Syllabus

Course Description

Course Title	Mathematics of Finance
Course Code	27331
Course Title Additional	
Scientific-Disciplinary Sector	STAT-04/A
Language	English
Degree Course	Bachelor in Economics and Management
Other Degree Courses (Loaned)	
Lecturers	dr. Silvia Bressan, Silvia.Bressan@unibz.it https://www.unibz.it/en/faculties/economics-management/academic-staff/person/37763
Teaching Assistant	
Semester	First semester
Course Year/s	2
CP	6
Teaching Hours	36
Lab Hours	18
Individual Study Hours	-
Planned Office Hours	
Contents Summary	The course deals with: Mathematics of time value of money and interest rates: Students will explore the relationship between time and the value of money. Mathematics of bond investments: Students will learn the main features and mathematical foundations of government and corporate bonds. Mathematics of risk and return: Students will be introduced to the risk/reward trade- off of financial assets, focusing on equity

	instruments.
Course Topics	Mathematics of time value of money: Students will explore the relationship between time and the value of money. Key concepts include interest rates, discounting and compounding of cash flows, present value and future value of single sums, annuities, perpetuities, and debt retirement methods. Mathematics of bond investments: Students will learn the main features and the mathematical foundations of government and corporate bonds. Key concepts include bond evaluation and pricing, determination of yield rates and rates of return, and the measurement of interest rate risk. Hints to green bonds. Mathematics of risk and return: Students will be introduced to the risk/reward trade-off of financial assets, focusing on equity instruments. Students will learn tools to analyse both historical asset returns and expected returns.
Keywords	Interest rate, discounting/compounding of cash flows, annuities, debt retirement, corporate bonds, government bonds, bond pricing, bond yield to maturity, forward rates, term structure of interest rates, bond duration, bond convexity, corporate equity, holding period return, log-return, expected return, risk of corporate equity, volatility, tail risk.
Recommended Prerequisites	No prerequisites, however it is advisable that the students have basic prior knowledge in statistics as well as in calculus and linear algebra.
Propaedeutic Courses	
Teaching Format	Frontal lectures and frontal exercise sessions. Exercises will be solved using a standard calculator. Few examples will also be presented using Excel/R. Knowledge on the use of Excel/R is not a prerequisite and is not covered by the final assessment.
Mandatory Attendance	Attendance not compulsory but strongly recommended
Specific Educational Objectives and Learning Outcomes	ILO (Intended Learning Outcomes) ILO 1 Knowledge and understanding ILO 1.1 Knowledge of the method of analysis for estimating present values and discount factors to estimate the cost of capital and valuation of bonds and shares

	ILO 1. 2 Knowledge of medium and long-term financial forecasting methodologies and sensitivity analysis with simulation under uncertainty to manage risks in corporate and international finance ILO 1.3 knowledge and understanding of the international financial environment, multinational risk defence techniques and competitive strategies adopted by global banks ILO 2 Ability to apply knowledge and understanding ILO 2.1 be able to apply the main theories of capital, foreign exchange and commodity markets to actual observed data, including in the international context ILO 2.2 be able to use techniques for evaluating the performance of financial investments and understand the mechanisms of price formation of risky financial assets and spot and forward interest rates ILO 2.3 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 ILO3 Making judgements ILO 3.1 choose the most appropriate quantitative and qualitative methods of analysis ILO 3.2 finding the necessary information in databases, legal sources and scientific literature ILO 3.3 use logical reasoning to combine information and analytical methods, also using modern software packages, to arrive at a solution.B38 ILO 4 Learning skills ILO 4.1 retrieve information from databases, scientific literature, laws and regulations as required in professional life ILO 4.2 analyse, critically process and integrate data, information and future experience, also using advanced software
Specific Educational Objectives and Learning Outcomes (additional info.)	
Assessment	Written exam for attending and non-attending students with theoretical review questions and numerical exercises (ILOs 1-4).

Evaluation Criteria	Final mark from exam assessment (100%). Relevant for exam assessment: Theoretical knowledge of the concepts covered in class and ability to solve financial problems.
Required Readings	Lecture slides and notes with exercises provided by the lecturer. The content of the materials is based on the following textbooks: - Jonathan Berk, and P. DeMarzo, “Corporate Finance”, 4th edition, Pearson, 2017. ISBN: 9780134083278; - Zvi Bodie, Z., A. Kane, and A. Marcus, “Investments”, 13th Edition, 2024. ISBN: 9781264412662; - Raymond Brooks, “Financial Management: Core Concepts”, 4th Edition, Pearson, 2019. ISBN: 9780134730417; - Frank J. Fabozzi, “Capital Markets: Institutions, Instruments, and Risk Management”, 5th Edition 2015, ISBN: 978-0-262-02948-3; - Gary C. Guthrie, and L. D. Lemon, “Mathematics of Interest Rates and Finance”, New International Edition, Pearson, 2014. ISBN: 9780130461827.
Supplementary Readings	
Further Information	
Sustainable Development Goals (SDGs)	Affordable and clean energy, Responsible consumption and production, Industry, innovation and infrastructure