Syllabus

Descrizione corso

Titolo insegnamento	Introduction to Analysis and Optimization Techniques
Codice insegnamento	76436
Titolo aggiuntivo	
Settore Scientifico-Disciplinare	MATH-03/A
Lingua	Inglese
Corso di Studio	Corso di laurea in Informatica e Management delle Aziende digitali
Altri Corsi di Studio (mutuati)	
Docenti	dr. Andrea Mazzullo, Andrea.Mazzullo@unibz.it https://www.unibz.it/en/faculties/engineering/academic-staff/person/38537 dr. Mufutau Ajani Rufai, MufutauAjani.Rufai@unibz.it https://www.unibz.it/en/faculties/engineering/academic-staff/person/48142
Assistente	
Semestre	Secondo semestre
Anno/i di corso	1
CFU	6
Ore didattica frontale	40
Ore di laboratorio	20
Ore di studio individuale	90
Ore di ricevimento previste	18
Sintesi contenuti	- Sequences and series - Univariate functions - Derivatives and differentials - Indefinite and Riemann integrals - Basic optimization techniques in one variable - Mathematical tools for decision making without and with

	uncertainty
Argomenti dell'insegnamento	• Sequences and series: definitions and basic properties of sequences and series of real numbers. • Univariate functions: definitions and basic properties of real functions in one variable, limits, continuity. • Derivatives and differentials: definitions and main theorems of differential calculus. • Indefinite and Riemann integrals: definitions and main theorems of integral calculus. • Basic optimization techniques in one variable: study of functions, local and global extrema, first and second derivative tests, standard form of optimization problems, Taylor polynomials, Newton's method. • Mathematical tools for decision making without and with uncertainty: sets and relations, principle of mathematical induction, basics of Combinatorics, Newton's Binomial Theorem, Pascal's Triangle, hints on Multivariate Calculus and applications.
Parole chiave	Mathematical Analysis, Optimization Techniques
Prerequisiti	None.
Insegnamenti propedeutici	
Modalità di insegnamento	• Frontal classroom lectures • Lab exercises In the lectures, concepts and techniques are introduced, both by presenting notions on the blackboard and by collectively discussing related exercises and examples. In the labs, students (either in small groups, or individually) develop possible approaches to address the exercises proposed by the lecturer and compare their solutions with the rest of the class.
Obbligo di frequenza	Attendance is not compulsory, but highly encouraged. All the material used in the lectures and in the labs will be made available on the MS Teams of the course. However, students should note that an active engagement in understanding the theoretical notions and in finding solutions to the exercises is required to reach the learning outcomes of the course.
Obiettivi formativi specifici e risultati di apprendimento attesi	The course belongs to the type "di base – formazione matematico-fisica". The course offers an introduction to the fundamental concepts and

	techniques of elementary calculus, mathematical analysis and optimization in connection to their use in business informatics and economics. Knowledge and understanding: • D1.1 - Possess basic knowledge of mathematical analysis, algebra, numerical calculation and optimisation methods which support computer science and advanced economics. Applying knowledge and understanding: • D2.1 - Ability to use mathematics and statistical data analysis tools to solve computational problems. Learning skills • D5.1 - Learning ability to undertake further studies with a high degree of autonomy.
Obiettivi formativi specifici e risultati di apprendimento attesi (ulteriori info.)	
Modalità di esame	The final exam consists of a written test (100%) of 3 hours, containing questions and exercises on the material covered during the course. The aim of both the written test is to check to which degree students have mastered the following learning outcomes: 1) acquiring knowledge and understanding; 2) applying knowledge and understanding.
Criteri di valutazione	Correctness and clarity of the answers.
Bibliografia obbligatoria	• L. Peccati, S. Salsa, A. Squellati. Mathematics for Economics and Business. Bocconi University Press, 2017. Subject Librarian: David Gebhardi, David.Gebhardi@unibz.it
Bibliografia facoltativa	• Michiel Bertsch, Roberta Dal Passo, Lorenzo Giacomelli. Analisi Matematica. MacGraw Hill, 2011 (in Italian). • M. Bramanti, C. Pagani, S. Salsa. Analisi Matematica 1. Zanichelli, 2008 (in Italian). • E. Lanconelli. Lezioni di Analisi Matematica 1. Pitagora, 1994 (in Italian).

	• W. Rudin. Principles of Mathematical Analysis. McGraw-Hill, 1976 (3rd ed.).
Altre informazioni	
Obiettivi di Sviluppo Sostenibile (SDGs)	Istruzione di qualità