Freie Universität Bozen
Libera Università di Bolzano
Università Liedia de Bulsan

Syllabus
Course description

Course title	Mathematics for PPE
Course code	27042
Scientific sector	SECS-S/06
Degree	Bachelor in Economics and Social Sciences
Semester and academic year	1st (M1) and 2nd (M2) semester 2020-2021
Year	1
Credits	12 (6+6)
Modular	Yes

Total lecturing hours	72 (36+36)
Total lab hours	none
Total exercise hours	72 (36+36)
Attendance	Suggested, but not required
Prerequisites	none
Course page	https://www.unibz.it/en/faculties/economics-management/bachelor-economics-social-sciences/

Specific educational objectives	The course refers to the basic (M1) and typical (M2) educational activities and belongs to the scientific area of statistics-mathematics (quantitative methods for decision-making). The course is aimed at creating ability to analyze complex economic phenomena by choosing appropriate analytical methods and retrieving the information necessary for implementing the corresponding decision- making processes.

Module 1	Mathematics A for PPE M1
Lecturer	Yuriy Kaniovskyi Office E 505 Yuriy.Kaniovskyi@unibz.it Tel. 0471013150 https://www.unibz.it/en/faculties/economics-management/academic-staff/person/86-yuriy-kaniovskyi
Scientific sector of the lecturer	SECS-S/06
Teaching language	English
Office hours	18 hours Cockpit – students' zone – individual timetable Webpage: https://www.unibz.it/en/timetable/?sourceId=unibz&department=26&degree=13141%2C13182
Lecturing assistant	Paolo Maraner

	Office E 523 Paolo.Maraner@unibz.it Tel. 0471 013288 / 013289 https://www.unibz.it/it/faculties/economics-management/academic-staff/person/12920-paolo-maraner
List of topics covered	Sets and operations with them. Functions of one variable: limits, continuity, derivatives, linear and quadratic approximations, convexity in terms of second derivative, single-variable optimization, integration. Finite and infinite geometric series and their sums. Exponential and logarithmic functions.
Teaching format	Frontal lessons and exercises

Module 2	Mathematics B for PPE M2
Lecturer	Yuriy Kaniovskyi Office E 505 Yuriy.Kaniovskyi@unibz.it Tel. 0471013150 https://www.unibz.it/en/faculties/economics-management/academic-staff/person/86-yuriy-kaniovskyi
Scientific sector of the lecturer	SECS-S/06
Teaching language	English
Office hours	18 hours Cockpit – students' zone – individual timetable Webpage: https://www.unibz.it/en/timetable/?sourceId=unibz&department=26&degree=13141%2C13182
Lecturing assistant	Paolo Maraner Office E 523 Paolo.Maraner@unibz.it Tel. 0471 013288 / 013289 https://www.unibz.it/it/faculties/economics-management/academic-staff/person/12920-paolo-maraner
List of topics covered	Functions of two variables: continuity, partial derivatives, directional derivatives, total derivative, linear and quadratic approximations, tangent plane, convexity in terms of second derivatives, homogeneity. Linear algebra: vectors, scalar product, linear combinations, matrix operations, transpose, inverse, definiteness of a matrix, equation of a plane. Cramer's rule for systems of two equations with two unknowns and its geometric interpretation. Convex sets and cones in the Cartesian plane. Implicit function and its first derivative, tangent at a point of a level curve. Unconstrained and constrained two-variable optimization. Necessary and sufficient conditions for an unconstrained extreme point. The Lagrangian method. Nonlinear programming and Kuhn –

	Tucker theory.
Teaching format	Frontal lessons and exercises

Learning outcomes	*Knowledge and understanding* Students acquire knowledge of basic mathematical tools specific to economic analysis. This bulk builds upon their general secondary education. Through considering classical examples (like Cobb – Douglas production function) students learn to understand the interrelations between different topics of the course and their relevance to disciplines in economics and management. More specifically: **M1:** Provides the basic mathematical tools concerning functions of one variable and static models. The corresponding skills, allow, on the one hand, to understand and analyze the corresponding economic mechanisms and, on the other hand, they create a base for M2 part. **M2:** Comprises intermediate mathematical tools necessary to understand and analyze economic mechanisms through theoretical and empirical models described by functions of several variables. Particular learning outcomes include: understanding of comparative static analysis, use of the Lagrangian method in cost/utility optimization. Applying knowledge and understanding **M1:** Ability to apply calculus in analyzing the behavior of economic agents through both normative and descriptive models. **M2:** Mastering intermediate mathematical tools in analyzing behavior of economic agents, from both theoretical and empirical points of view. Ability to formalize simple economic problems through mathematical models, to find solutions and to interpret them. *Making judgments* Within the scope of mathematical modelling, students learn to explain the outcome in terms of the corresponding social, scientific or ethical issues. *Communication skills* The course provides skills necessary for a presentation of ideas, problems and solutions based on the acquired mathematical skills to both specialist and non-specialist audiences. *Learning skills* The course creates a base of knowledge and learning skills (acquired through class work, exercises and individual study supervised by the lecturer and teaching assistant) necessary to continue with a high degree of autonomy a further study in economics and management.

Assessment	A written final exam (questions and problems to solve) covering both M1 and M2 parts (M1 partial exam and M2 partial exam, respectively).
Assessment language	English
Evaluation criteria and criteria for awarding marks	Final grade: 50% grade for M1 partial exam, 50% for M2 partial exam. The grades of partial exams are only valid for the academic year in question. They cannot be carried over beyond that time frame.

Required readings	K. Sydsaeter and P.J. Hammond – Mathematics for Economic Analysis, Prentice Hall, 1995. Other editions of variants of this book (given in the extended syllabus), under slightly different titles, are suitable as well.
Supplementary readings	Not needed