UCL Université catholique de Louvain

LINMA2171

2014-2015

Numerical Analysis : Approximation, Interpolation, Integration

5.0 credits	30.0 h + 22.5 h	1q

Teacher(s) :	Absil Pierre-Antoine ;
Language :	Français
Place of the course	Louvain-la-Neuve
Inline resources:	> http://icampus.uclouvain.be/claroline/course/index.php?cid=LINMA2171
Prerequisites :	LFSAB1104 (Numerical methods) Remark : LINMA2171 is the second part of a teaching programme in numerical analysis, of which LINMA1170 is the first part ; however, LINMA1170 is not a prerequisite for LINMA2171.
Main themes :	-- Interpolation -- Function approximation -- Numerical integration
Aims :	-- AA1.1, AA1.2, AA1.3 At the end of the course, the student will be able to: -- Implement, in concrete problems, the basic knowledge required from an advanced user and a developer of numerical computing software; -- Analyze in depth various methods and algorithms for numerically solving scientific or technical problems, related in particular to interpolation, approximation, and integration of functions. Transversal learning outcomes : -- Use a reference book in English; -- Use programming languages for scientific computing. *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 :	-- Homeworks, exercises, or laboratory work during the course semester -- Exam Precisions are given in the course outline (plan de cours) available on iCampus & t; LINMA2171 & t; Documents et liens
Teaching methods :	-- Lectures -- Homeworks, exercises, or laboratory work under the supervision of the teaching assistants
Content :	-- Polynomial interpolation: Lagrange's interpolation formula, Neville's algorithm, Newton's interpolation formula, divided differences, Hermite interpolation. -- Interpolation by spline functions : cubic spline interpolation, B-splines. -- Rational interpolation. -- Trigonometric interpolation. -- Orthogonal polynomials : Legendre polynomials, Chebyshev polynomials. -- Polynomial minimax approximation : existence, de la Vallée-Poussin's theorem, equioscillation theorem, uniqueness, Chebyshev interpolation. --

	Polynomial approximation in the least-squares sense. -- Numerical integration : Newton-Cotes formula, Gauss method. -- Integration of differential equations : introduction to the finite element method. -- Other topics related to the course themes.
Bibliography :	-- Reference book -- Complementary documents posted on iCampus Precisions are given in the course outline (plan de cours) available on iCampus.
Cycle and year of study :	> Master [120] in Statistics: General > Bachelor in Mathematics > Master [120] in Mathematical Engineering
Faculty or entity in charge:	MAP