

Syllabus

Kursbeschreibung

Höhere Mathematik 1
42193
MAT/05
Italienisch
Bachelor in Industrie- und Maschineningenieurwesen
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Erstes Semester
1
9
60
30
135
27
The objective of this course is to give a sound background on
notions and techniques
of mathematical analysis for real functions of one real variable. The
course covers topics in infinitesimal, differential and integral
calculus and gives an introduction to complex numbers.
Introduction to the set of real numbers and to complex numbers.



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	Basic notions on real functions of one real variable.Real sequences and numerical series.
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	Limits and continuity of functions.
	Landau symbols and rate of convergence/divergence.
	Differential calculus and its applications.
	Local comparison and Taylor expansions.
	 Antiderivatives and integral calculus for functions of one real variable.
	Definite and improper Riemann integrals.
Themen der	• Complex numbers. Definition, algebraic operations, trigonometric
Lehrveranstaltung	and exponential form, algebraic equations.
	Real functions, limits and continuity in one variable.
	Review of the properties of real numbers and the basic concepts
	on real functions of one real variable. Sequences and limits for
	sequences. Limits and continuity of functions. Infinite and
	infinitesimal functions: Landau symbols and rate of convergence.
	Differential calculus of real valued functions in one variable.
	Tangent to a graph and first derivative. Rules of differentiation.
	Differentiability and singular points. Theorems of Rolle and
	Lagrange. Absolute and relative extrema. Higher-order derivatives.
	Qualitative study of a function.
	Local comparison of functions and Taylor expansions in one
	variable.
	Taylor formulas. Expansions of elementary functions and algebraic
	techniques to determine Taylor polynomials. Local analysis and
	limits calculation using Taylor expansions.
	Real sequences and numerical series.
	Convergence criteria for numerical real series. Fundamentals of
	Taylor series
	Integral calculus of real valued functions in one variable.
	Antiderivatives and rules of indefinite integration for functions in
	one real variable. Definite and improper integrals.
Stichwörter	Infinitesimal calculus, differential calculus, integral calculus,
Suctiviolici	
	complex numbers
Empfohlene	Mastery of the topics and techniques of the preparatory course in
Voraussetzungen	mathematics.
Propädeutische	
Lehrveranstaltungen	
Unterrichtsform	The course is made up of a series of frontal lectures, both devoted

	to the presentation of theoretical concepts and to their application in exercises.
	Topics will be presented on the blackboard and explanations will be
	supported by the use of software, both in analysing calculations
	and for the graphical visualization.
	The reference textbook for theory is cited in the bibliography.
	During the course lists of exercises will be made available to the
	students. Each of the activities carried out during the course's
	hours will be documented on the OLE web site.
Anwesenheitspflicht	Recommended.
Spezifische Bildungsziele	The course is part of basic didactic activities and in particular in the
und erwartete	disciplinary sector "Mathematics, Informatics and Statistics". The
Lernergebnisse	course is compulsory.
	It is and introductory course, devoted to the basic notions of
	mathematical analysis, in particular of infinitesimal, differential and
	integral calculus for real functions of one real variable. The
	objective is not only to convey a set of notions and tools, but also
	to acquire a deeper understanding of the mathematical concepts
	from which they are derived. This is fundamental in order to be
	able to use learned techniques in a rational way and to apply them
	to other technical and scientific subjects
	Intended Learning Outcomes (ILO)
	Knowledge and understanding
	1. Knowledge of the fundamental concepts and basic tools of
	infinitesimal, differential and integral calculus for real functions of
	one real variable.
	Applying knowledge and understanding
	2. Mastering of a methodology of non-mechanical, rational
	application of calculus techniques.
	Making judgements
	3. Ability to evaluate the characteristics of the problem to be
	solved, set it in the correct theoretical framework and subsequently
	choose the most suitable method to get to its solution.
	Communication skills
	4. Mastery of the use of the specific mathematical lexicon.
	Learning skills
	5. Capability to a rational, analytical approach in handling
	problems.
Spezifisches Bildungsziel	
-1	

und erwartete Lernergebnisse (zusätzliche Informationen)	
Art der Prüfung	The final exam consists of: - a written examination, with exercises about the topics covered during the course, that aims at verifying the understanding of the theory and the ability in using the relevant calculus techniques; - the subsequent discussion of the corrected test.
Bewertungskriterien	A single final mark will be given. The written examination is composed of a first part in which the achievement of the minimal requisites of understanding of concepts and ability in the application of calculus tools is proofed (ILOs 1-2) and a second part consisting in the solution of exercises where the mastery of different topics, the ability to combine calculus tools and to have a comprehensive vision of the problem are evaluated (ILOs 3-5). In the second part, the clarity of the solution scheme, the appropriateness of the methodology chosen in solving the problems (ILOs 3-4) and the correctness of the application of calculus techniques (ILOs 1-2) are assessed. Any errors and omissions underlined during the correction will be discussed with the student.
	Form: written exam Length /duration: Short answer test with pass threshold of 60% ILOs assessed: 1-2 Summative assessment
	Form: written exam + (optional) Discussion of the written exam Grade: 95% for the written exam + 5% for the discussion) Length/Duration: 4 exercises (120 minutes) for the written exam + 5-10 minutes for the discussion ILOs assessed: 1-5 for the written exam + 4-5 for the discussion
Pflichtliteratur	Textbook: C. Canuto, A. Tabacco "Analisi Matematica I", Springer Verlag Italia, 2014.

	(Print: ISBN: 88-470-5722-1 Online: Ebook Springer) An english version of the text is also available: C. Canuto, A. Tabacco, "Mathematical Analysis I", Springer International Publisher, 2015. (Print: ISBN: 978-3-319-12771-2 Online: Springer Ebook)
Weiterführende Literatur	Other bibliographic references for exercises or further study (available at the University library) may be suggested during the course, also in languages different from the official one. The student can refer to the web site of the course for any related information.
Weitere Informationen	
Ziele für nachhaltige Entwicklung (SDGs)	Hochwertige Bildung