Freie Universität Bozen
Libera Università di Bolzano
Università Liedia de Bulsan

Syllabus
Course description

Course title	**Financial Mathematics**
Course code	**27504 (loaned from 25425)**
Scientific sector	SECS-S/06
Degree	Master in Data Analytics for Economics and Management LM-Data (curriculum Data Analytics for Economics) (loaned from Master in Accounting and Finance)
Semester and academic year	1st semester 2024/2025
Year	1
Credits	6
Modular	No

Total lecturing hours	36
Total lab hours	-
Total exercise hours	-
Attendance	suggested, but not required
Prerequisites	not foreseen
Course page	https://www.unibz.it/en/faculties/economics-management/master-accounting-finance/ https://www.unibz.it/en/faculties/economics-management/master-data-analytics-economics-management/

Specific educational objectives	The purpose of the class is to expose students to the mathematical concepts and techniques used in the financial industry. Students will learn basic concepts as "time-value of money", interest rate conventions, pricing interest-sensitive securities, portfolio theory, sensitivity measures (e.g. duration, beta), the structure, mechanics and the pricing of derivatives (forwards, futures, swaps and options) using the no-arbitrage principle, the use of derivatives.

Lecturer	Alex Weissensteiner Office E206 e-mail: Alex.Weissensteiner@unibz.it

	Tel: 0471/013496 http://www.unibz.it/en/economics/people/StaffDetails.html?personid=1080&hstf=1080
Scientific sector of the lecturer	SECS-S/06
Teaching language	English
Office hours	please refer to the lecturer's web page
Lecturing assistant	-
Teaching assistant	-
Office hours	-
List of topics covered	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; 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.
Learning outcomes	1. Knowledge and understanding: Knowledge of the major financial instruments and how to price them. Understand the principle of diversification and portfolio theory. Understanding of the no-arbitrage pricing principle (fundamental theorem of asset pricing). 2. Applying knowledge: Ability to measure financial risks and to hedge them with financial derivatives, to price risky assets by applying the fundamental theorem of asset pricing. 3. Making judgments: Relevant examples should encourage students to express their own judgments in classroom and to improve their problem-solving skills. 4. Communication skills: The applied teaching method (mix of theory and applications) should stimulate the participation of students in classroom discussions. 5. Learning skills: The course should provide the necessary foundations in financial mathematics in order to attend other finance classes in the Master program.

Assessment	Written exams: one mid-term and a final exam at the end of the semester.

	The mid-term and final exams are aimed at verifying skill 1 (Knowledge and understanding). Specific questions concerning interpretation of results and calculation in real applications during the exams will be aimed at verifying skills 2, 3 and 4 (Applying knowledge and understanding, Making judgements, Communication skills). Such questions will be largely based on practical in class activities carried out in groups as well as individually. Autonomous study (5, Learning skills) is also assessed since passing the mid-term and final exams possible by the autonomous execution of exercises suggested by the teacher for homework.
Assessment language	English
Evaluation criteria and criteria for awarding marks	Assessment based on mid-term (33%, counts for the January exam session only) and final exam (67%, or 100% in case of missed mid-term exam). Threshold (18 out of 30+ points). For exam sessions after January, 100% of the assessment is based on the final exam.

Required readings	John Hull: Optionen, Futures und andere Derivate, Pearson, 9th ed, 2017
Supplementary readings	P. Wilmott, S. Howison and J. Dewynne, The Mathematics of Financial Derivatives: A Student Introduction, Cambridge University Press, 1995 Selected chapters from CFA Institute Curriculum 2018 edition, Level I – III