UCLouvain

# linfo1112

*2025*

# Algebra

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 |
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| 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 | The course focuses on :<br>• the understanding of mathematical tools and techniques based on a rigorous learning of concepts favored by highlighting their concrete application,<br>• the rigorous manipulation of these tools and techniques in the context of concrete applications.<br>**Matrix calculation**<br>• transposition,<br>• operation on matrices,<br>• rank and resolution of a linear system,<br>• inversion,<br>• determinant<br>**Resolution of linear equation systems**<br>• Matrix writing of a system of linear equations<br>• Basic operations on the lines<br>• Elimination of Gauss-Jordan<br>• LU Factoring<br>• Implementation of Linear Equation System Resolution Algorithms<br>**Linear algebra**<br>• vectors, vector operations,<br>• vector spaces (vector, independence, base, dimension),<br>• linear applications (applications to transformations of the plan, kernel and image),<br>• eigenvectors and eigenvalues (including applications) |
| Learning outcomes | **At the end of this learning unit, the student is able to :**<br>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:<br>• S1.G1<br>• S2.2<br>1 Students who have successfully completed this course will be able to:<br>• Model concrete problems using matrices and vectors;<br>• Solve concrete problems using matrix calculation techniques (in particular the resolution of linear systems);<br>• Reason using correctly the mathematical notation and methods keeping in mind but exceeding a more intuitive understanding of the concepts. |
| Evaluation methods | Written exam and implementation assignments carried out during the semester (10% of the mark). |
| Teaching methods | The course is given in the form of lectures and practical work sessions.<br>The implementation assignments are supervised by the course assistants.<br>A partial, optional but dispensatory questioning takes place halfway through. |
| Content | Matrix calculation |

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| | • transposition,<br>• matrix operation,<br>• rank, resolution of a linear system,<br>• inversion,<br>• determining<br><br>Solving Systems of Linear Equations<br><br>• Matrix writing of a system of linear equations<br>• Basic row operations<br>• Gauss method<br>• Orthogonality and QR factorization<br>• Implementation in Python language of algorithms for solving systems of linear equations<br><br>Linear algebra<br><br>• vectors, operations on vectors,<br>• vector spaces (vector, independence, basis, dimension), Euclidean space,<br>• linear applications (applications to plane, kernel and image transformations),<br>• eigenvectors and eigenvalues (including linear operators) |
| Inline resources | Available on Moodle:<br>Course slides<br>Syllabus<br>Statements and solutions to exercises and assignments<br>Old exam questions, with solutions |
| Other infos | To review your prior knowledge, you can use the site https://www.auto-math.be |
| Faculty or entity in charge | INFO |

| Programmes containing this learning unit (UE) | | | | |
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| Program title | Acronym | Credits | Prerequisite | Learning outcomes |
| Bachelor in Computer Science | SINF1BA | 5 | | 🔍 |