ICTP DIPLOMA PROGRAMME IN MATHEMATICS 2012-13

Algebraic Geometry

L. Göttsche (20 lectures : 30 hrs)

I. Affine and projective varieties: Affine algebraic sets, Zariski topology, ideal of an algebraic set, Hilbert Basis theorem, irreducible componenents, Hilbert Nullstellensatz. Projective varieties, projective Nullstellensatz.

II. Functions and morphisms: Regular functions on affine and quasiprojective varieties, morphisms, characterization of morphisms of affine and projective varieties, examples. Segre embedding and products of quasiprojective varieties. Separatedness, completeness, proof that projective varieties are complete with applications, Segre embedding, rational maps.

III. Dimension and nonsingularity.
Study of finite morphisms, definition of dimension, theorem on dimension of a hypersurface. Dimension of intersection of two varieties in affine and projective space, relation of dimension to transzendence degree.
Tangent space, singular and nonsingular points of a variety.