-dat-man
Semester	2
Independent teaching activities	Lectures, Project
ECTS credits	7
Type	Specialized general knowledge
Prerequisite	–
Language	English
Offered to ERASMUS students	No
Website	TBA

Learning outcomes

Students that succeed in this course should be able to:

- Describe fundamental concepts and theory related to the architecture and functionality of a data management system.
- Describe and analyze fundamental tools and techniques used in data management systems.
- Design or adopt appropriate algorithms and techniques related to a given problem in the area of data management.

General competences

- Search for, analysis and synthesis of data and information, with the use of the necessary technology.
- Team work.
- Adapting to new situations.
- Decision-making.

Syllabus

Introduction to the database environment concepts. Architecture of database systems. Physical database design and performance. Query processing and optimization. Data warehousing. Data mining. Data visualization. Database administration (security, authorization, transaction processing, concurrency control, recovery).

Teaching and learning methods - Evaluation

Delivery	Face-to-face
Use of information and communications technology	• Use of ICT teaching. • Communication with students.
Teaching methods	Activity semester workload: 26 Hours for Lectures. 13 Hours for Laboratory practice – Tutorials – Interactive teaching. 36 Hours for Project. 50 Hours for Studying. 125 Course total.
Student performance evaluation	Final examination (∼40%) consisting of: • Problem solving questions. • Open-ended questions. • Theory understanding short questions. Project examination and presentation (∼40%). Inclass exercices (∼40%).

Attached bibliography

- Fundamentals of database systems. R. Elmasri and S.B. Navathe.
- Database management systems. R. Ramakrishnan and J. Gehrke.
- Modern database management. J. A. Hoffer, R. Venkataraman and H. Topi.
- Database system concepts. A. Silberschatz, H.F. Korth, S. Sudarshan.
- Database systems: The complete book. H. Garcia-Molina, J. D. Ullman, J. Widom.

3.2 Advanced programming languages for finance

General

Academic unit	Department of Informatics and Telecommunications
Level of studies	Postgraduate
Course code	adv-pro-lan-fin
Semester	2
Independent teaching activities	Lectures, Project
ECTS credits	8
Type	Specialized general knowledge
Prerequisite	
Language	English
Offered to ERASMUS students	No
Website	TBA

Learning outcomes

Students that succeed in this course should be able to:

- Solve problems by utilizing advanced features of the R language.
- Implement and test solutions to medium-sized real-world problems using R.
- Describe algorithmic alternatives (present algorithmic thinking and modular software design skills) that will be useful in solving large-sized problems.
- Design algorithmic solutions for demanding real-world problems

General competences

- Search for, analysis and synthesis of data and information, with the use of the necessary technology.
- Team work.
- Adapting to new situations.
- Decision-making.

Syllabus

Data handling with R (importing, exporting, generating, storing, reporting). Advanced data structures (data frames, time-series objects, lists). Graphics and plotting. Statistical analyses. Data summarisation. Efficiency issues in analyses and calculations. Debugging and stepwise execution. Package usage and creation. Interaction with other programming languages/environments. Defaults, preferences, and code documentation. Advanced and object-oriented programming with R.

Teaching and learning methods - Evaluation

Delivery	Face-to-face
Use of information and communications technology	• Use of ICT teaching. • Communication with students.
Teaching methods	Activity semester workload: 39 Hours for Lectures 13 Hours for Laboratory practice – Tutorials – Interactive teaching 30 Hours for Project 43 Hours for Studying 125 Course total
Student performance evaluation	Final examination (∼50%) consisting of: • Problem solving questions. • Open-ended questions. • Theory understanding short questions. Project examination and presentation (∼50%).

Attached bibliography

- The R book. M. J. Crawley.
- R in a nutshell: A desktop quick reference. J. Adler.
- R in action – Data analysis and graphics with R. R. Kabacoff.
- Data analysis and graphics using R – An example-based approach. J. Maindonald and W.J. Braun.

3.3 Advanced time series analysis

General

Academic unit	Department of Economics
Level of studies	Postgraduate
Course code	adv-tim-ser-ana
Semester	2
Independent teaching activities	Lectures, Project
ECTS credits	8
Type	Specialized general knowledge
Prerequisite	
Language	English
Offered to ERASMUS students	No
Website	TBA

Learning outcomes

Students that succeed in this course should be able to:

- Have a full working knowledge of basic and advanced models frequently used in time series analysis.
- Have a full working knowledge as to how they can link methods from probability and statistical inference to time series analysis.
- Understand the differences between linear and non-linear types of models and their differences in generating predictions for future periods.
- Understand the concept of financial volatility and how this is linked to various time series data.
- Have a full working knowledge on the methods that can be used to evaluate the predictive ability of various time series models.
- Apply all the above in the context of different economic and financial time series.

