Syllabus

Descrizione corso

Titolo insegnamento	Matematica per EPE
Codice insegnamento	27279
Titolo aggiuntivo	
Settore Scientifico-Disciplinare	
Lingua	Inglese
Corso di Studio	Corso di laurea in Economia, Politica ed Etica
Altri Corsi di Studio (mutuati)	
Docenti	dr. Luciano Marzufero, Luciano.Marzufero@unibz.it https://www.unibz.it/en/faculties/economics-management/academic-staff/person/49853 prof. dr. Martin Meier, Martin.Meier@unibz.it https://www.unibz.it/en/faculties/economics-management/academic-staff/person/50913 dr. Paolo Maraner, Paolo.Maraner@unibz.it https://www.unibz.it/en/faculties/economics-management/academic-staff/person/12920
Assistente	
Semestre	Tutti i semestri
Anno/i di corso	1
CFU	12
Ore didattica frontale	72 (36 + 36)
Ore di laboratorio	72 (36 + 36)
Ore di studio individuale	-
Ore di ricevimento previste	36 (18 + 18)
Sintesi contenuti	Mathematics A This course introduces the fundamental concepts of mathematical

	analysis, starting from the basic language of sets, functions, and numbers. It develops tools for the study of single-variable functions, including limits, derivatives, Taylor expansions, and other properties. Optimization in one dimension and basic notions of convexity are also covered, together with an introduction to integral calculus. Mathematics B This course builds on the foundations of Mathematics A and extends them to multivariable contexts. It covers linear algebra techniques and the study of functions of several variables, including gradients and other properties. Topics also include convexity/concavity and optimization methods, with special emphasis on the Lagrange method and applications in economics. Time permitting, a short introduction to probability theory is provided.
Argomenti dell'insegnamento	MATHEMATICS A: 1. Basic mathematical concepts: sets, relations, functions, numbers, limits, absolute values. 2. Functions of one variable: basic properties, derivatives and their calculus, Taylor approximations, Newton's method. 3. Convexity and single-variable optimization (Fermat's rule and sufficient optimality conditions). 4. Elements of integration (indefinite, definite and improper). MATHEMATICS 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 and concavity. 3. Multivariable optimization, Lagrange method and economic applications. 4. If enough time remains: Basics of probability theory.
Parole chiave	sets; relations; functions; limits; derivatives; Taylor

	approximations; Newton's method; optimization; integration; matrix calculus; system of linear equations; Gaussian elimination method; gradients; multivariable optimization; Lagrange method.
Prerequisiti	
Insegnamenti propedeutici	None
Modalità di insegnamento	Lectures and exercise sessions
Obbligo di frequenza	Suggested, but not mandatory
Obiettivi formativi specifici e risultati di apprendimento attesi	ILO (Intended Learning Outcomes) - M-1 Mathematics A for EPE ILO 1 Knowledge and understanding ILO 1.1 knowledge of mathematical techniques for solving optimisation problems; ILO 1.2 knowledge of the technical vocabulary of the subjects of this learning area; ILO 2 Applying knowledge and understanding: ILO 2.1 ability to calculate derivatives and partial derivatives; ILO 2.2 ability to calculate limits and sums of series; ILO 2.3 ability to use quantitative methods to solve problems in economics; ILO 2.4 ability to read, write and communicate in the technical language of quantitative methods in the three official languages of instruction; ILO 3 Autonomy of judgement ILO 3.1 Acquisition of the ability to judge and of the methodological tools useful for the critical analysis of data, sources, assumptions and implications of scientific practice, of the political, ethical and legal context within which economic phenomena are set and with which they interact ILO 4 Communication skills ILO 4.1 Proficiency (oral and written) in Italian, German and English, including translation between these languages. Intercultural competence. Conceptual awareness, synthesis and written expression, in particular in the drafting of scientific or

	science-based documents ILO 5 Learning skills ILO 5.1 Promotion of critical thinking and analytical skills to focus on complex problems in their long-term dynamics and the variety of their implications, including ethical ones ILO (Intended Learning Outcomes) - M-2 Mathematics B for EPE ILO 1 Knowledge and understanding ILO 1.1 knowledge of mathematical techniques for solving optimisation problems; ILO 1.2 knowledge of probabilistic and inferential tools for using statistical models; ILO 1.3 knowledge of the technical vocabulary of the subjects of this learning area. ILO 2 Applying knowledge and understanding: ILO 2.1 ability to calculate derivatives and partial derivatives; ILO 2.2 ability to calculate limits and sums of series; ILO 2.3 ability to use quantitative methods to solve problems in economics; ILO 2.4 ability to read, write and communicate in the technical language of quantitative methods in the three official languages of instruction; ILO 3 Autonomy of judgement ILO 3.1 Acquisition of the ability to judge and of the methodological tools useful for the critical analysis of data, sources, assumptions and implications of scientific practice, of the political, ethical and legal context within which economic phenomena are set and with which they interact ILO 4 Communication skills

