

**Master's Degree in Business Administration and Management (LM-77)**  
**Quantitative Methods for Economics and Finance**  
a.y. 2024-2025, 2nd year, 1st semester, 9 ECTS Credits

**Prof. Francesco Rania**

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| <b>Course Information</b>                          | Quantitative Methods for Economics and Finance (SECS-S/06) 9 ECTS – 63 hours<br>Lesson period: 2nd year, 1st semester, a.y. 2024-2025   |
| <b>Professor Information</b>                       | Prof. Francesco Rania<br>Department of Law, Economy and Sociology<br>Website: <a href="https://www.diges.unicz.it/web/docenti/rania-francesco/">https://www.diges.unicz.it/web/docenti/rania-francesco/</a><br>Email: <a href="mailto:raniaf@unicz.it">raniaf@unicz.it</a><br>Phone: +39 0961 3694 4987<br>Office hours: during the lesson period; before and after the lessons and every month before the examination  |
| <b>Course Description</b>                          | Quantitative Methods for Economics and Finance aims to provide mathematical statistical tools and prediction methods, which allow the investigation on economic, financial, and social phenomena.   |
| <b>Course goals and Expected Learning Outcomes</b> | Upon course completion, a student will be able to: <ul style="list-style-type: none"> <li>• Calculate and interpret confidence interval estimates of population parameters</li> <li>• Formulate and conduct tests of significance for population parameters;</li> <li>• Describe and apply the classical regression model and its application to cross-section data.</li> <li>• Competently use regression, logit and probit analysis to quantify economic relationships using standard regression programmes in simple applications.</li> <li>• Apply regression analysis to fit time-series models with awareness of some of the econometric problems.</li> <li>• Describe and apply the stochastic – geometric processes with awareness of some of the financial problems.</li> </ul>  |
| <b>Program</b>                                     | <p><u>Elements of Statistics:</u> Organization and representation of data; synthetic indicators of central position, variability, skewness, and kurtosis; Statistical ratios; random variables; estimation, tests of hypothesis.</p> <p><u>Bivariate analysis:</u> cross tables of categorical variables, independence test; the linear regression of a cardinal variable with a single regressor, assumptions, OLS method, regressor estimate and test, model test.</p> <p><u>Multivariate analysis:</u> linear regression of a cardinal variable with several regressors, OLS method, regressor estimates and tests, model test; logistic regression of a categorical variable, Odds ratio; regression with time effects; the assumptions and standard errors in the regression with fixed effects.</p> <p><u>Stochastic processes:</u> Gauss, Markov, and Wiener processes.</p> <p><u>Financial data analysis:</u> prices, returns, shares; Markowitz model; Efficient frontier; Risk aversion; Single index model; Selection of the optimal portfolio in a downside risk context.</p> <p><u>The event study method:</u> the model; statistical analysis; Multi-title analysis; Application of the event study methodology to a business case. <u>Black-Litterman model:</u> the equilibrium approach, investor view and confidence level, the Bayesian approach, Black-Littermann model.</p> <p><u>Elements of Social Finance.</u></p> <p><u>Integrated risk management:</u> Market risk, Value at risk, Methods to</p> |

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|  | compute Var, Credit risk, Credit Metrics method, Credit derivatives, operational risk, operational risk exposure, basic method, standardized method, advanced methods.  |   |  |   |
| <b>Expected student workload</b>                                     | Approximately 150 hours.  |   |  |   |
| <b>Teaching methods</b>  | <ul style="list-style-type: none"> <li>- Lectures</li> <li>- Case studies</li> <li>- Exercises during the classroom lessons</li> </ul>  |   |  |   |
| <b>Learning resources (textbooks, eventual further reading, ...)</b> | <p><u>Textbook</u></p> <ul style="list-style-type: none"> <li>- James H. Stock, Mark W. Watson, Introduzione all'econometria, redatto da F. Peracchi, Pearson Addison Wesley (2009 edition or next).</li> <li>- Marco Micocci, Giovanni Battista Masala, Manuale di Matematica Finanziaria Metodi e strumenti quantitativi per il risk management, Carocci editore 2012.</li> </ul> <p><u>Further reading</u></p> <ul style="list-style-type: none"> <li>- Hansjoerg Albrecher, Andreas Binder, Volkmar Lautscham, Philipp Mayer, Introduction to Quantitative Methods for Financial Markets, Birkauer Basel Springer 2013.</li> <li>- Gujarati: Basic Econometrics, Fourth Edition McGraw-Hill 2004</li> </ul> |   |  |   |
| <b>Support activities</b>  | Subject-specific seminars   |   |  |   |
| <b>Attendancy policy</b>   | The attendancy policy is established by art. 8 of the University teaching regulation: <a href="http://www.unicz.it/pdf/regolamento_didattico_ateneo_dr681.pdf">http://www.unicz.it/pdf/regolamento_didattico_ateneo_dr681.pdf</a> .   |   |  |   |
| <b>Assesment Methods</b>   | The course does not include intermediate assessment tests.<br>The examination is written and oral. The student must have obtained a score of 14/30 in the written part to be able to sit for the final (oral) part.   |   |  |   |
|  | <b>Grade</b>  | <b>Grade knowledge and understanding of the topic</b> | <b>Ability to analyze and synthesize</b>   | <b>Use of references</b>                            |
|  | Fail  | Severe shortcomings and inaccuracies                  | Irrelevant frequent generalizations. Inability to synthesize                                   | Completely inappropriate                            |
|  | 18-20   | Sufficient. Important shortcomings.                   | Sufficient capabilities  | Sufficient  |
|  | 21-23   | Basic knowledge                                       | The student is capable of correct analysis and synthesis, he argues logically and consistently | The student uses standard references                |
|  | 24-26   | Satisfactory. Good knowledge                          | The student has good analysis and synthesis skills. The arguments are expressed consistently   | The student uses standard references                |
|  | 27-29   | Very good   | The student has considerable skills in analysis and synthesis                                  | The student studies in depth the topics of the exam |
|  | 30-30L  | Excellent   | The student has Excellent analysis and synthesis skills  | Important insights                                  |