Facultatea de Științe Economice și Gestiunea Afacerilor

Str. Teodor Mihali nr. 58-60
Cluj-Napoca, RO-400951
Tel.: 0264-41.86.52-5
Fax: 0264-41.25.70
econ@econ.ubbcluj.ro
www.econ.ubbcluj.ro

DETAILED SYLLABUS
Calculus and optimization

1. Information about the study program

1.1 University	Babeș-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	EME0625 Calculus and optimization					
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					34
Additional documentation in the library, through specialized databases and field activities					30
Preparing seminars/laboratories, essays, portfolios and reports					36
Tutoring					4
Assessment (examinations)					4
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 economics, for the well functioning of the private or public organizations • Collecting, analyzing and interpreting the data and the information connected to economic problems • To give assistance to the management of the institution (in which the graduate activates) in the decisional process (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 mathematical methods used in any economic field, within both the academic world and the business real world.
7.2 Specific objectives	• Represent and evaluate basic mathematical information verbally and symbolically. • Understand the fundamental concepts of calculus (functions, limits, partial derivatives, integrals) and be able to apply the methods of calculus to solve real optimization problems from a theoretical and an applied perspective; • Interpret mathematical models • Introduce students to the concepts of modelling and optimization; • Expand mathematical reasoning skills to develop convincing mathematical arguments;

8. Contents

8.1 Course	Teaching methods	Observations
Calculus: Functions of one variable. Derivatives; Taylor series; Integrals; Economical applications	The professor gives a talk and encourages discussions on the theme.	1 course
Calculus: Functions of several variables. Partial derivatives; The chain rule; Derivatives of functions defined implicitly; Differentials ; Homogeneous functions	The professor gives a talk and encourages discussions on the theme.	2courses
Concavity and convexity; Quasiconcavity and quasiconvexity	The professor gives a talk and encourages discussions on the theme.	1course
Optimization: Necessary and sufficient conditions for a local optimum; Conditions which assure that a stationary point is a global optimum	The professor gives a talk and encourages discussions on the theme.	1course
Optimization (equality constraints): Lagrange's multipliers method. Interpretation of Lagrange multipliers; Conditions which assure that a stationary point is a global optimum Envelope theorem	The professor gives a talk and encourages discussions on the theme.	1course
Optimization (the Kuhn-Tucker conditions for problems with inequality constraints); Necessary Kuhn-Tucker conditions; Sufficient Kuhn-Tucker conditions	The professor gives a talk and encourages discussions on the theme.	1course

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

References:
- Chiang A. C., Wainwright K., *Fundamental Methods of Mathematical Economics*, New York: McGraw-Hill, 2005   - Curt P., Filip D. A., *Quantitative Methods in Economics,* Editura Mediamira, Cluj-Napoca, 2009   - Simon P., Blume L., *Mathematics for Economists*, New York: W. W. Norton, 1994   - 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

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:
- Chiang A. C., Wainwright K., *Fundamental Methods of Mathematical Economics*, New York: McGraw-Hill, 2005   - Curt P., Filip D. A., *Quantitative Methods in Economics,* Editura Mediamira, Cluj-Napoca, 2009   - Simon P., Blume L., *Mathematics for Economists*, New York: W. W. Norton, 1994   - 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

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, Calculus and optimization is a course which provides the students the tools for modelling and solving practical, real situations. Therefore, it is a course of vital importance for the professional development of any student in any economic field

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 calculus and optimization The ability to use the concepts, notions and tools of calculus and optimization in economic applications (i.e. practical problems, real life situations, etc.).	Written exam The final exam consists of one theoretical subjects and two practical ones	50%
10.5 Seminar/laboratory	The degree by which the students correctly acquired the concepts, notions and tools of calculus and optimization	1 written test Presence and active participation will be taken into account.	50%

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

	The ability to use the concepts, notions and tools of calculus and optimization in economic applications (i.e. practical problems, real life situations, etc.).	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.	
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;			

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