Content

Course Code	Course Name	Semester	Theory	Practice	Lab	Credit	ECTS
ING107	Mathematics II	2	4	2	0	3	7

Prerequisites	
Admission Requirements	

Language of Instruction	French
Course Type	Compulsory
Course Level	Bachelor Degree
Objective	This course deals in depth with the subject of linear algebra. Linear algebra is the basis of many techniques used in many fields such as computer science, automata and economics. Throughout the course, the basic concepts of linear algebra will be explored with an emphasis on real Euclidean spaces and vector spaces of polynomials. In this context, the objectives of the course are: - Introduce students to all the axiomatic definitions and signs of linear algebra: group, vector space, matrix ... - Teach students a number of simple computational techniques that will facilitate solving linear algebra problems: solving a linear system, factoring a polynomial, simplifying a rational fraction, inverting a matrix. - Explain the concept of dimension and its properties in a vector space. - Show students the link between a linear function and its different matrix representations.
Content	1. Geometry of the plane and the space: Collinearity / orthogonality of the vectors of R ^ 2 or R ^ 3. 2. Geometry of the plane and the space: Application to the study to the study of the lines of the plane / of the lines and the planes of space 3. Linear systems: Gaus pivot method for solving linear systems. Geometric interpretation for systems with 2 or 3 unknowns. Discussion of the solutions of a system with parameters 4. Matrices: Definition and properties of operations on matrices. Matrix writing of a linear system. Reversible matirces. Linear application associated with a matrix. 5. Complex numbers: Cartesian and polar representation of a complex. Application to geometry and trigonometry 6. Complex numbers: Equation of degree 2 with complex coefficients. Nth roots of a complex. 7. Polynomials: Operations on polynomials. Euclidean division Roots of a polynomial 8. Partial examination / Arasinav 9. Polynomials: Taylor formulas. Factoring on C and on R 10. Vector spaces: Definition, examples and properties. Vector subspace of a vector space. 11. Vector spaces: Free families, generating families and bases of a vector space. 12. Vector Spaces: Dimensional theory. 13. Linear applications: Definition and properties. Matrix representation of a linear application. 14. Linear applications: Kernel and image of a linear application. Rank theorem. Change of bases.
References	1. Lectures notes ans worksheets 2. http://braise.univ-rennes1.fr/braise.cgi 3. http://www.unisciel.fr

Theory Topics

Week	Weekly Contents
1	1- Geometry. Determinant in R^2
2	Vector product and determinant in R^3. Lines and planes of space
3	2- Linear systems. Gaussian pivot method
4	3- Matrices Definition, operations
5	Invertible matrices
6	4- Complex numbers Cartesian representation, polar representation
7	nth roots of unity
8	Mid-term exams
9	5- Polynomials Definition, operations, Euclidean division
10	Taylor formula. Factorization
11	6- Vector spaces. Definition, examples. Linear subspaces
12	Linearly independent or spanning set of vectors. Basis.
13	Dimension of a vector space
14	7- Linear applications Definition, examples. Matrix representation