UCLouvain

linma2171

2023

Numerical Analysis : Approximation, Interpolation, Integration

5.00 credits	30.0 h + 22.5 h	Q1

Teacher(s)	Absil Pierre-Antoine ;Vary Simon (compensates Absil Pierre-Antoine) ;
Language :	English > French-friendly
Place of the course	Louvain-la-Neuve
Prerequisites	Basic skills in numerical methods, as covered, for example, within LEPL1104 (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
Learning outcomes	**At the end of this learning unit, the student is able to :** • AA1.1, AA1.2, AA1.3 At the end of the course, the student will be able to: 1 • 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.
Evaluation methods	• Work carried out during the term: homework assignments, exercises, or laboratory work. These activities are thus organized (and evaluated) only once per academic year. • Exam: written, or sometimes oral depending on the circumstances. The final grade is min(2/5 D + 3/5 E, D+5, E+5), where D is the grade of the work carried out during the term and E is the grade of the exam. Further information is provided in the "Course outline" document available on Moodle (see "Online resources" below).
Teaching methods	• Lectures • Homeworks, exercises, or laboratory work under the supervision of the teaching assistants
Content	• Interpolation: polynomial, by spline functions, rational, trigonometric. • Orthogonal polynomials: Legendre polynomials, Chebyshev polynomials. • Approximation: uniform and in the least-square sense, by polynomials and by splines. • Numerical integration: Newton--Cotes formulas, Gauss method. • Other topics related to the course themes.
Inline resources	https://moodle.uclouvain.be/course/view.php?id=747
Bibliography	• Textbook • Complementary documents posted on Moodle Further information is provided in the "Course outline" document available on Moodle.
Faculty or entity in charge	MAP

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Mathematics	MATH2M	5		🔍
Master [120] in Mathematical Engineering	MAP2M	5		🔍
Master [120] in Data Science Engineering	DATE2M	5		🔍
Master [120] in Data Science: Information Technology	DATI2M	5		🔍