



COURSE DESCRIPTION

Applied Mathematics for Economics Business Administration

Academic year 2026-2027

1. Programme-related data

1.1. Higher Education Institution	Babeș-Bolyai University
1.2. Faculty	Business
1.3. Department	Business
1.4. Field	Business Administration
1.5. Level of study	Bachelor
1.6. Degree programme / Qualification	Business Administration / Bachelor in Economic Studies
1.7. Form of education	Full time

2. Information regarding the discipline

2.1. Name of the discipline	Applied Mathematics for Economics			Discipline code	ILE0086
2.2. Course coordinator	Assoc.prof. Gabriela PETRUȘEL, PhD				
2.3. Seminar coordinator	Assoc.prof. Gabriela PETRUȘEL, PhD				
2.4. Year of study	1	2.5. Semester	1	2.6. Type of assessment	Exam
2.7. Course status	Compulsory			2.8. Course type	Core subject

3. Total estimated time (hours per semester of teaching activities)

3.1. Number of hours per week	4	of which: 3.2. course	2	3.3. seminar/ laboratory/ project	2
3.4. Total of hours in the curriculum	56	of which: 3.5. course	28	3.6. seminar/ laboratory	28
Time allocation for individual study (IS) and self-taught activities (ST)					hours
Learning from textbooks, course materials, bibliography, and notes (IS)					14
Additional research in the library, on subject-specific electronic platforms, and on-site					14
Preparing seminars/ laboratories/ projects, assignments, reports, portfolios, and essays					28
Tutoring (professional guidance)					2
Examinations					2
Other activities					9
3.7. Total hours of individual study (IS) and self-taught activities (ST)				69	
3.8. Total hours per semester				125	
3.9. Number of credits				5	

4. Prerequisites (where applicable)

4.1. curriculum-related	
4.2. skills-related	

5. Specific conditions (where applicable)

5.1. course-related	classroom with computer and projector;
5.2. seminar/laboratory-related	classroom with computer and projector;

6.1. Competencies resulting from the completion of the degree programme

Professional competencies	
Competency code	Competency
PC1	Gathering, processing and analysing data regarding the interaction between a company/an organisation and the external environment.
PC5	Using databases specific to business management.
Transversal competencies	
Competency code	Competency
TC1	Implementing ethical principles, norms and values within one's own rigorous, efficient, and responsible strategy of work.

6.2. Learning outcomes relevant to the degree programme

Learning outcomes targeted by the subject		
Competency code	Knowledge and comprehension	Specific academic skills
PC1 PC5 TC1	The student/graduate operates with concepts, indicators, models, instruments, and mathematical methods for the analysis and optimization of managerial processes in relation to the organizational environment. The student/graduate uses elements of financial mathematics, optimization of multivariable functions, forecasting the evolution of economic indicators over time, probabilistic modelling of economic phenomena occurring under conditions of risk and uncertainty, evaluation of statistical indicators characterizing economic phenomena, and estimation of model parameters. The student/graduate identifies, differentiates, and coherently analyses the concepts, models, and quantitative methods required in the decision-making process within organizations.	The student/graduate models an economic process and its determining factors by using multivariable functions. The student/graduate uses mathematical algorithms to determine the optimal solution to a maximization or minimization problem of a function modelling a performance indicator. The student/graduate probabilistically models scenarios for the evolution of an economic phenomenon, evaluates the outcome associated with each scenario, and estimates the expected result based on the identified scenarios by using numerical characteristics of random variables (mean value, variance, correlation coefficient). The student/graduate analyses data, estimates the parameters of a statistical model, and substantiates managerial decisions based on these analyses. The student/graduate quantifies the time value of a capital flow by using financial mathematics models.

7. Subject-specific learning outcomes

Knowledge and understanding
1. The student/graduate knows the concepts, models, and mathematical methods used in the analysis and optimization of economic and managerial processes.
2. The student/graduate understands the methods of optimizing functions of one or more variables and their role in supporting economic decision-making.
3. The student/graduate knows the models and algorithms used in linear programming, duality, and transportation problems for solving economic problems.
Specific academic skills
1. The student/graduate solves economic problems (mathematical modeling) using functions of one or more variables and interprets the results obtained.
2. The Student/Graduate applies the algorithms and optimization methods to determine optimal solutions in linear programming and transportation problems.

3. The Student/Graduate analyzes and solves the economic problems using mathematical models, formulating conclusions and recommendations for the decision-making process.

8. Contents

8.1. Course	Teaching and learning 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
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;	interactive discussion,	one lecture

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

Bibliography

1. Cristian Chifu, Gabriela Petrușel: Matematica aplicată în administrarea afacerilor, Casa Cărții de Știință, Cluj-Napoca 2012, 240 p.
2. Tania Lazăr, Vasile Lazăr, Gabriela Petrușel: Matematici aplicate în economie, Risoprint 2014, 200 p.
3. Chifu I.C., Matematici pentru economiști, Alma Mater, Cluj-Napoca, 2006. (biblioteca facultății).

8.2. Seminar/ laboratory	Teaching and learning 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;	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; ✓ data interpolation;	exercise, case study	one seminar
6. Real n-dimensional vector space ✓ vector space R^n ✓ linear dependence in R^n ✓ basis in a vector space;	exercise, case study	one seminar

✓ the basis algorithm with applications;		
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

Bibliography

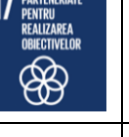
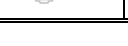
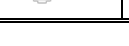
- 1.Cristian Chifu, Gabriela Petrușel: Matematica aplicată în administrarea afacerilor, Casa Cărții de Știință, Cluj-Napoca 2012, 240 p.
- 2.Tania Lazăr, Vasile Lazăr, Gabriela Petrușel: Matematici aplicate în economie, Risoprint 2014, 200 p.
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9. Evaluation

- The same evaluation criteria are maintained for all exams sessions. The components of the evaluation process carried out during the semester cannot be recovered/redone in the examination sessions.
- To be able to accumulate the points obtained during the semester, it is mandatory to obtain a minimum of 5 (five) in the final exam (written/oral).

Type of activity	9.1 Evaluation criteria	9.2 Evaluation methods	9.3 Percentage in the final grade
9.4. Course	- correct logical and coherent application of the concepts learned - logical and accurate explanation and interpretation of the results;	Final Exam (during the exam session)	50%
9.5. Seminar/ laboratory	- the ability to apply concepts learned in practice - correct logical and coherent application of the concepts learned - economic explanation of the results - active participation in solving exercises and case studies - interest and constant involvement in seminar activities throughout the semester	written test (during the semester) the active participation in seminars	30% 20%
9.6 Minimum standard for passing			
For the minimum grade (5), students must - Know the fundamental concepts and to be able to apply them. - To give an interpretation of the results..			

10. SDG labels (Sustainable Development Goals)

		Sustainable Development Generic Label						
								
								
								Nu se aplică nici o etichetă
								X

Date of entry:	Signature of course coordinator	Signature of seminar coordinator
22.05.2026	Assoc.prof. Gabriela PETRUȘEL, PhD	Assoc.prof. Gabriela PETRUȘEL, PhD
Date of approval in the department:	Signature of the head of department	
27.05.2026	Prof. Ioan Cristian CHIFU, PhD	