

COURSE OUTLINE

(1) GENERAL

SCHOOL	Finance and Statistics		
ACADEMIC UNIT	Banking and Financial Management		
LEVEL OF STUDIES	Postgraduate program		
COURSE CODE		SEMESTER	
COURSE TITLE	Quantitative Methods and Introduction to Python and R		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>		WEEKLY TEACHING HOURS	CREDITS
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	Preparation Class		
PREREQUISITE COURSES:	No		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	English		
IS THE COURSE OFFERED TO ERASMUS STUDENTS			
COURSE WEBSITE (URL)			

(2) LEARNING OUTCOMES

Learning outcomes <i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i> <i>Consult Appendix A</i> • Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area • Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B • Guidelines for writing Learning Outcomes
The course reviews material from undergraduate courses in Mathematical Analysis, Linear Algebra, Probability, Statistics and Econometrics and introduces students to the programming languages Python and R. With the successful completion of the course, students will 1. Have the technical tools necessary for successfully attending the quantitative courses of the program such as Computational and Quantitative Finance, Introduction to Statistical Learning, Modern Programming Methods, and Artificial Intelligence and Machine Learning in Finance. 2. Be able to complete simple programming exercises in Python and R.

General Competences <i>Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?</i>	
<i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i> <i>Adapting to new situations</i> <i>Decision-making</i> <i>Working independently</i> <i>Team work</i> <i>Working in an international environment</i> <i>Working in an interdisciplinary environment</i> <i>Production of new research ideas</i>	<i>Project planning and management</i> <i>Respect for difference and multiculturalism</i> <i>Respect for the natural environment</i> <i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i> <i>Criticism and self-criticism</i> <i>Production of free, creative and inductive thinking</i> <i>.....</i> <i>Others...</i> <i>.....</i>
• Search for, analysis and synthesis of data and information, with the use of the necessary technology • Decision making • Working independently • Team work • Project planning and management • Production of free, creative and inductive thinking	

(3) SYLLABUS

1. Review of basic concepts in Mathematical Analysis, sequences, series, functions, continuity, differentiability, integration, convexity, optimization of functions. 2. Review of basic concepts in Linear Algebra, matrix operations, quadratic forms, positive definiteness, eigenvalues and eigenvectors, singular value decomposition. 3. Review of basic concepts in Probability, conditional probability, Bayes rule, discrete and continuous random variables, expected value, variance, moments, moment generating functions, law of large numbers, central limit theorem. 4. Review of basic concepts in Statistics/Econometrics, parameters, estimators, unbiasedness, mean squared error, consistency, method of moments, maximum likelihood, confidence intervals, hypothesis testing, linear regression model. 5. Introduction to Python and R, illustration of the theoretical topics covered using programming languages.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face-to-face.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	Using of PowerPoint slides

<i>Use of ICT in teaching, laboratory education, communication with students</i>	The slides-notes of the lectures are offered in electronic form to the students through an electronic platform (e-class) Communication with students via email																										
TEACHING METHODS <i>The manner and methods of teaching are described in detail.</i> <i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i> <i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i>	<table border="1"> <thead> <tr> <th><i>Activity</i></th><th><i>Semester workload</i></th></tr> </thead> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr> <td>Course total</td><td> </td></tr> </tbody> </table>	<i>Activity</i>	<i>Semester workload</i>																							Course total	
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STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i> <i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i> <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	Pass/Fail Exam (100%)																										

(5) ATTACHED BIBLIOGRAPHY

- *Suggested bibliography:*

Mathematics for Economists (1994) by Simon and Blume
Introductory Statistics with R (2008) by Dalgaard
A First Course in Probability (2014) by Ross
Linear Algebra with Applications to Economics (2024) by Khrushchev