UNIVERSITATEA BABEŞ-BOLYAI
BABEŞ-BOLYAI TUDOMÁNYEGYETEM
BABEŞ-BOLYAI UNIVERSITÄT
BABEŞ-BOLYAI UNIVERSITY
TRADITIO ET EXCELLENTIA

FACULTATEA DE BUSINESS IN PARTNERSHIP
Facultatea de Business

Str. Horea nr.7
Cluj-Napoca, 400174
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SYLLABUS
Academic year 2023-2024

1. Information regarding the programme

1.1. Higher education institution	Babeş-Bolyai University
1.2. Faculty	Faculty of Business
1.3. Department	Business
1.4. Field of study	Business Administration
1.5. Study cycle	Bachelor
1.6. Study programme / Qualification	Business Administration (English)

2. Information regarding the course

2.1. Name of the course	Applied mathematics for economics						
2.2. Code	ILE0086						
2.3. Course coordinator	Assoc.prof. Gabriela PAETRUŞEL, PhD						
2.4. Seminar coordinator	Assoc.prof. Larisa BATRANCEA, PhD						
2.5. Year of study	1	2.6. Semester	I	2.7. Type of evaluation	E	2.8. Type of course	compulsory

3. Total estimated time (hours/semester of didactic activities)

3.1. Hours per week	4	Of which: 3.2. lecture	2	3.3 seminar/laboratory	2
3.4. Total hours in the curriculum	56	Of which: 3.5. lecture	28	3.6. seminar/laboratory	28

Time allotment:	hours
Learning using manual, course support, bibliography, course notes	14
Additional documentation (in libraries, on electronic platforms, field documentation)	14
Preparation for seminars/labs, homework, papers, portfolios and essays	28
Tutorship	2
Evaluations	2
Other activities:	9
3.7. Total individual study hours	69
3.8. Total hours per semester	125
3.9. Number of ECTS credits	5

4. Prerequisites (if necessary)

4.1. curriculum	
4.2. competencies	

5. Conditions (if necessary)

5.1. for the course	classroom with computer and projector;
5.2. for the seminar /lab activities	classroom with computer and projector;

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6. Specific competencies acquired

Professional competencies	C1. Gathering, processing, and analysing data regarding the interaction between a company/ an organisation and the external environment. C1.3. Assessing critically and constructively the way of explaining and/or solving problems referring to the economic influence of the external environment on a company/an organization. C2. Providing assistance for running a company/ an organisation as a whole. C2.3. Applying the appropriate tools for solving a problem regarding the relations between the subdivisions of the enterprise/organization..
Transversal competencies	CT.1. Implementing ethical principles, norms, and values within one's own rigorous, efficient, and responsible strategy of work.

7. Objectives of the discipline (outcome of the acquired competencies)

7.1 General objective of the discipline	• acquire knowledge and skills in several areas of mathematics, economics and business critical applications; • developing skills of mathematical modelling of business processes; • communication skills in mathematical language;
7.2 Specific objective of the discipline	• the ability to use the mathematical language in understanding economic phenomena; • the ability to interpret phenomena and economic trends through the mathematical apparatus; • the ability to determine the optimal in an economic process; • the ability to effectively use post-optimization techniques and parametric programming of economic process that can be transcribed into linear programming language; • the ability to produce an optimal transport plan;

8. Content

8.1 Course	Teaching methods	Remarks
1. Real functions of one variables ✓ the notion of function of one variable, the table of variation, the graph; ✓ the properties of real functions of one variable;	interactive discussion,	one lecture
2. Extreme values for real functions of one variable with applications in business ✓ Find the extreme points of real functions of one variable; ✓ Find the maximum value of the economical functions of one variable;	interactive discussion,	one lecture

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3. Differential calculus ✓ differential of a real function of several variables; ✓ partial derivatives of first order; ✓ higher order partial derivatives; ✓ higher order differentials;	interactive discussion,	one lecture
4. Extreme values for real functions of several variables ✓ Find the extreme points of real functions of several variable with applications in economics;	interactive discussion,	one lecture
5. Adjustment and interpolation of data with applications in business ✓ data adjustment; ✓ data interpolation;	interactive discussion,	one lecture
6. Real n-dimensional vector space ✓ vector space R^n ✓ linear dependence in R^n ✓ basis in a vector space; ✓ the basis algorithm with applications;	interactive discussion,	one lecture
7. Linear equations and inequality systems ✓ how to solve a linear equation system using basis changing algorithm; ✓ how to solve linear inequality system;	interactive discussion,	one lecture
8. Linear programming problem ✓ mathematical modeling for the linear programming problem; ✓ solutions for a linear programming problem; ✓ graphical method and algebraic method;	interactive discussion,	one lecture
9. The Simplex Algorithm ✓ the rules of simplex algorithm method;	interactive discussion,	one lecture
10. Duality in linear programming problem ✓ dual problem; ✓ dual simplex algorithm;	interactive discussion,	one lecture
11. Post-Optimization ✓ the problem of post-optimization; ✓ modifying the objective functions coefficients;	interactive discussion,	one lecture
12. Parametric programming problem ✓ the problem of parametric programming; ✓ using parameters as coefficients of objective function;	interactive discussion,	one lecture

