

## Algebra 2

1. **Course number and name:** 020AL2CI3 Algebra 2
2. **Credits and contact hours:** 6 ECTS credits, 3x1:15 contact hours
3. **Name(s) of instructor(s) or course coordinator(s):** Fares Maalouf
4. **Instructional materials**
  - a. **Text book:** C. Cochet & X. OUDOT, Maths MP/MP\* Vuibert 2022
  - b. **Other supplemental materials:** Notes on certain topics from internet sites.
5. **Specific course information**
  - a. **Catalog description:**

This course, a continuation of Algebra 1, explores the advanced study of algebraic structures such as groups, rings, and fields. It includes a detailed examination of endomorphisms, matrix reduction, and special substructures of algebraic structures like ideals. Topics explored include classification of matrices, the computation of eigenvalues and equivalent matrices. With a mix of theoretical understanding and practical applications, students will gain a comprehensive understanding of these mathematical concepts.
  - b. **Prerequisites:** 020AL1CI2 Algebra 1
  - c. **Required/Selected Elective/Open Elective:** Required
6. **Educational objectives for the course**
  - a. **Specific outcomes of instruction:**
    - Identify, manipulate algebraic structures.
    - Characterize substructures and special subsets (ideals, sets of generators, bases).
    - Study and manipulate linear applications.
    - Classify matrices.
    - Compute eigenvalues and eigenvectors.
    - Compute equivalent diagonal or triangular matrix to a given one.
  - b. **PIs addressed by the course:**

<b>PI</b>	1.3
<b>Covered</b>	x
<b>Assessed</b>	x

## **7. Brief list of topics to be covered**

- Generalities on algebraic structures (2 lectures)
- Group theory, subgroups order of a group finite groups, subgroups, morphisms cyclic groups (8 lectures)
- Rings, ideals, morphisms and applications to number theory and polynomials (8 lectures)
- Morphisms of fields and vector spaces (2 lectures)
- Invariant subspaces and equivalent matrices (6 lectures)
- Eigenvalues and eigenvectors spectrum of an endomorphism (6 lectures)
- Diagonalization and trigonalization applications (10 lectures)