UBBFSEGA FSEGA
CLUJ-NAPOCA
Universitatea Babeş-Bolyai | Facultatea de Ştiinţe Economice şi Gestiunea Afacerilor

UNIVERSITATEA BABEŞ-B Facultatea de Ştiinţe Economice şi Gestiunea Afacerilor
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DETAILED SYLLABUS
Linear Algebra and Probabilities

1. Information about the study program

1.1 University	Babeş-Bolyai University
1.2 Faculty	Faculty of Economics and Business Administration
1.3 Department	Statistics, Forecasts, Mathematics
1.4 Field of study	Accounting
1.5 Program level (bachelor or master)	Master
1.6 Study program / Qualification	Accounting and Organizations

2. Information about the subject

2.1 Subject title	EME0623 Linear Algebra and Probabilities				
2.2 Course activities professor	Prof. dr. Paula CURT				
2.3 Seminar activities professor	Prof. dr. Paula CURT				
2.4 Year of study	I	2.5 Semester	1	2.6 Type of assessment SE	2.7 Subject regime CO

3. Total estimated time (teaching hours per semester)

3.1 Number of hours per week	3	out of which: 3.2 course	1	3.3 seminar/laboratory	2
3.4 Total number of hours in the curriculum	42	out of which: 3.5 course	14	3.6 seminar/laboratory	28
Time distribution					Hours
Study based on textbook, course support, references and notes					37
Additional documentation in the library, through specialized databases and field activities					25
Preparing seminars/laboratories, essays, portfolios and reports					40
Tutoring					3
Assessment (examinations)					3
Others activities					

3.7 Total hours for individual study	108
3.8 Total hours per semester	150
3.9 Number of credits	6

4. Preconditions **(if necessary)**

4.1 Curriculum	It is not the case
4.2 Skills	It is not the case

5. Conditions (if necessary)

5.1. For course development	The student is expected to attend each class session and to participate in class discussion.
5.2. For seminar / laboratory development	The student is expected to attend each class session and to participate in class discussion. The student is expected to complete all homework assignments punctually.

NOTE: This document represents an informal translation performed by the faculty.

6. Acquired specific competences

Professional competences	• The adequate use of the concepts, theories, methods and tools specific to linear algebra in order to be well used in economics and business problems • Collecting, analyzing and interpreting data and information connected to different economic problems • To be able to take different economic decisions based as much as possible on scientific arguments
Transversal competences	• Applying the principles, the norms and the ethical values of the profession such that the graduates are able to construct a rigorous, efficient and responsible strategy of work • The ability to identify the roles and responsibilities within a team of complex tasks, being able to insure with the rest of the teammates an efficient team work • The ability to identify the opportunities for continuous professional development and the efficient use of all the identified resources and techniques

7. Subject objectives (arising from the acquired specific competences)

7.1 Subject's general objective	The main objective of this course is to familiarize students with techniques and methods of linear algebra and probabilities used in economic research field
7.2 Specific objectives	Understand the fundamental concepts of linear algebra and probabilities and to be able to apply these methods to solve real problems from a theoretical and applied perspective; Interpret mathematical models such as formulas, graphs, tables and schematics, and draw inferences from them; Expand mathematical reasoning skills to develop convincing mathematical arguments; Represent and evaluate basic mathematical information verbally and symbolically.

8. Contents

8.1 Course	Teaching methods	Observations
Introductory topics. Review of basic Linear Algebra. Matrix and vector algebra (linear independence, the rank of a matrix, main results on linear systems, the Leontief model)	The professor gives a talk and encourages discussions on the theme.	1 course
Eigenvalues, eigevectors, diagonalization, spectral decomposition. Matrix decompositions: Cholesky decomposition. Singular value decomposition.	The professor gives a talk and encourages discussions on the theme.	1 course
Quadratic forms	The professor gives a talk and encourages discussions on the theme.	1 course
Linear programming: graphical method, graphical method by using Excel, the Solver from Excel, sensitivity analysis, duality, applications	The professor gives a talk and encourages discussions on the theme.	1 course
Descrete probability models. Special discrete distributions	The professor gives a talk and encourages discussions on the theme.	1 course

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	Teaching methods	Observations
Continuous random variables. Special continuous distributions	The professor gives a talk and encourages discussions on the theme.	1 course
Conditional distributions. Moment generating functions and limit theory	The professor gives a talk and encourages discussions on the theme.	1 course

References:
- Sydsæter K., Hammond P., *Essential Mathematics for Economic Analysis*, Massachusetts: Prentice Hall, 2002
- Sydsæter K., Hammond P., Seierstad A., Strøm A., *Further Mathematics for Economic Analysis*, Boston: Prentice Hall, 2005
- Curt P., Filip D. A., *Quantitative Methods in Economics,* Editura Mediamira, Cluj-Napoca, 2009
- Downing D., Clark J., *Quantitative Methods*, Barron's business review series, 1988
- Render B., Stair, R.M. JR., *Quantitative Analysis for Management*, third edition, Allyn and Bacon, Inc., 1988
- Stapleton, J.H., *Models for Probability and Statistical Inference. Theory and Applications*, Wiley Interscience, 2008

8.2 Seminar/laboratory	Teaching methods	Observations
Problems and exercises which correspond to each theoretical chapter. Economical applications. Case studies.	Solving problems. Analysis of terms and concepts, discussions, case studies, discussion of the homework etc.	14 seminars

References:
- Sydsæter K., Hammond P., *Essential Mathematics for Economic Analysis*, Massachusetts: Prentice Hall, 2002
- Sydsæter K., Hammond P., Seierstad A., Strøm A., *Further Mathematics for Economic Analysis*, Boston: Prentice Hall, 2005
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9. Corroboration / validation of the subject's content in relation to the expectations coming from representatives of the epistemic community, of the professional associations and of the representative employers in the program's field.

- In any economic field there are required minimal skills to present and describe the most important characteristics of some specific real situations. In this context, Linear Algebra (as well as Calculus and optimization) is a course which provides the students the tools for modeling and solving practical and real situations. Therefore, it is a course of vital importance for the professional development of any student in any economic research field.

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10. Assessment (examination)

Type of activity	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	The degree by which the students correctly acquired the concepts, notions and tools of Linear Algebra and Probabilities	Written exam The final exam consists of one theoretical subject and two practical ones	50%
	The ability to use concepts, notions and tools of Linear Algebra and Probabilities in economic applications (i.e. practical problems, real life situations, etc.)		
10.5 Seminar/laboratory	The degree by which the students correctly acquired the concepts, notions and tools of Linear Algebra and Probabilities	1 written test Presence and active participation will be taken into account. The assessment of the homework projects. The assessment tries to measure the degree by which the students acquired the theory and the ability to apply it in practical examples and real life situations. The realization of the homework projects is conditioning the obtaining of the final grade.	50%
	The ability to use the concepts, notions and tools of Linear Algebra and Probabilities in economic applications (i.e. practical problems, real life situations, etc.).		
10.6 Minimum performance standard			
• It is necessary to obtain a minimum grade of 5 (five) in order to pass this subject; • The grades being granted are between 1 (one) and 10 (ten); • Students must approach each element (question, problem) within the exam sheet; • The exam is written and takes approximately 120 minutes.			

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