MATH32062 - 2010/2011

General Information

- Title: Introduction to Algebraic Geometry
- Unit code: MATH32062
- Credits: 10
- Prerequisites: MATH20212
- Co-requisite units:
- School responsible: Mathematics
- Members of staff responsible: Dr. Gábor Megyesi

Specification

Aims

To introduce students to the basic notions of affine and projective algebraic geometry.

Brief Description of the unit

Algebraic geometry studies objects called varieties defined by polynomial equations. A very simple example is the hyperbola defined by the equation $xy = 1$ in the plane. There is a way of associating rings to varieties, and then the geometric properties can be studied using algebra, for example points correspond to maximal ideals, or the geometry of the variety can give information about certain algebraic properties of the ring. Algebraic geometry originated in nineteenth century Italy, but it is still a very active area of research. It has close connections with algebra, number theory, topology, differential geometry and complex analysis.

Learning Outcomes

Successful students will

- understand the correspondences between algebraic varieties, ideals and co-ordinate rings both in the affine and projective cases,
- be able to calculate the singular points and the dimension of algebraic varieties,
- be able to carry out calculations on elliptic curves.

Future topics requiring this course unit

Syllabus

1. Affine and projective spaces.
2. Affine and projective varieties.
3. Co-ordinate rings.
4. Function fields.
5. Morphisms and rational maps.
6. Hilbert's Nullstellensatz.
7. The classification of curves.
8. The group law on the points of an elliptic curve.

Textbooks

Miles Reid, *Undergraduate Algebraic Geometry,* CUP.

Teaching and learning methods

Two lectures per week plus one weekly examples class. In addition students should expect to do at least four hours private study each week for this course unit.

Assessment

Coursework: 20%.
End of semester examination (2 hours): 80%.

Arrangements