

# Syllabus

## *Course Description*

<b>Course Title</b>	Mathematics for Economists
<b>Course Code</b>	27356
<b>Course Title Additional</b>	
<b>Scientific-Disciplinary Sector</b>	
<b>Language</b>	English
<b>Degree Course</b>	Bachelor in Economics and Management
<b>Other Degree Courses (Loaned)</b>	
<b>Lecturers</b>	Prof. Dr. Martin Meier, Martin.Meier@unibz.it <a href="https://www.unibz.it/en/faculties/economics-management/academic-staff/person/50913">https://www.unibz.it/en/faculties/economics-management/academic-staff/person/50913</a>
<b>Teaching Assistant</b>	
<b>Semester</b>	All semesters
<b>Course Year/s</b>	1
<b>CP</b>	12
<b>Teaching Hours</b>	36+36
<b>Lab Hours</b>	60+60
<b>Individual Study Hours</b>	-
<b>Planned Office Hours</b>	36
<b>Contents Summary</b>	<p>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.</p> <p>M2: In this course we study linear algebra and functions of several variables.</p>

<b>Course Topics</b>	<p>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.</p> <p>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.</p>
<b>Keywords</b>	mathematics for economists, sets, relations, functions, linear algebra, optimization
<b>Recommended Prerequisites</b>	none
<b>Propaedeutic Courses</b>	none
<b>Teaching Format</b>	Lectures and exercise sessions
<b>Mandatory Attendance</b>	
<b>Specific Educational Objectives and Learning Outcomes</b>	<p>ILO 1 Knowledge and understanding  ILO 1.1 knowledge of basic and intermediate level mathematical tools for understanding and analysing economic mechanisms through theoretical models and empirical applications</p> <p>ILO 2 Apply knowledge and understanding  ILO 2.1 know how to analyse (unconstrained) optimisation problems and mathematically interpret models of social and economic dynamics  ILO2.2 knowing how to work with basic and intermediate level mathematical and basic level statistical tools to study the behaviour of economic subjects, from a theoretical and empirical point of view</p> <p>ILO 3 Making judgements  ILO 3.1 choose the most appropriate quantitative and qualitative methods of analysis</p>

	<p>ILO 4 Learning skills</p> <p>ILO 4.1 analyse, critically process and integrate data, information and future experience, also using advanced software</p>
<b>Specific Educational Objectives and Learning Outcomes (additional info.)</b>	
<b>Assessment</b>	<p>M1: A written final exam (questions and problems to solve) which counts 100% for the M1 partial grade. ILO 1.1, ILO 2.1, ILO 3.1, ILO 4.1.</p> <p>M2: A written final exam (questions and problems to solve) which counts 100% for the M2 partial grade. ILO 1.1, ILO 2.1, ILO 3.1, ILO 4.1.</p> <p>The final mark is the average of the marks of M1 and M2 -</p> <p>There is no different assessment for attending and non-attending students.</p>
<b>Evaluation Criteria</b>	<p>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.</p>
<b>Required Readings</b>	<p>Lecture Slides that will be uploaded in the reserve collection.</p>
<b>Supplementary Readings</b>	<p>None.</p>
<b>Further Information</b>	
<b>Sustainable Development Goals (SDGs)</b>	<p>No poverty, Partnerships for 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</p>

## *Course Module*

<b>Course Constituent Title</b>	Mathematics for Economists 1
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<b>Course Code</b>	27356A
<b>Scientific-Disciplinary Sector</b>	STAT-04/A
<b>Language</b>	English
<b>Lecturers</b>	Prof. Dr. Martin Meier, Martin.Meier@unibz.it <a href="https://www.unibz.it/en/faculties/economics-management/academic-staff/person/50913">https://www.unibz.it/en/faculties/economics-management/academic-staff/person/50913</a>
<b>Teaching Assistant</b>	
<b>Semester</b>	First semester
<b>CP</b>	6
<b>Responsible Lecturer</b>	
<b>Teaching Hours</b>	36
<b>Lab Hours</b>	60
<b>Individual Study Hours</b>	
<b>Planned Office Hours</b>	18
<b>Contents Summary</b>	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.
<b>Course Topics</b>	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.
<b>Teaching Format</b>	Lectures and exercise sessions.
<b>Required Readings</b>	Lecture notes provided in due course (available in the Reserve Collection).
<b>Supplementary Readings</b>	

## *Course Module*

<b>Course Constituent Title</b>	Mathematics for Economists 2
<b>Course Code</b>	27356B
<b>Scientific-Disciplinary Sector</b>	STAT-04/A
<b>Language</b>	English
<b>Lecturers</b>	Prof. Dr. Martin Meier, Martin.Meier@unibz.it <a href="https://www.unibz.it/en/faculties/economics-management/academic-staff/person/50913">https://www.unibz.it/en/faculties/economics-management/academic-staff/person/50913</a>
<b>Teaching Assistant</b>	
<b>Semester</b>	Second semester
<b>CP</b>	6
<b>Responsible Lecturer</b>	
<b>Teaching Hours</b>	36
<b>Lab Hours</b>	60
<b>Individual Study Hours</b>	
<b>Planned Office Hours</b>	18
<b>Contents Summary</b>	In this course we study linear algebra and functions of several variables.
<b>Course Topics</b>	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.
<b>Teaching Format</b>	Lectures and exercise sessions.
<b>Required Readings</b>	Lecture notes provided in due course (available in the Reserve Collection)
<b>Supplementary Readings</b>	