UCLouvain

lepl1101

2023

Algebra

5.00 credits	30.0 h + 30.0 h	Q1

Teacher(s)	. SOMEBODY ;Glineur François ;Jungers Raphaël ;Remacle Jean-François ;Verleysen Michel (coordinator) ;Wertz Vincent (compensates Verleysen Michel) ;
Language :	French
Place of the course	Louvain-la-Neuve
Main themes	Linear algebra : linear equation systems, matrix calculus, linear applications, euclidean spaces, vector spaces on a field, linear sequences, quadratic forms. Modelling and solving of simple problems.
Learning outcomes	**At the end of this learning unit, the student is able to :** **Contribution of the course to the program objectives** Regarding the learning outcomes of the program of Bachelor in Engineering, this course contributes to the development and the acquisition of the following learning outcomes: • LO1.1, 1.2 • LO 2.2, 2.3, 2.4, 2.6, 2.7 • LO 3.1, 3.2, 3.3 • LO 4.1, 4.4 **Specific learning outcomes of the course** At the end of the course the students will be able to 1 • Master the elementary notions of linear algebra ; • Apply the notion of euclidean space and orthogonal projection to solve approximation problems in Rn and other spaces; • Calculate vector spaces of a linear operator; • Diagonalize a linear space if possible; • Study the evoluation of a linear system and of a linear recurrence: • Determine the caracteristics of a quadratic form; • Understand the main mathematical proof techniques ; • Make a critical reading and analysis of a problem statement; • Find examples and counter-examples related to a mathematical statement; • Write short mathematical proofs with rigor; • Modelli of simple problems, and problem solving using the methods cited above.
Evaluation methods	The written examination will cover the learning outcomes. Two assignments (peer-reviewed) to be carried out during the term are compulsory; these two assignments, including their evaluation, may count for the January exam session only. If a lecture is cancelled because of a conflict of agenda, an activity to achieve remotely may be required, which might also count for the (january) exam.
Teaching methods	Lectures in auditorium, supervised exercise sessions and problem based learning, possibly supplemented with writing assignments and online exercises. Some of the above activities (lectures, exercise sessions, problem based learning) may be organised on line. Some activities are dedicated to questions related with sustainable development.
Content	• Systems of linear equations, • Matrix calculus, • Vector spaces, • Linear applications, • Euclidean spaces, orthogonal projection and approximation problems, • Linear operators, eigenvectors and diagonalization, Jordan form and matrix exponential • Adjoint operator, spectral theorem, quadratic forms, law of inertia, • Sequences and series, linear differential equations
Inline resources	Cours : LEPL1101 - Algèbre (uclouvain.be)
Bibliography	Le syllabus constitute le support de cours obligatoire. Une référence supplémentaire intéressante à conseiller est:G. Strang, Introduction to linear algebra, 5th edition, Cambridge University Press

Faculty or entity in charge	BTCI

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Bachelor in Engineering	FSA1BA	5		🔍
Bachelor in Engineering : Architecture	ARCH1BA	5		🔍