

## **Syllabus**

## Kursbeschreibung

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Titel der Lehrveranstaltung	Introduction to Analysis and Optimization Techniques
Code der Lehrveranstaltung	76436
Zusätzlicher Titel der Lehrveranstaltung	
Wissenschaftlich- disziplinärer Bereich	MAT/05
Sprache	Englisch
Studiengang	Bachelor in Wirtschaftsinformatik
Andere Studiengänge (gem. Lehrveranstaltung)	
Dozenten/Dozentinnen	dr. Andrea Mazzullo, Andrea.Mazzullo@unibz.it https://www.unibz.it/en/faculties/engineering/academic- staff/person/38537
Wissensch. Mitarbeiter/Mitarbeiterin	
Semester	Zweites Semester
Studienjahr/e	1
KP	6
Vorlesungsstunden	40
Laboratoriumsstunden	20
Stunden für individuelles Studium	90
Vorgesehene Sprechzeiten	
Inhaltsangabe	<ul> <li>Sequences and series</li> <li>Univariate functions</li> <li>Derivatives and differentials</li> <li>Indefinite and Riemann integrals</li> <li>Basic optimization techniques in one variable</li> <li>Mathematical tools for decision making without and with uncertainty</li> </ul>



Lehrveranstaltung sequence universaltung sequence universaltung universaltung sequence universaltung universaltung sequence universaltung univ	uences and series: definitions and basic properties of ces and series of real numbers. variate functions: definitions and basic properties of real as in one variable, limits, continuity. ivatives and differentials: definitions and main theorems of atial calculus. efinite and Riemann integrals: definitions and main as of integral calculus.
<ul> <li>University</li> <li>function</li> <li>Derived</li> <li>differen</li> <li>Indetheoren</li> <li>Basi</li> </ul>	variate functions: definitions and basic properties of real as in one variable, limits, continuity. ivatives and differentials: definitions and main theorems of atial calculus. efinite and Riemann integrals: definitions and main
function     Der differen     Inde theoren     Bas	ivatives and differentials: definitions and main theorems of calculus.  efinite and Riemann integrals: definitions and main
<ul> <li>Der differen</li> <li>Inde theoren</li> <li>Bas</li> </ul>	ivatives and differentials: definitions and main theorems of tial calculus.  efinite and Riemann integrals: definitions and main
differen  Inde  theoren  Bas	itial calculus. efinite and Riemann integrals: definitions and main
• Inde theorem • Basi	efinite and Riemann integrals: definitions and main
theoren  Bas	-
• Bas	ns of integral calculus
	is of integral calculus.
function	ic optimization techniques in one variable: study of
Taricción	ns, local and global extrema, first and second derivative
	tandard form of optimization problems, Taylor polynomials, 's method.
• Mat	hematical tools for decision making without and with
uncerta	inty: sets and relations, principle of mathematical induction,
basics o	of Combinatorics, Newton's Binomial Theorem, Pascal's
Triangle	e, hints on Multivariate Calculus and applications.
Stichwörter Mathem	natical Analysis, Optimization Techniques
Empfohlene None.	
Voraussetzungen	
Propädeutische	
Lehrveranstaltungen	
Unterrichtsform • From	ntal classroom lectures
• Lab	exercises
In the l	ectures, concepts and techniques are introduced, both by
	ing notions on the blackboard and by collectively discussing
related	exercises and examples.
In the la	abs, students (either in small groups, or individually)
develop	possible approaches to address the exercises proposed by
	urer and compare their solutions with the rest of the class.
Anwesenheitspflicht Attenda	nce is not compulsory, but highly encouraged. All the
•	I used in the lectures and in the labs will be made available
on the	MS Teams of the course. However, students should note
	active engagement in understanding the theoretical notions
	finding solutions to the exercises is required to reach the
and in i	•
	g outcomes of the course.
learning	g outcomes of the course.  urse belongs to the type "di base – formazione matematico-

Lernergebnisse	The course offers an introduction to the fundamental concepts and techniques of elementary calculus, mathematical analysis and optimization in connection to their use in business informatics and economics.
	<ul> <li>Knowledge and understanding:</li> <li>D1.1 - Possess basic knowledge of mathematical analysis, algebra, numerical calculation and optimisation methods which support computer science and advanced economics.</li> <li>Applying knowledge and understanding:</li> <li>D2.1 - Ability to use mathematics and statistical data analysis tools to solve computational problems.</li> <li>Learning skills</li> <li>D5.1 - Learning ability to undertake further studies with a high degree of autonomy.</li> </ul>
Spezifisches Bildungsziel und erwartete Lernergebnisse (zusätzliche Informationen)	
Art der Prüfung	The final exam consists of a written test (50%) and an oral test (50%).
	The written test (of 2 hours) contains questions and exercises on the material covered during the course. The oral test (of ca. 20 minutes) can involve both a discussion of the answers given in the written part, as well as unseen questions and short exercises based on the course topics.
	The aim of both the written and the oral tests is to check to which degree students have mastered the following learning outcomes:  1) acquiring knowledge and understanding; 2) applying knowledge and understanding.
Bewertungskriterien	Correctness and clarity of the answers.
Pflichtliteratur	L. Peccati, S. Salsa, A. Squellati. Mathematics for Economics and Business. Bocconi University Press, 2017.
	Subject Librarian: David Gebhardi, <u>David.Gebhardi@unibz.it</u>

Weiterführende Literatur	E. Lanconelli. Lezioni di Analisi Matematica 1. Pitagora, 1994 (in Italian).  W. Rudin. Principles of Mathematical Analysis. McGraw-Hill, 1976 (3rd ed.).
Weitere Informationen	
Ziele für nachhaltige Entwicklung (SDGs)	Hochwertige Bildung