Syllabus

Course Description

Course Title	Mathematics for Economists
Course Code	27356
Course Title Additional	
Scientific-Disciplinary Sector	
Language	English
Degree Course	Bachelor in Economics and Management
Other Degree Courses (Loaned)	
Lecturers	Prof. Dr. Martin Meier, Martin.Meier@unibz.it https://www.unibz.it/en/faculties/economics-management/academic-staff/person/50913 Dr. Paolo Maraner, PMaraner@unibz.it https://www.unibz.it/en/faculties/economics-management/academic-staff/person/12920
Teaching Assistant	
Semester	All semesters
Course Year/s	1
CP	12
Teaching Hours	36+36
Lab Hours	60+60
Individual Study Hours	-
Planned Office Hours	18+18
Contents Summary	M1: The course "Mathematics for Economists M1" deals with basic mathematical concepts like sets, relations, functions, numbers, limits and absolute values. Moreover we will introduce functions of one variable by studying their basic properties, derivatives and their calculus, Taylor approximations and the Newton's method. We will also address the single-variable optimization (Fermat's rule and sufficient optimality conditions) and the elements of

	integration. M2: In this course we study linear algebra and functions of several variables.
Course Topics	M1: Sets, relations, functions. Basic algebra, numbers, approximations, sequences and their limits, series, geometric series. Real functions (polynomial, rational, irrational, exponential and logarithmic functions), limits of functions, differentiation,Taylor approximations, Newton's method, convexity, single variable optimization, integration. M2: 1. Matrix calculus, rank and linear independence, systems of linear equations, Gaussian elimination, applications. 2. Functions of several variables: gradients, Hesse matrices, Taylor approximation, convexity. 3. Multivariable optimization, Lagrange method and economic applications. Simple least square regression. 4. If enough time remains: Basics of probability theory.
Keywords	mathematics for economists, sets, relations, functions, linear algebra, optimization
Recommended Prerequisites	none
Propaedeutic Courses	none
Teaching Format	Lectures and exercise sessions
Mandatory Attendance	not mandatory, but strongly suggested
Specific Educational Objectives and Learning Outcomes	Knowledge and understanding (A4b2) Area: Quantitative Methods for Decision Making knowledge of basic and intermediate level mathematical tools for understanding and analysing economic mechanisms through theoretical models and empirical applications knowledge of tools for static, dynamic, and comparative analysis of data on individuals, firms, and economies knowledge and understanding of descriptive statistics, the fundamentals of probability theory and sample methods, standard distributions and their application to economic analysis as well as linear and non-linear regression understanding of parametric estimation and hypothesis testing Knowledge of computer tools necessary for reading and analysing economic data and models

	knowledge of the structure of computer networks, their main applications and security techniques as well as techniques for data collection, presentation and analysis using appropriate software knowledge of international accounting systems and the double-entry method for the recognition and measurement of business operations "understanding of financial statements " "in-depth knowledge of accounting data recognition or management control " Knowledge of the analysis method for estimating present values and discount factors for estimating the cost of capital and valuation of bonds and shares Knowledge of medium and long-term financial forecasting methodologies and sensitivity analysis with simulation under uncertainty to manage risks in corporate and international finance knowledge and understanding of the international financial environment, multinational risk defence techniques and competitive strategies adopted by global banks knowledge of the mechanisms underlying effective communication of quantitative topics in three languages: Italian, German and English "Ability to apply knowledge and understanding (A4b2)" Area: quantitative methods for decision-making to be able to analyse (unconstrained) optimisation problems and to mathematically interpret models of social and economic dynamics to be able to formalise economic problems by means of mathematical models, to solve such problems and to interpret the results conceptually being able to analyse economic data using descriptive statics, parametric and non-parametric methods as well as linear and non-linear regression and interpret the results knowing how to apply international accounting standards to the various contexts of business reality knowing how to derive and interpret economic information taken from the web knowing how to use computers and computer networks to analyse

