UCLouvain

lepl1105

2019

In view of the health context linked to the spread of the coronavirus, the methods of organisation and evaluation of the learning units could be adapted in different situations; these possible new methods have been - or will be - communicated by the teachers to the students.

5 credits	30.0 h + 30.0 h	Q2

Teacher(s)	Glineur François ;Keunings Roland ;SOMEBODY ;
Language :	French
Place of the course	Louvain-la-Neuve
Main themes	Functions of several real variables. Continuity and differentiability. Optimization problems, vector analysis and integral theorems. Linear differential equations. Modelling of simple problems.
Aims	At the end of the course the students will be able to 1 • Express metric notions in Rn using the language of general topology. • Study limits, continuity, directional derivatives and differentiability for functions of several variables. • Apply Taylor polynomial in order to approximate a function. • Locate and identify free extrema of a function; locate extrema under constraints of a function using the technique of Lagrange multipliers. • Calculating multiple integrals possibly using a change of variables. • Calculate line integrals, surface integrals, the flow of a vector field along a curve and the flow of a vector field through a surface possibly using Stokes type theorems. • Apply the resolving method for linear differential equations with constant coefficients of order n. • Analyse and write rigorously statements and demonstrations on the mathematical content specified below, and illustrate them with examples and counter-examples. - - - - *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	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** Students will be evaluated with an individual written exam, based on the above-mentioned objectives. Results from continuous assessment may also be taken into account for the final grade.
Teaching methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** Lectures in a large auditorium, supervised exercise (APE) and problem (APP) sessions in small groups, possibly online exercises.
Content	• Linear constant-coefficient ordinary differential equations of any order, Cauchy problem • Scalar and vector-valued real functions of several variables, topology, continuity • Differentiability, partial and directional derivatives, chain rule, tangent plane, gradient and Jacobian matrix • Higher order partial derivatives and Taylor polynomial • Unconstrained and constrained extrema, Lagrange multipliers • Multiple integrals and changes of variables • Line and surface integrals, circulation and flux of a vector field • Notion of boundary and Stokes-type theorems
Inline resources	https://moodleucl.uclouvain.be/course/view.php?id=12176
Bibliography	• **Multivariable Calculus with Applications** _ par Peter D. Lax et Maria Shea Terrell, Springer, 2017.
Faculty or entity in charge	BTCI

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Aims
Bachelor in Engineering	FSA1BA	5		
Bachelor in Engineering : Architecture	ARCH1BA	5		