Syllabus

Course Description

Course Title	Financial mathematics
Course Code	27504
Course Title Additional	
Scientific-Disciplinary Sector	SECS-S/06
Language	English
Degree Course	Master in Data Analytics for Economics and Management
Other Degree Courses (Loaned)	Loaned from course 25425 - Master in Accounting and Finance (LM-77 AF)
Lecturers	Prof. Dr. Peter Alfons Schmid, PeterAlfons.Schmid@unibz.it https://www.unibz.it/en/faculties/economics-management/academic-staff/person/44766
Teaching Assistant	
Semester	First semester
Course Year/s	1
CP	6
Teaching Hours	36
Lab Hours	-
Individual Study Hours	-
Planned Office Hours	18
Contents Summary	The course provides the main mathematical concepts and techniques used in the financial industry. These are pricing of bonds, term structure determination, mechanics and pricing of derivatives (forwards, futures, swaps and options) and the use of derivatives. Thus, you learn the necessary foundations in order to attend other finance classes on the master's level.
Course Topics	Time value of money, interest rate markets and conventions, pricing of bonds, duration and convexity, interest rate term structure determination and yield spreads, mechanics of forward and future markets; determination of forward and future prices;

	interest rate and currency swaps; credit default swaps; mechanics of option markets; trading strategies involving options; binomial trees; Wiener processes; Black-Scholes-Merton model; options on stock indices, currencies, and futures; the Greek letters; volatility smile.
Keywords	Interest rates, term structure, duration, convexity, forwards, futures, swaps, options, risk-neutral valuation, binomial trees, Black-Scholes-Merton model, Greek letters, volatility smile.
Recommended Prerequisites	
Propaedeutic Courses	
Teaching Format	Frontal lectures and mini cases.
Mandatory Attendance	Recommended, but not required.
Specific Educational Objectives and Learning Outcomes	Knowledge and understanding: The student acquires specific knowledge of the economic and business domains of his/her interest and necessary to address decision-making and management issues in public and private organisations with an interdisciplinary perspective. In the Data Analytics for Economics track, knowledge will be oriented towards economic theory, economic analysis and econometrics through the development of micro- and macroeconomics, decision theory under conditions of uncertainty, time series analysis and forecasting techniques, and methods for causal inference from both administrative and experimental data. Knowledge will also be oriented towards data analysis. In the Business Analytics track, the knowledge acquired will concern the tools necessary for analysing and interpreting business and organisational data, as well as business economic measurements, business models and their evolution, tools and techniques to support decision-making, performance measurement systems consistent with digitisation and sustainability processes, the governance of marketing processes, with particular regard to digital and interactive marketing and the impact of digitisation on marketing activities. Applying knowledge and understanding: Ability to analyse business issues that characterise data-driven decision support through the application of statistical and computational models. Ability to use and apply models for market analysis and economic

	policy formulation. Making judgements: Master's graduates will have the ability to apply the acquired knowledge to interpret data in order to make directional and operational decisions in an economic-business context. Master graduates will have the ability to apply the acquired knowledge to support processes related to production, management and risk promotion activities and investment choices through the organisation, analysis and interpretation of complex databases. Communication skills: Master's graduates will be able to communicate effectively in oral and written form the specialised contents of the individual disciplines, using different registers, depending on the recipients and the communicative and didactic purposes, and to evaluate the formative effects of their communication. Learning skills: "MSc graduates should be familiar with the tools of scientific research. They will also be able to make autonomous use of information technologies to carry out bibliographic research and investigations both for their own training and for further education. In addition, through the curricular teaching and the activities related to the preparation of the final thesis, they will be able to acquire the ability. - to identify thematic links and to establish relationships between methods of analysis and application contexts; - to frame a new problem in a systematic manner and to implement appropriate analysis solutions; - to formulate general statistical-econometric models from the phenomena studied.
Specific Educational Objectives and Learning Outcomes (additional info.)	
Assessment	Written exams after 50% and at the end of the semester.
Evaluation Criteria	1st session: assessment based on mid-term (33%) and final exam (67%) or final exam (100%)

	2nd and 3rd session: final exam (100%)
Required Readings	John Hull: Optionen, Futures und andere Derivate, Pearson, 11th ed, 2021.
Supplementary Readings	Selected chapters from CFA Institute Curriculum 2025 edition, Level I – III
Further Information	
Sustainable Development Goals (SDGs)	Decent work and economic growth, Responsible consumption and production, Industry, innovation and infrastructure