General competences

- Analysis and synthesis of data and information.
- Decision-making.

Syllabus

Introduction. The concept of a time series. The importance of sampling frequency. Examples of economic and financial time series and the concept of financial volatility. Stationary and non-stationary time series. Linear and non-linear models for time series analysis and forecasting. Benchmarking and backtesting for the predictive ability of time series models. Methods for volatility estimation. Multivariate models for time series analysis. Applications in empirical finance and financial econometrics.

Teaching and learning methods - Evaluation

Delivery	Face-to-face
Use of information and communications technology	• Use of ICT teaching • Communication with students
Teaching methods	Activity semester workload: 39 Hours for Lectures 39 Hours for Project 47 Hours for Studying 125 Course total
Student performance evaluation	Final examination (∼40%) consisting of: • Multiple questions. • Problem solving questions. • Open-ended questions Mid-term examination (∼40%) that consists of: • Multiple questions. • Problem solving questions. • Open-ended questions. Case study (∼20%).

Attached bibliography

- Statistics and data analysis for financial engineering. D. Ruppert.
- Optimal statistical inference for financial engineering. M. Taniguchi, J. Hirukawa and K. Tamaki.
- Financial econometrics. S. Rachev, S. Mittnik, F. Fabozzi, S. Focardi and T. Jasik.
- Analysis of financial time series. R. Tsay.

3.4 Asset management

General

Academic unit	Department of Economics
Level of studies	Postgraduate
Course code	adv-tim-ser-ana
Semester	2
Independent teaching activities	Lectures, Project
ECTS credits	7
Type	Specialized general knowledge
Prerequisite	
Language	English
Offered to ERASMUS students	No
Website	TBA

Learning outcomes

Students that succeed in this course should be able to:

- Understand Quantitative Equity Portfolio Management.
- Understand the process of portfolio construction.
- Understand the role of factor models on portfolio construction
- Understand the asset owner dilemma
- Perform mean variance investments
- Have a full working knowledge of the differences between short and long term investment
- Understand the factor theory Apply the factor investment procedure
- Apply all the above in the context of different economic and financial time series.

General competences

- Analysis and synthesis of data and information.
- Decision-making.

Syllabus

The asset owner dilemma. Mean Variance Investing, Investing for the long run, investing over the life cycle. Factor theory, Factors, Equities, Bonds, Alpha, Factor investing, hedge funds.

Teaching and learning methods - Evaluation

Delivery	Face-to-face
Use of information and communications technology	• Use of ICT teaching • Communication with students
Teaching methods	Activity semester workload: 39 Hours for Lectures 39 Hours for Project 47 Hours for Studying 125 Course total
Student performance evaluation	Final examination (∼40%) consisting of: • Multiple questions. • Problem solving questions. • Open-ended questions Mid-term examination (∼40%) that consists of: • Multiple questions. • Problem solving questions. • Open-ended questions. Case study (∼20%).

Attached bibliography

- Asset management: A systematic approach to factor investing. A. Ang.
- Active portfolio management: a quantitative approach for producing superior returns and selecting superior returns and controlling risk. R.C. Grinold and R.N. Kahn.

4 Third semester

4.1 Advanced technologies for fast financial computations

General

Academic unit	Department of Informatics and Telecommunications
Level of studies	Postgraduate
Course code	adv-tec-fas-fin-com
Semester	3
Independent teaching activities	Lectures, Project
ECTS credits	5
Type	Specialized general knowledge
Prerequisite	
Language	English
Offered to ERASMUS students	No
Website	TBA

Learning outcomes

Students that succeed in this course should be able to:

- Understand and analyze problems and studies of acceleration technologies used for financial applications.
- Exploit the latest software and hardware technologies by applying them to overcome bottlenecks in current and future large-scale financial computation.

General competences

- Search for, analysis and synthesis of data and information, with the use of the necessary technology.
- Working in an interdisciplinary environment.
- Adapting to new situations.
- Production of free, creative and inductive thinking.

Syllabus

Financial applications with high-end processing requirements (high frequency automated trading systems, low or zero-latency market data, real-time risk analysis applications). Applications of dataflow computing to finance (risk management, real time margining and initial and lifetime margining calculations, value at risk, counterparty risk). Processing requirements description. Software and hardware platforms for acceleration of processing (graphics processing units,, multi-chip modules, PLDA IP and board-level products, FPGAs).

Teaching and learning methods - Evaluation

Delivery	Face-to-face
Use of information and communications technology	• Use of ICT teaching. • Communication with students.
Teaching methods	Activity semester workload: 39 Hours for Lectures 13 Hours for Laboratory practice – Tutorials – Interactive teaching 30 Hours for Project 43 Hours for Studying 125 Course total
Student performance evaluation	Final examination (∼50%) consisting of: • Problem solving questions. • Open-ended questions. • Theory understanding short questions. Project examination and presentation (∼50%).

