

**Bachelor Degree in Business Administration (L-18)**  
**Mathematics for Economics and Finance**  
a.y. 2020-2021, 1st year, 2nd semester, 12 ECTS Credits

**Prof. Francesco Rania**

<b>Course Information</b>	Mathematics for Economics and Finance (SECS-S/06) 12 ECTS – 84 hours Lesson period: 1st year, 2nd semester, a.y. 2020-2021
<b>Professor Information</b>	Prof. Francesco Rania Department of Law, Economy and Sociology Website: <a href="https://www.diges.unicz.it/web/docenti/rania-francesco/">https://www.diges.unicz.it/web/docenti/rania-francesco/</a> Email: <a href="mailto:raniaf@unicz.it">raniaf@unicz.it</a> Phone: +39 0961 3694 4987 Office hours: during the lesson period; before and after the lessons and every month before the examination
<b>Course Description</b>	The course aims to provide mathematical tools in Linear Algebra, Mathematical Analysis, and Financial Mathematics to model and solve basic economic and financial problems.
<b>Course goals and Expected Learning Outcomes</b>	Upon course completion, a student will be able to: <ul style="list-style-type: none"> <li>• Know and apply the tools of Mathematical Analysis</li> <li>• Understand and use the basic concepts of linear algebra and matrices, including linear transformations, eigenvectors and the characteristic polynomial</li> <li>• Know and apply arithmetic and geometric progressions, series, sequence;</li> <li>• Describe and solve simple static and dynamic problems in the economic and financial field;</li> <li>• Acknowledge and represent an equilibrium problem and decision problem in the economic and financial field.</li> </ul>
<b>Program</b>	<p><b>Module 1</b>  Numerical sets; Arithmetic operations; Solving equations; Simple inequalities; Calculating percentage.  Set theory; propositions, theorems, connectives, implications, necessary and sufficient conditions.  Functions; Composition of functions; Inverse function; Graphs.  Topology of R; Euclidean metrics; Relationships between point and set.  Function of one real variable; Elementary functions; Limits (notes); Continuous functions; Derivative of function; Rules for finding the derivative; Taylor polynomial; Free and constrained Optimization; Absolute minimum and maximum.</p> <p><b>Module 2</b>  Capitalization and actualization; Interest and discount; Compounding interest; Equivalent rates; Present value of a complex transaction; Incomes and loans; Amortization plans.  Functions of several variables; Case <math>n=2</math>; Level curves; Continuity and derivability; Partial derivate; Quadratic Forms.  Weierstrass Theorem; Fermat Theorem; Sufficient condition to calculate the local minimum and maximum; Constrained optimization; Lagrange method; Kuhn-Tucker conditions.  Vector Space <math>R^n</math>; linearly independent vectors; Bases; Linear transformations; Kernel and Image.  Matrix Algebra; Square matrices; Determinants; Inverse matrix; Rank of matrix; Systems of linear equations; Gauss method.  Eigenvectors and the characteristic polynomial; Diagonal matrix.</p>

	Indefinite integrals; differentiation and integration; Rules for finding integrals; Definite integrals; Improper integrals. Difference equations of the first and second order; Differential equations of the first and second order. Linear programming; Graphical method.			
<b>Expected student workload</b>	Approximately 210 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>- K. Sydsaeter, P. Hammond, A. Strom, Metodi Matematici per l'Analisi Economica e Finanziaria, Pearson Italia, 2015.</li> </ul> <p><u>Further reading</u></p> <ul style="list-style-type: none"> <li>- L. Peccati, S. Salsa, A. Squellati, Matematica per l'economia e l'azienda, Terza Edizione, Egea Editore, Milano.</li> <li>- A. Torriero, M. Scovenna, L. Scaglianti, Manuale di Matematica, Metodi e applicazioni, Cedam, 2013.</li> <li>- M. Micocci, G.B. Masala, Metodi e strumenti quantitativi per il risk management, Carocci editore 2012 (Parte Prima).</li> <li>- C.P. Simon, L.E. Blume, Matematica 1 per l'Economia e le Scienze Sociali, Università Bocconi Editore, 2002.</li> <li>- C.P. Simon, L.E. Blume, Matematica 2 per l'Economia e le Scienze Sociali, Università Bocconi Editore, 2002.</li> <li>- T. Bradley, Essential mathematics for Economics and Business, 4th edition Wiley.</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 includes intermediate assessment tests for attending students. 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