

English version

Topics on Kähler Geometry and Hodge Theory.

Level of course

PhD Course

Semester/quarter

1st + 2nd quarter (Autumn 2011)

Hours per week

4 hours

Name of lecturer

Mario Garcia Fernandez

Objectives of the course

This course will be an introduction to complex and Kähler geometry with emphasis on Hodge Theory and elliptic operator theory with a goal towards understanding Kodaira's characterization of complex algebraic manifolds.

Compulsory programme

None.

Prerequisites

Basic Differential Geometry and Analysis.

Course contents

The course will cover the following topics:

1. Introduction to complex and Kähler geometry: complex and Kähler manifolds, vector bundles and connections, Chern classes.
2. Elliptic operator Theory.
3. Hodge Theory.
4. Kodaira's embedding Theorem and sheaf theory.

Learning outcomes and competences

Relevant to the course subject matter the student should at the end of the course be able to:

- (a) reproduce key results and give rigorous and detailed proofs of them,
- (b) compare key results,
- (c) apply the basic techniques, results and concepts of the course to concrete examples and exercises,
- (d) to study a prescribed topic on his own and give an oral presentation of selected parts of the topic for his fellow students with pertinent written notes,
- (e) combine concepts from geometry, analysis and topology, and
- (f) show, how the course generalizes classical results.

Literature

R.O. Wells, Jr., *Differential Analysis on Complex Manifolds*, GTM **65**, Springer (1980).

S. Kobayashi, *Differential Geometry of Complex Vector Bundles*, Princeton University Press (1987).

S. Kobayashi and K. Nomizu, *Foundations of Differential Geometry*, Volume II, Interscience Publishers, New York (1969).

S. K. Donaldson and P. B. Kronheimer, *The geometry of four-manifolds*, Oxford University Press (1990).

Teaching methods

4 hours of lectures per week including exercises and oral presentations of the students

Assessment methods

Passed / not passed will be based on the students participation in the course

Credits

10 ECTS

Language of instruction

English

Capacity limits

XX

Special comments on this course

None