UCLouvain

lepl1105

2025

Analysis II

The version you're consulting is not final. This course description may change. The final version will be published on 1st June.

5.00 credits	30.0 h + 30.0 h	Q2

Teacher(s)	. SOMEBODY ;Glineur François ;Jacques Laurent ;
Language :	French
Place of the course	Louvain-la-Neuve
Prerequisites	This course supposes acquired the notions of mathematics developed in the courses **LEPL1101** and **LEPL1102**.
Main themes	Functions of several real variables. Continuity and differentiability. Optimization problems, vector analysis and integral theorems. Linear differential equations. Modelling of simple problems.
Learning outcomes	**At the end of this learning unit, the student is able to :** 1 At the end of the course the students will be able to • 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. • Use the math content above to model and solve simple problems. The course contributes to developing the AAs of the program: to be completed (AA 1.1, 1.2, maybe 2.3, 2.6, 2.7, 3.2, 4.1)
Evaluation methods	Students are assessed individually with a written exam organized during the session, based on the learning outcomes listed above.
Teaching methods	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://moodle.uclouvain.be/course/view.php?id=3557
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	Learning outcomes
Bachelor in Engineering	FSA1BA	5		🔍
Bachelor in Engineering : Architecture	ARCH1BA	5		🔍