

Programma del corso di
COMPLEMENTI DI ALGEBRA COMMUTATIVA

(Prof. Marco D'Anna)

- 1) Integral dependence: integral extensions; fields algebraic extensions; Properties of integral extensions (lying over, incomparability and going-up); integrally closed domains and going down theorem; integral closure of an ideal; reductions of ideals and reduction number.
- 2) Valuations and valuation rings: valuation on a field (additive and multiplicative); value groups and valuation rings; integral closure and valuation overrings; discrete valuation rings; Dedekind domains; fractional ideals and ideal class group.
- 3) Completions: completion of a module as an inverse limit; completion given by a fundamental system of neighbourhoods; equivalence of the two definitions; Cauchy sequences; completion of semilocal rings; when a ring is contained as a subring in its completion; valuations and completions; Hensel's Lemma; power series rings; power series ring and polynomial rings; applications to singularities.
- 4) Noetherian local rings: system of parameters; regular sequences; Cohen Macaulay rings; Cohen Macaulay type; Gorenstein rings; complete intersections; regular local rings; the one-dimensional case; ideal theory in one dimensional local rings; applications to curve singularities