	ILO 4.1 Proficiency (oral and written) in Italian, German and English, including translation between these languages. Intercultural competence. Conceptual awareness, synthesis and written expression, in particular in the drafting of scientific or science-based documents ILO 5 Learning skills ILO 5.1 Promotion of critical thinking and analytical skills to focus on complex problems in their long-term dynamics and the variety of their implications, including ethical ones
Obiettivi formativi specifici e risultati di apprendimento attesi (ulteriori info.)	
Modalità di esame	A written final exam (questions and problems to solve) covering both M1 and M2 parts (M1 partial exam and M2 partial exam, respectively). Written exam of maximal 120min at the end of each module. There is no different assessment for attending and non-attending students.
Criteri di valutazione	Final grade: 50% grade for M1 partial exam, 50% for M2 partial exam. The grades of partial exams are only valid for the academic year in question. They cannot be carried over beyond that time frame.
Bibliografia obbligatoria	• Lecture notes provided in due course (available in the Reserve Collection) • L. Peccati, S. Salsa, A. Squellati, "Mathematics for Economics and Business", Bocconi University Press, 2016. • Further readings will be announced at the beginning of the course.
Bibliografia facoltativa	
Altre informazioni	
Obiettivi di Sviluppo Sostenibile (SDGs)	Partnership per gli obiettivi, Istruzione di qualità

Modulo del corso

Titolo della parte costituente del corso	Matematica A per EPE

Codice insegnamento	27279A
Settore Scientifico-Disciplinare	STAT-04/A
Lingua	Inglese
Docenti	prof. dr. Martin Meier, Martin.Meier@unibz.it https://www.unibz.it/en/faculties/economics-management/academic-staff/person/50913 dr. Luciano Marzufero, Luciano.Marzufero@unibz.it https://www.unibz.it/en/faculties/economics-management/academic-staff/person/49853
Assistente	
Semestre	Primo semestre
CFU	6
Docente responsabile	
Ore didattica frontale	36
Ore di laboratorio	36
Ore di studio individuale	-
Ore di ricevimento previste	18
Sintesi contenuti	This course introduces the fundamental concepts of mathematical analysis, starting from the basic language of sets, functions, and numbers. It develops tools for the study of single-variable functions, including limits, derivatives, Taylor expansions, and other properties. Optimization in one dimension and basic notions of convexity are also covered, together with an introduction to integral calculus.
Argomenti dell'insegnamento	MATHEMATICS A for EPE: 1. Basic mathematical concepts: sets, relations, functions, numbers, limits, absolute values. 2. Functions of one variable: basic properties, derivatives and their calculus, Taylor approximations, Newton's method. 3. Convexity and single-variable optimization (Fermat's rule and sufficient optimality conditions). 4. Elements of integration (indefinite, definite and improper).

Modalità di insegnamento	Lectures and exercise sessions
Bibliografia obbligatoria	Lecture notes provided in due course (available in the Reserve Collection) L. Peccati, S. Salsa, A. Squellati, Mathematics for Economics and Business, Bocconi University Press, 2016.
Bibliografia facoltativa	

Modulo del corso

Titolo della parte costituente del corso	Matematica B per EPE
Codice insegnamento	27279B
Settore Scientifico-Disciplinare	STAT-04/A
Lingua	Inglese
Docenti	dr. Paolo Maraner, Paolo.Maraner@unibz.it https://www.unibz.it/en/faculties/economics-management/academic-staff/person/12920 prof. dr. Martin Meier, Martin.Meier@unibz.it https://www.unibz.it/en/faculties/economics-management/academic-staff/person/50913
Assistente	
Semestre	Secondo semestre
CFU	6
Docente responsabile	
Ore didattica frontale	36
Ore di laboratorio	-
Ore di studio individuale	-
Ore di ricevimento previste	18
Sintesi contenuti	This course builds on the foundations of Mathematics A and extends them to multivariable contexts. It covers linear algebra techniques and the study of functions of several variables, including gradients and other properties. Topics also include convexity/concavity and optimization methods, with special

	emphasis on the Lagrange method and applications in economics. Time permitting, a short introduction to probability theory is provided.
Argomenti dell'insegnamento	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 and concavity. 3. Multivariable optimization, Lagrange method and economic applications. 4. If enough time remains: Basics of probability theory.
Modalità di insegnamento	Lectures and exercise sessions.
Bibliografia obbligatoria	Lecture notes provided in due course (available in the Reserve Collection)
Bibliografia facoltativa	