	large quantities of data in solving complex problems and to write theses and articles knowing how to evaluate fixed-income and equity financial instruments of companies listed on stock markets through the use of spreadsheet programs knowing how to analyse financial statements by means of balance sheet ratios and communicate the results in accordance with international professional standards being able to apply the main theories on capital, foreign exchange and commodity markets to actually observed data, also in an international context knowing how to set up and carry out an empirical project using econometric software and financial or economic databases knowing how to use techniques for evaluating the performance of financial investments and understanding the price formation mechanisms of risky financial assets and spot and forward interest rates knowing how to work with basic and intermediate level mathematical tools, and basic level statistics, to study the behaviour of economic actors, from a theoretical and empirical point of view knowing how to analyse economic datasets using spreadsheets or other suitable software knowing how to use computer tools for the analysis of economies being able to communicate the results of quantitative analyses prepared according to international professional standards in three languages: Italian, German and English Making judgements choose the most appropriate quantitative and qualitative methods of analysis find the necessary information in databases, legal sources and scientific literature use logical reasoning to combine information and analytical methods, also using modern software packages, to arrive at a solution Learning skills analyse, critically process and integrate data, information and future experience, also using advanced software

Specific Educational Objectives and Learning Outcomes (additional info.)	
Assessment	M1: A written final exam (questions and problems to solve) which counts 100% for the M1 partial grade. M2: A written final exam (questions and problems to solve) which counts 100% for the M2 partial grade. The final mark is the average of the marks of M1 and M2 - There is no different assessment for attending and non-attending students.
Evaluation Criteria	Final grade: 50% grade for M1 partial grade, 50% for M2 partial grade. The results of assignments and partial exams are only valid for the academic year in question. They cannot be carried over beyond that time frame.
Required Readings	Lecture Slides that will be uploaded in the reserve collection.
Supplementary Readings	None.
Further Information	
Sustainable Development Goals (SDGs)	No poverty, Partnerships fot the goals, Good health and well-being, Quality education, Gender equality, Clean water and sanitation, Affordable and clean energy, Decent work and economic growth, Industry, innovation and infrastructure, Reduced inequalities, Sustainable cities and communities, Responsible consumption and production, Climate action, Life below water, Life on land, Peace, justice and strong institutions, Zero hunger

Course Module

Course Constituent Title	Mathematics for Economists 1
Course Code	27356A
Scientific-Disciplinary Sector	STAT-04/A
Language	English
Lecturers	Prof. Dr. Martin Meier, Martin.Meier@unibz.it

	https://www.unibz.it/en/faculties/economics-management/academic-staff/person/50913
Teaching Assistant	
Semester	First semester
CP	6
Responsible Lecturer	
Teaching Hours	36
Lab Hours	60
Individual Study Hours	
Planned Office Hours	18
Contents Summary	The course "Mathematics for Economists M1" deals with basic mathematical concepts like sets, relations, functions, numbers, limits and absolute values. Moreover we will introduce functions of one variable by studying their basic properties, derivatives and their calculus, Taylor approximations and the Newton's method. We will also address the single-variable optimization (Fermat's rule and sufficient optimality conditions) and the elements of integration.
Course Topics	Sets, relations, functions. Basic algebra, numbers, approximations, sequences and their limits, series, geometric series. Real functions (polynomial, rational, irrational, exponential and logarithmic functions), limits of functions, differentiation,Taylor approximations, Newton's method, convexity, single variable optimization, integration.
Teaching Format	Lectures and exercise sessions.
Required Readings	Lecture notes provided in due course (available in the Reserve Collection).
Supplementary Readings	

Course Module

Course Constituent Title	Mathematics for Economists 2
Course Code	27356B
Scientific-Disciplinary Sector	STAT-04/A
Language	English

Lecturers	Prof. Dr. Martin Meier, Martin.Meier@unibz.it https://www.unibz.it/en/faculties/economics-management/academic-staff/person/50913
Teaching Assistant	
Semester	Second semester
CP	6
Responsible Lecturer	
Teaching Hours	36
Lab Hours	60
Individual Study Hours	
Planned Office Hours	18
Contents Summary	In this course we study linear algebra and functions of several variables.
Course Topics	1. Matrix calculus, rank and linear independence, systems of linear equations, Gaussian elimination, applications. 2. Functions of several variables: gradients, Hesse matrices, Taylor approximation, convexity. 3. Multivariable optimization, Lagrange method and economic applications. Simple least square regression. 4. If enough time remains: Basics of probability theory.
Teaching Format	Lectures and exercise sessions.
Required Readings	Lecture notes provided in due course (available in the Reserve Collection)
Supplementary Readings	