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13. Transportation problems with applications in business ✓ construction of transportation problem; ✓ solutions of a transportation problem; ✓ solving methods;	interactive discussion,	one lecture
14. Revision 1. solving a model for final exam;	interactive discussion,	one lecture

Bibliography:

1. Cristian Chifu, Gabriela Petrusel, *Matematica aplicata in administrarea afacerilor,* Casa Cartii de Stiinta, 2012.
2. Chifu I.C., *Matematici pentru economişti*, Ed. Alma Mater, Cluj-Napoca, 2006.
3. Chifu-Oros I. C., *Matematici economice, Analiză matematică, Curs pentru studenţii anului I,* Alma Mater, Cluj-Napoca, 2003.
4. Chifu-Oros I.C., Luca I.T., *Matematici Economice. Elemente de Programare Liniară şi Teoria Probabilităţilor*, Presa Universitară Clujeană, Cluj-Napoca, 2004, pg. 1-16.
5. Mureşan A. S., Mihoc M.,..., *Matematici pentru economişti*, vol. I, Ed. Dacia, Cluj-Napoca, 2000.
6. Wilkes M., *Mathematics for Business, Finance and Economics*, International Thomson Business Press, 1999.

8.2. Seminar	Teaching method	Remarks
1. Real functions of one variables ✓ the notion of function of one variable, the table of variation, the graph ✓ the properties of real functions of one variable;	exercise, case study	one seminar
2. Extreme values for real functions of one variable with applications in business ✓ Find the extreme points of real functions of one variable; ✓ Find the maximum value of the economical functions of one variable;	exercise, case study	one seminar
3. Differential calculus ✓ differential of a real function of several variables; ✓ partial derivatives of first order; ✓ higher order partial derivatives; ✓ higher order differentials;	exercise, case study	one seminar
4. Extreme values for real functions of several variables ✓ Find the extreme points of real functions of several variable with applications in economics;	exercise, case study	one seminar
5. Adjustment and interpolation of data with applications in business ✓ data adjustment;	exercise, case study	one seminar

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✓ data interpolation;		
6. Real n-dimensional vector space ✓ vector space R^n ✓ linear dependence in R^n ✓ basis in a vector space; ✓ the basis algorithm with applications;	exercise, case study	one seminar
7. Linear equations and inequality systems ✓ how to solve a linear equation system using basis changing algorithm; ✓ how to solve linear inequality system;	exercise, case study	one seminar
8. Linear programming problem ✓ mathematical modeling for the linear programming problem; ✓ solutions for a linear programming problem; ✓ graphical method and algebraic method;	exercise, case study	one seminar
9. The Simplex Algorithm ✓ the rules of simplex algorithm method;	exercise, case study	one seminar
10. Duality in linear programming problem ✓ dual problem; ✓ dual simplex algorithm;	exercise, case study	one seminar
11. Post-Optimization ✓ the problem of post-optimization; ✓ modifying the objective functions coefficients;	exercise, case study	one seminar
12. Parametric programming problem ✓ the problem of parametric programming; ✓ using parameters as coefficients of objective function;	exercise, case study	one seminar
13. Transportation problems with applications in business ✓ construction of transportation problem; ✓ solutions of a transportation problem; ✓ solving methods;	exercise, case study	one seminar
14. Revision ✓ review exercises and problems	exercise, case study	one seminar

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9. Corroborating the content of the discipline with the expectations of the epistemic community, professional associations and representative employers within the field of the program

- The course content is correspondence with what is done in other universities in the country and abroad.
- To adapt to the market demands of the contents meetings were held with representatives of the business community.

10. Evaluation

- **The same evaluation criteria hold for all exams sessions;**
- **In order to be able to cumulate the points obtained during the semester, it is mandatory to obtain minimum 5 (five) in the final exam.**

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share in the grade (%)
10.4 Course	• correct logical and coherent application of the concepts learned • logical and accurate explanation and interpretation of the results;	final exam	50%
	• the ability to apply concepts learned in practice • correct logical and coherent application of the concepts learned • economic explanation of the results; • interest in the individual preparation throughout the whole semester	control papers the active participation in seminars	30% 20%
10.6 Minimum performance standards			
➢ Knowledge of the fundamental concepts and their applicate examples; ➢ The economic interpretation of the results.			

Date	Course coordinator	Seminar coordinator
29.09.2023	Conf.dr. Gabriela PETRUŞEL	Conf.dr. Gabriela PETRUŞEL
Date of approval		Head of department
11.10.2023		Prof.dr. Ioan Cristian CHIFU