UCLouvain

lmat1121

2017

Mathematical analysis 1

5 credits	30.0 h + 30.0 h	Q1

Teacher(s)	Ponce Augusto ;Van Schaftingen Jean ;
Language :	French
Place of the course	Louvain-la-Neuve
Main themes	The course presents the Differential and Integral Calculus in one variable, and its mathematical foundations.
Aims	**Contribution du cours aux acquis d'apprentissage du programme de bachelier en mathématique. A la fin de cette activité, l'étudiant aura progressé dans :** By the end of the course, the student should have progressed in obtaining the following skills: - Recognise and understand a basic foundation of mathematics. - Choose and use the basic tools of calculation to solve mathematical problems. - Recognise the fundamental concepts of important current mathematical theories. - Establish the main connections between these theories, analyse them and explain them through the use of examples. - Identify, by use of the abstract and experimental approach specific to the exact sciences, the unifying features of different situations and experiments in mathematics or in closely related fields (probability and statistics, physics, computing). - Show evidence of abstract thinking and of a critical spirit. - Recognise the key arguments and the structure of a proof. - Evaluate the rigour of a mathematical or logical argument and identify any possible flaws in it. - Distinguish between the intuition and the validity of a result and the different levels of rigorous understanding of this same result. 1 - Write a mathematical text according to the conventions of the discipline. **Acquis d'apprentissage spécifiques au cours. A la fin de cette activité, l'étudiant sera capable de :** By the end of the course, the student should be able to : - Recognise the concepts, tools and methods of the Differential and Integral Calculus in one variable: ' by providing rigorous mathematical definitions, ' by stating the main propositions and theorems, ' by proving propositions, theorems and their variants, ' by illustrating definitions, propositions, and theorems by examples, counter-examples, and applications, ' by comparing concepts among themselves, ' by verifying some property using a definition and different characterisations, ' by adapting proofs presented in the lectures to similar situations. - Compute using the concepts, tools and methods of the Differential and Integral Calculus: ' by computing limits, derivatives and integrals, ' by solving optimisation problems, ' by solving differential equations. - - - - *The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".*
Evaluation methods	Learning will be assessed by a compulsory test in the course of the semester and by a final examination. The questions will ask students to: - reproduce the subject matter, especially definitions, theorems, proofs, and examples - select and apply methods from the course to solve problems and exercises - adapt methods of demonstration from the course to new situations -summarise and compare topics and concepts. Assessment will focus on - knowledge, understanding and application of the different mathematical methods and topics from the course - precision of calculations - rigour of arguments, proofs and reasons - quality of construction of answers.

Teaching methods	Learning activities consist of lectures, exercise sessions and tutorial sessions. The lectures aim to introduce fundamental concepts, to explain them by showing examples and by determining their results, to show their reciprocal connections and their connections with other courses in the programme for the Bachelor in Mathematics. The exercise sessions aim to teach how to select and use calculation methods and how to construct proofs. The tutorial sessions give students individual help and follow up in their learning. The three activities are given in presential sessions.
Content	real numbers and sequences - continuous functions - integrals - derivatives - Differential and Integral Calculus - differential equations
Inline resources	**http://icampus.uclouvain.be/claroline/course/index.php?cid=MAT1121-001+**
Bibliography	Syllabus en version imprimée disponible à la DUC et en ligne sur le site http://www.duc.be/.
Faculty or entity in charge	SC

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Aims
Bachelor in Physics	PHYS1BA	5		
Bachelor in Mathematics	MATH1BA	5		