Freie Universität Bozen
Libera Università di Bolzano
Università Liedia de Bulsan

Syllabus
Course description

Course title	**Financial Engineering and quantitative investment strategies**
Course code	**25424**
Scientific sector	SECS-S/06
Degree	LM 77 A&F
Semester	2
Year	2023/2024
Credits	6
Modular	No

Total lecturing hours	36
Total lab hours	-
Total exercise hours	-
Attendance	Highly recommended
Prerequisites	Financial Mathematics
Course page	

Specific educational objectives	The purpose of this course is 1) to introduce students to a broad array of topics from Financial Engineering and 2) to equip students with tools and methodologies for implementing quantitative investment strategies. A special focus is given to alternative investments as capital formation partly shifted away from public markets and traditional assets. Based on financial theory, methods of engineering, tools of mathematics and programming, the course builds a coherent picture of current industry trends and methods used by sophisticated investment market players to earn abnormal returns and hedge risks. Practical examples will be analyzed by using the software package "R". Summarizing, the course enables students to develop the theoretical knowledge and practical skills required for coping with various problems encountered in modern financial markets.

Lecturer	Peter Alfons Schmid Office E310 e-mail: peteralfons.schmid@unibz.it
Scientific sector of the lecturer	SECS-S/06
Teaching language	English
Office hours	18

Lecturing assistant	Not foreseen
Teaching assistant	Not foreseen
Office hours	18h
List of topics covered	• Quantitative methods: Review of financial mathematics and modelling. • Credit risk transfer: Determination of credit risk and usage of instruments like credit default swaps, total return swaps, asset backed securities, etc. • Structured products: Development and pricing of products - based on equities and fixed income securities - that exhibit specific return, risk or other attributes. • Alternative investments: Fundamentals of the alternative investment space, especially real assets, private equity & hedge funds. Adding value through active management (absolute & relative returns, risk reduction through diversification) • Investment strategies: Theoretical foundation and empirical testing of trend following, and momentum strategies, fixed-income strategies and relative value & event driven strategies.
Teaching format	Lectures and applications in R.

Learning outcomes	Knowledge and understanding: • Knowledge of modern finance topics with advanced use of quantitative methods. • Understanding and knowledge of the tools necessary to estimate and manage financial markets perplexities. • Knowledge how to solve real world quantitative finance problems using R. Applying knowledge and understanding: • Analyze and solve complex portfolio problems. • Find the necessary literature and data to solve financial problems. • Being able to use R to solve problems of quantitative finance. • Implement and test trading strategies. Making judgments • Being able to choose the appropriate methods and techniques to be applied in various real-life situations common to the financial industry. Communication skills • Being able to communicate financial decisions based on empirical evidence. Learning skills • Being able to understand and find a solution for financial problems. • Identify and obtain the necessary data to be used as an input for problem-solving tasks.

Assessment	Students may **opt between two different types of assessment**: 1) **Standard assessment** for the course is an obligatory final examination which is a closed book written exam (100% of the final grade). 2) Moreover, there is the possibility of an **optional assessment**, where students write a project paper and have their performance assessed by both the project paper (50% of the final grade) and the obligatory final examination (50% of the final grade). The optional assessment is only available for attending students having notified the lecturer of their choice at the latest on the date of the 9th lecture. The optional course project can be done in groups of 2 students.
Assessment language	English
Evaluation criteria and criteria for awarding marks	Theoretical knowledge of models and concepts covered in the class as well as knowledge of their empirical applications.

Required readings	Selected chapters from: • Financial Engineering and Computation: Principles, Mathematics, Algorithms by Y.-D. Lyuu, 2002, Cambridge University Press. • Principles of Financial Engineering by R. Kosowski and S.N. Neftci, 2015, Academic Press. • Alternative Investments: CAIA Level I, 4th edition, by D.R. Chambers, M.J.P. Anson, K.H. Black, H.B. Kazemi, 2020, Wiley Finance Editions.
Supplementary readings	Research papers will be provided during class.