UCLouvain

lsinc1111

2023

Analysis

5.00 credits	30.0 h + 30.0 h	Q1

This learning unit is not open to incoming exchange students!

Teacher(s)	Nunes Grapiglia Geovani ;
Language :	French
Place of the course	Charleroi
Prerequisites	This course assumes the skills of the end of secondary school in analysis (functions, calculation of derivatives and integrals).
Main themes	The course emphasizes: • the understanding of mathematical tools and techniques based on a rigorous learning of the concepts favored by the highlighting of their concrete application, • the rigorous manipulation of these tools and techniques within the framework of concrete applications. For most of the concepts studied, the applications are chosen within the framework of the other courses of the program in computer sciences (for example biology/chemistry). • Sets and numbers • One-variable real functions • Boundaries • Continuous functions • Differentiable functions • Integrals
Learning outcomes	**At the end of this learning unit, the student is able to :** With regard to the AA reference system of the "Bachelor in Computer Science" program, this course contributes to the development, acquisition and evaluation of the following learning outcomes: S1.G1 S2.2 S1.G1 S2.2 Students who successfully complete this course will be able to: • Model concrete problems using the notions of sets, functions, limits, derivatives and integrals; • Solve concrete problems using limit, derivative and integral calculation techniques; • Reasoning by correctly manipulating mathematical notations and methods keeping in mind but going beyond a more intuitive interpretation of concepts.
Evaluation methods	Students are assessed individually during a written exam on the basis of the learning outcomes announced above. In addition, homework results will be incorporated into the final grade as a bonus. The exact terms and conditions will be specified during the course.
Teaching methods	Lectures and exercise-based learning activities (APE). Online assignments will also be offered. The course and the learning activities through exercises will favor interactions between teachers and students. Some of the above activities (lessons, APE, APP) can be organized remotely.
Content	The course emphasizes: • the understanding of mathematical tools and techniques based on a rigorous learning of the concepts favored by the highlighting of their concrete application, • the rigorous manipulation of these tools and techniques within the framework of concrete applications. For most of the concepts studied, the applications are chosen within the framework of the other courses of the program in computer sciences (for example biology/chemistry). The concepts covered in this course are described below. Sets and numbers • Sets (notation, intersection, union, difference) • Interval, upper bound, lower bound, extremum • Absolute value, powers and roots • Cardinality of a set (finite and infinite) and notion of inclusion-exclusion

	• Equivalence • Elements of logic and techniques of proof One-variable real functions • Injective, surjective and bijective functions • Algebraic operations on functions (including graphical interpretation) • Polynomial functions • Exponential, logarithmic and trigonometric functions • Composition of functions and inverse functions Limits and continuity • Conditions of existence • Limits to infinity • Fundamental theorems of continuous functions Differentiable functions • Derivative at a point (including graphical interpretation) • Derivation techniques • L'Hospital's theorem • Maximum and minimum • Concavity and convexity • Linear function approximation • Taylor expansion Primitives and integrals • Primitives • Definite integrals (including graphical interpretation) • Improper integrals • Integration techniques First-order ordinary differential equations
Faculty or entity in charge	SINC

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Learning outcomes
Bachelor in Computer Science	SINC1BA	5		🔍