

De Rham Cohomology

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Timetable: 20 hours. Class meets on Monday from 11:00 to 13:00 and Thursday from 15:00 to 17:00. The first lecture will be on Monday, March 28, 2011, Torre Archimede.

The lecture of Monday, April 25, 2011 will be made on Tuesday 26, from 15:00 to 17:00.

The room is 2BC/30 (Torre Archimede), except for March 31 where the room will be 2AB/40, and April 14 and April 28 where the room will be the Meeting Room, VII floor (stair B).

Course requirements: Basic differential geometry and algebraic topology. Manifolds. Basic schemes theory. Basic commutative and homological algebra.

Examination and grading: Oral.

SSD: MAT/03 Geometry, MAT/05 Mathematical Analysis, MAT/02 Algebra.

Aim: To understand topological invariants for algebraic varieties only in algebraic way. How to understand topological invariants for differential varieties only in differential way. How to understand invariants for exotic varieties (in ch.p or without points ...) taking inspiration by the previous results.

Course contents:

We will introduce de Rham Cohomology as a way of calculating topological invariants (homotopy groups, Betti numbers) using differential methods. We will show how this is related to a more general theory (sheaf theory) allowing to find some invariants (which look like the topological ones) in exotic spaces endowed with exotic topologies. This will be applied to for algebraic varieties (schemes) even in characteristic different than 0 and to introduce generalized cohomology theories.