

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 + 22.5 h

Q1

Teacher(s)	Absil Pierre-Antoine ;
Language :	English
Place of the course	Louvain-la-Neuve
Main themes	<ul style="list-style-type: none"> <li>• Interpolation</li> <li>• Function approximation</li> <li>• Numerical integration</li> </ul>
Aims	<ul style="list-style-type: none"> <li>• AA1.1, AA1.2, AA1.3</li> </ul> <p>At the end of the course, the student will be able to:</p> <ul style="list-style-type: none"> <li>• Implement, in concrete problems, the basic knowledge required from an advanced user and a developer of numerical computing software;</li> <li>1 • Analyze in depth various methods and algorithms for numerically solving scientific or technical problems, related in particular to interpolation, approximation, and integration of functions.</li> </ul> <p>Transversal learning outcomes :</p> <ul style="list-style-type: none"> <li>• Use a reference book in English;</li> <li>• Use programming languages for scientific computing.</li> </ul> <p>-----</p> <p><i>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".</i></p>
Evaluation methods	<p><b>Due to the COVID-19 crisis, the information in this section is particularly likely to change.</b></p> <ul style="list-style-type: none"> <li>• Homeworks, exercises, or laboratory work during the course semester</li> <li>• Exam</li> </ul> <p>Precisions are given in the course outline (plan de cours) available on Moodle.</p>
Teaching methods	<p><b>Due to the COVID-19 crisis, the information in this section is particularly likely to change.</b></p> <ul style="list-style-type: none"> <li>• Lectures</li> <li>• Homeworks, exercises, or laboratory work under the supervision of the teaching assistants</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Polynomial interpolation: Lagrange's interpolation formula, Neville's algorithm, Newton's interpolation formula, divided differences, Hermite interpolation.</li> <li>• Interpolation by spline functions : cubic spline interpolation, B-splines.</li> <li>• Rational interpolation.</li> <li>• Trigonometric interpolation.</li> <li>• Orthogonal polynomials : Legendre polynomials, Chebyshev polynomials.</li> <li>• Polynomial minimax approximation : existence, de la Vallée-Poussin's theorem, equioscillation theorem, uniqueness, Chebyshev interpolation.</li> <li>• Polynomial approximation in the least-squares sense.</li> <li>• Numerical integration : Newton-Cotes formula, Gauss method.</li> <li>• Integration of differential equations : introduction to the finite element method.</li> <li>• Other topics related to the course themes.</li> </ul>
Inline resources	<a href="https://moodleucl.uclouvain.be/course/view.php?id=5443">https://moodleucl.uclouvain.be/course/view.php?id=5443</a>
Bibliography	<ul style="list-style-type: none"> <li>• Ouvrage de référence</li> <li>• Documents complémentaires disponibles sur Moodle.</li> </ul> <p>Des précisions sont fournies dans le plan de cours disponible sur Moodle.</p>

Faculty or entity in charge	MAP
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Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Aims
Master [120] in Data Science Engineering	DATE2M	5		
Master [120] in Mathematics	MATH2M	5		
Master [120] in Mathematical Engineering	MAP2M	5		
Master [120] in Statistic: General	STAT2M	5		
Master [120] in Data Science: Information Technology	DAT12M	5		