Elements of Advanced Algebra

General informations
Year: first. The course is divided into two parts, the first one in the first semester, the second one in the second semester;
CFU: 6+6;
Ore: 35+35 (lessons) and 12+12 (exercises);
The knowledge of basic ring theory is required.

Obiettivi
Deepen the knowledge of commutative ring theory, with particular attention to polynomial ring and its quotients, with a glance toward the applications to algebraic geometry and number theory. It will be also presented the theory of Groebner bases, to introduce the student to computational algebra and its applications.

Text
M.F. Atiyah, I.G. Macdonald, Introduction to commutative algebra.

Verifiche ed esami
Exercises will be proposed to the students both in the classroom and as homeworks; the homeworks will be presented by the students in the classroom. At the end of the first part a written exam will be held. At the end of the second part there will be an oral exam that will take into account the exercises done during the whole year.
First part.


III. Rings and modules of fractions. Definizione e proprietà. Localization and local properties. Ideals of rings of fractions.


V. Artinian rings. Aritinin rings and modules. Compositions series. Length. A ring is aritinian if and only if it is noetherian and zero dimensional.


VII. Hilbert’ nullstellensatz: weak and strong versions.


Second part