Attached bibliography

- TBA

4.2 Financial information systems

General

Academic unit	Department of Informatics and Telecommunications
Level of studies	Postgraduate
Course code	fin-inf-sys
Semester	3
Independent teaching activities	Lectures, Project
ECTS credits	5
Type	Specialized general knowledge
Prerequisite	
Language	English
Offered to ERASMUS students	No
Website	TBA

Learning outcomes

Students that succeed in this course should be able to:

- Define accounting information systems and describe the foundational concepts.
- Describe different types of fraud, express the basic ethic principles, list and apply internal control mechanisms.
- Describe and apply risk management strategies relevant to IT systems.
- Describe and apply principles of corporate and IT governance.
- Describe and apply the procedures for auditing information technology-based processes.
- Explain how different IT infrastructure elements can be used in the context of accounting information systems, e-commerce and e-business and assess the suitability of each option for the purpose of implementing a given goal.
- Describe and apply accounting information systems-related processes and controls for selected business processes.

General competences

- Search for, analysis and synthesis of data and information, with the use of the necessary technology.
- Working in an interdisciplinary environment.
- Showing social, professional and ethical responsibility and sensitivity to gender issues.
- Team work.
- Adapting to new situations.
- Decision-making.

Syllabus

Introduction. Foundational concepts. Fraud, ethics and internal control. Internal control and risks in IT systems. Corporate governance. IT governance. Auditing information technology-based processes. Data and database. E-commerce and e-business. IT Infrastructure for e-business. Processes and controls for selected business processes.

Teaching and learning methods - Evaluation

Delivery	Face-to-face
Use of information and communications technology	• Use of ICT teaching. • Communication with students.
Teaching methods	Activity semester workload: 32 Hours for Lectures 7 Hours for Laboratory practice – Tutorials – Interactive teaching 36 Hours for Project 50 Hours for Studying 125 Course total
Student performance evaluation	Final examination (∼50%) consisting of: • Problem solving questions. • Open-ended questions. • Theory understanding short questions. Project examination and presentation (∼50%).

Attached bibliography

- Accounting information systems: The processes and controls. L. Turner and A. Weickgenannt

4.3 Financial security and anonymity

General

Academic unit	Department of Informatics and Telecommunications
Level of studies	Postgraduate
Course code	fin-sec-anon
Semester	3
Independent teaching activities	Lectures, Project
ECTS credits	5
Type	Specialized general knowledge
Prerequisite	
Language	English
Offered to ERASMUS students	No
Website	TBA

Learning outcomes

Students that succeed in this course should be able to:

- Describe basic principles of financial services and mechanisms to protect them.
- Evaluate the impact in the security of tools and certainparameter choices.
- Describe well-known attacks on financial systems and the weaknesses they exploit.

General competences

- Search for, analysis and synthesis of data and information, with the use of the necessary technology.
- Working in an interdisciplinary environment.
- Showing social, professional and ethical responsibility and sensitivity to gender issues.
- Team work.
- Adapting to new situations.
- Decision-making.

Syllabus

Introduction (financial applications, technologies, economics), security aspects (threats, security services, measures), topics in cryptography (symmetric cryptography, public?key cryptography, hash functions), e-cach (protocols, concepts, building blocks, security), wallets (offline, web-based, protocols), micropayment systems (systems, security), public?key infrastructures (digital signatures, public-key certificates), trusted third parties(architectures, technologies), privacy and anonymity (overview, systems, protocols, anonymous currencies), web protocols(SSL, TLS).

Teaching and learning methods - Evaluation

Delivery	Face-to-face
Use of information and communications technology	• Use of ICT teaching. • Communication with students.
Teaching methods	Activity semester workload: 39 Hours for Lectures 13 Hours for Laboratory practice – Tutorials – Interactive teaching 30 Hours for Project 43 Hours for Studying 125 Course total
Student performance evaluation	Final examination (∼50%) consisting of: • Problem solving questions. • Open-ended questions. • Theory understanding short questions. Project examination and presentation (∼50%).

Attached bibliography

- Handbook of financial cryptography and security. B. Rosenberg.
- Understanding bitcoin - Cryptography, engineering and economics. P. Franco.

4.4 Risk management

General

Academic unit	Department of Economics
Level of studies	Postgraduate
Course code	ris-man
Semester	3
Independent teaching activities	Lectures, Project
ECTS credits	5
Type	Specialized general knowledge
Prerequisite	
Language	English
Offered to ERASMUS students	No
Website	TBA

Learning outcomes

Students that succeed in this course should be able to:

- Understand the role of risk management in the banking sector.
- Estimate value-at-risk and expected shortfall.
- Perform backtesting analysis.
- Understand credit and operational risk management.
- Understand the basel accords.

General competences

- Analyze and synthesis of data and information.
- Team work.
- Decision-making.

