


5.00 credits

30.0 h + 30.0 h

Q2

Teacher(s)	Craeye Christophe ; Vitale Enrico ;
Language :	French
Place of the course	Louvain-la-Neuve
Prerequisites	This course assumes that the student already masters the skills of end of secondary allowing to translate a problem into a system of equations with several variables and to solve it.
Main themes	<p>The course focuses on :</p> <ul style="list-style-type: none"> <li>• the understanding of mathematical tools and techniques based on a rigorous learning of concepts favored by highlighting their concrete application,</li> <li>• the rigorous manipulation of these tools and techniques in the context of concrete applications.</li> </ul> <p><b>Matrix calculation</b></p> <ul style="list-style-type: none"> <li>• transposition,</li> <li>• operation on matrices,</li> <li>• rank and resolution of a linear system,</li> <li>• inversion,</li> <li>• determinant</li> </ul> <p><b>Resolution of linear equation systems</b></p> <ul style="list-style-type: none"> <li>• Matrix writing of a system of linear equations</li> <li>• Basic operations on the lines</li> <li>• Elimination of Gauss-Jordan</li> <li>• LU Factoring</li> <li>• Implementation of Linear Equation System Resolution Algorithms</li> </ul> <p><b>Linear algebra</b></p> <ul style="list-style-type: none"> <li>• vectors, vector operations,</li> <li>• vector spaces (vector, independence, base, dimension),</li> <li>• linear applications (applications to transformations of the plan, kernel and image),</li> <li>• eigenvectors and eigenvalues (including applications)</li> </ul>
Learning outcomes	<p><b>At the end of this learning unit, the student is able to :</b></p> <p>Given the learning outcomes of the "Bachelor in Computer science" program, this course contributes to the development, acquisition and evaluation of the following learning outcomes:</p> <ul style="list-style-type: none"> <li>• S1.G1</li> <li>• S2.2</li> </ul> <p>1 Students who have successfully completed this course will be able to:</p> <ul style="list-style-type: none"> <li>• Model concrete problems using matrices and vectors;</li> <li>• Solve concrete problems using matrix calculation techniques (in particular the resolution of linear systems);</li> <li>• Reason using correctly the mathematical notation and methods keeping in mind but exceeding a more intuitive understanding of the concepts.</li> </ul>
Evaluation methods	Written exam and implementation assignments carried out during the semester (approximately 15% of the mark).
Teaching methods	The course is given in the form of lectures and practical work sessions. The implementation assignments are supervised by the course assistants. A partial, optional but dispensatory questioning takes place halfway through.
Content	<p>Matrix calculation</p> <ul style="list-style-type: none"> <li>• transposition,</li> <li>• matrix operation,</li> <li>• rank, resolution of a linear system,</li> </ul>

	<ul style="list-style-type: none"> <li>• inversion,</li> <li>• determining</li> </ul> <p>Solving Systems of Linear Equations</p> <ul style="list-style-type: none"> <li>• Matrix writing of a system of linear equations</li> <li>• Basic row operations</li> <li>• Gauss-Jordan elimination</li> <li>• Orthogonality and QR factorization</li> <li>• Implementation in Python language of algorithms for solving systems of linear equations</li> </ul> <p>Linear algebra</p> <ul style="list-style-type: none"> <li>• vectors, operations on vectors,</li> <li>• vector spaces (vector, independence, basis, dimension), Euclidean space,</li> <li>• linear applications (applications to plane, kernel and image transformations),</li> <li>• eigenvectors and eigenvalues (including maps)</li> </ul>
Faculty or entity in charge	INFO

<b>Programmes containing this learning unit (UE)</b>				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Data Science : Statistic	DATS2M	5		
Bachelor in Computer Science	SINF1BA	5		