MA939-15 Topics in Number Theory

26/27

Department
Warwick Mathematics Institute
Level
Research Postgraduate Level
Module leader
Adam Harper
Credit value
15
Assessment
100% exam
Study location
University of Warwick main campus, Coventry

Description

Introductory description

The “Topics in Number Theory” module will rotate from year to year, according to the research interests of the module lecturer. Examples of areas which may be covered include

- Diophantine equations
- Rational points on algebraic varieties
- Modular and automorphic forms
- Galois representations and Iwasawa theory
- Analytic number theory and zeta-functions
- Combinatorial number theory and arithmetic statistics
  In the initial year 2020-21 the module will focus on rational points on algebraic varieties.

Module aims

The module aims to give students an overview of a particular area of contemporary number-theory research at an advanced level. In 2020-21 the module will aim to cover:

- Local and global solutions and the Hasse principle
- Weak approximation
- Rationality and unirationality over general fields
- del Pezzo surfaces
- Brauer groups

- Galois cohomology and Brauer-Manin obstructions

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

The topics for this module will rotate from year to year there will be no fixed syllabus. Examples of areas which may be covered include

- Rational points on algebraic varieties
- Modular and automorphic forms
- Galois representations and Iwasawa theory
- Analytic number theory and zeta-functions
- Combinatorial number theory and arithmetic statistics

Learning outcomes

By the end of the module, students should be able to:

- By the end of the module, students should have acquired advanced knowledge of a specific area of number theory of contemporary research interest. For instance, in 2020-21 students will be familiar with “local-to-global” problems and obstruction theory in the context of algebraic surfaces, and will be able to compute examples of Brauer groups in concrete cases arising from del Pezzo surfaces.

Indicative reading list

Reading lists can be found in Talis

Subject specific skills

This will vary from year to year according to the topics chosen. In 2020-1 students will acquire the following skills:

- Ability to investigate and solve Diophantine problems involving existence of rational or integral points on algebraic varieties, focusing on curves and surfaces
- Interplay between geometric and arithmetic properties of algebraic varieties
- Fluency in working with local and global fields
- Understanding of the distribution of these solutions and their relation to local solvability over p-adic fields

Transferable skills

- sourcing research material
- prioritising and summarising relevant information

- absorbing and organizing information
- presentation skills (both oral and written)

Study

Study time

Type	Required
Lectures	30 sessions of 1 hour (100%)
Total	30 hours

Private study description

Review lectured material.
Work on suplementary reading material.
Source, organise and prioritise material for additional reading.

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Students can register for this module without taking any assessment.

Assessment group B

	Weighting	Study time	Eligible for self-certification
Assessment component			
Oral exam	100%		No

An oral exam involving a presentation by the student, followed by questions from the panel (2 members of the department)

Reassessment component is the same

Feedback on assessment

Students will receive feedback from the course instructor after the oral exam, to cover also areas like presentation skills and use of technologies (or blackboard)

Past exam papers for MA939

Availability

There is currently no information about the courses for which this module is core or optional.