

MA954-15 Complex Geometry

26/27

Department

Warwick Mathematics Institute

Level

Taught Postgraduate Level

Module leader

Weiyi Zhang

Credit value

15

Assessment

100% exam

Study location

University of Warwick main campus, Coventry

Description

Introductory description

The primary goal of this Module is to present some fundamental techniques from several complex variables, Hermitian differential geometry (and partial differential equations, potential theory, functional analysis), to study the geometry of complex, and in particular, Kaehler manifolds. Hodge theory will be one important major topic of this course.

Module aims

The primary goal of this module is to present some fundamental techniques from several complex variables, Hermitian differential geometry (and partial differential equations, potential theory, functional analysis), to study the geometry of complex, and in particular, Kaehler manifolds.

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 primary goal of this Module is to present some fundamental techniques from several complex variables, Hermitian differential geometry (and partial differential equations, potential theory, functional analysis), to study the geometry of complex, and in particular, Kaehler manifolds. Hodge theory will be one important major topic of this course.

- Basics/definitions concerning complex manifolds, vector bundles and sheaf theory
- Some selected topics from several complex variables: the Cauchy integral, the Cauchy-Riemann equations, Hartogs's principle, plurisubharmonic functions, domains of holomorphy, holomorphic convexity, Riemann extension theorem, Hormander's L^2 estimates ...
- Hermitian differential geometry, curvature of Hermitian holomorphic vector bundles, Chern classes
- Some elliptic operator theory, Kaehler manifolds, Hodge decomposition, Kodaira embedding,
 - Outlook on the topology of varieties, Morse theory, Lefschetz pencils, variation of Hodge structures, Clemens-Schmid exact sequences, etc.

Learning outcomes

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

- By the end of the module students should be able to use the differential geometry and global analysis viewpoint to study complex manifolds. As the module provides the foundations of several different branches of mathematics, the module would be an important preparation for PhD students in related areas to read research papers.

Indicative reading list

[Reading lists can be found in Talis](#)

Subject specific skills

Develop a deep understanding and applicability of the following topics:

- fundamental techniques from several complex variables,
- Hermitian differential geometry (and partial differential equations, potential theory, functional analysis),
- geometry of complex, and in particular, Kaehler manifolds.

By the end of the module students should be able to use the differential geometry and global analysis viewpoint to study complex manifolds. The module would be an important preparation for PhD students in related areas to read research papers.

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 supplementary 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.

Assessment group A

	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 MA954](#)

Availability

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