Syllabus

Introduction. The need of risk management. VaR ? based regulatory capital. Computing VaR. Liquidity risk. Stress testing. Credit risk management. Operational risk management.

Teaching and learning methods - Evaluation

Delivery	Face-to-face
Use of information and communications technology	• Use of ICT teaching. • Communication with students.
Teaching methods	Activity semester workload: 39 Hours for Lectures 39 Hours for Project 47 Hours for Studying 125 Course total
Student performance evaluation	Final examination (∼40%) consisting of: • Multiple questions. • Problem solving questions. • Open-ended questions Mid-term examination (∼40%) that consists of: • Multiple questions. • Problem solving questions. • Open-ended questions. Case study (∼20%).

Attached bibliography

- Value at risk: The new benchmark for managing financial risk.P. Jorion.
- Financial institutions management: A risk management approach. A. Sauders and M. Cornett.

4.5 Macroeconomics for computational finance

General

Academic unit	Department of Economics
Level of studies	Postgraduate
Course code	mac-com-fin
Semester	3
Independent teaching activities	Lectures, Project
ECTS credits	5
Type	Specialized general knowledge
Prerequisite	
Language	English
Offered to ERASMUS students	No
Website	TBA

Learning outcomes

Students that succeed in this course should be able to:

- Understand the basic and intermediate theory of macroeconomics.
- Read and understand various macroeconomic measures.
- Link the evolution of the macroeconomy with the local and global financial markets.
- Manipulate (find, download and post-process) various kinds of macroeconomic data.
- Create simple associations and models, using real world data, to understand the impact of the macroeconomy in various kinds of financial data.
- Understand the importance and implications of macroeconomic news announcements and the impact that they have in the future evolution of financial data.

General competences

- Analyze and synthesis of data and information.
- Team work.
- Decision-making.

Syllabus

Introduction. Basic macroeconomic concepts – Why study macroeconomics. Basic and intermediate macroeconomic theory (classical, keynesian, new keynesian, monetarist, real business cycle, macroeconomic growth theories etc.). The link of macroeconomics with global financial markets. Types of macroeconomic data. Methods and models to link the macroeconomy with financial data. Empirical applications.

Teaching and learning methods - Evaluation

Delivery	Face-to-face
Use of information and communications technology	• Use of ICT teaching. • Communication with students.
Teaching methods	Activity semester workload: 39 Hours for Lectures 39 Hours for Project 47 Hours for Studying 125 Course total
Student performance evaluation	Final examination (∼25%) consisting of: • Multiple questions. • Problem solving questions. • Open-ended questions Mid-term examination (∼25%) that consists of: • Multiple questions. • Problem solving questions. • Open-ended questions. Case study (∼50%).

Attached bibliography

- International macroeconomics and finance: Theory and econometric methods. M. Nelson.
- Foundations of international macroeconomics. M. Obstfeld and K. Rogoff.
- Advanced macroeconomics. D. Romer.
- Exchange rate dynamics. E. Evans.

4.6 Quantitative trading strategies

General

Academic unit	Department of Economics
Level of studies	Postgraduate
Course code	qua-tra-str
Semester	3
Independent teaching activities	Lectures, Project
ECTS credits	5
Type	Specialized general knowledge
Prerequisite	
Language	English
Offered to ERASMUS students	No
Website	TBA

Learning outcomes

Students that succeed in this course should be able to:

- Understand the need for exploring various mathematical and statistical ideas through the simulation and testing of a quantitative trading strategy.
- Understand important concepts that make a quantitative strategy a viable candidate for real world application.
- Have a full working knowledge of the statistics required to successfully evaluate the performance of a quantitative trading strategy.
- Have a full working knowledge of the implications of trading costs in the performance of a quantitative trading strategy.
- Design and implement a basic quantitative trading strategy and create a presentation with its performance.
- Understand the need for benchmarking any strategy to one or more base models in order to compare performance.

General competences

- Analyze and synthesis of data and information.
- Team work.
- Decision-making.

Syllabus

Introduction. Basic trading concepts. Understanding trading costs. The design of a quantitative trading strategy with examples. Different strategies for different data? Setting up the backtesting. Performance evaluation and benchmarking. From simulation to real time: Differences and implications. Empirical applications in practice accounts.

Teaching and learning methods - Evaluation

Delivery	Face-to-face
Use of information and communications technology	• Use of ICT teaching. • Communication with students.
Teaching methods	Activity semester workload: 39 Hours for Lectures 39 Hours for Project 47 Hours for Studying 125 Course total
Student performance evaluation	Final examination (∼20%) consisting of: • Multiple questions. • Problem solving questions. • Open-ended questions Case study (∼80%).

Attached bibliography

- Quantitative trading with R. H. Georgakopoulos.
- Python for finance. Y. Hilpisch.