

# Nearby and vanishing cycles

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**Timetable:** 10 hrs. Lectures on April 2012 (see the calendar), Room 2BC/30, Torre Archimede.

**Course requirements:** Basic algebraic and differential geometry. sheaf theory. basic homology and cohomology theories.

**Examination and grading:** Oral exam.

**SSD:** MAT/03 Geometry

**Aim:** We will investigate the behaviour of some invariants of a family of varieties when they approach a singularity. This study can be understood in a geometric framework but also in a more differential and arithmetic ones (heart of categories and algebraic analysis).

**Course contents:**

1. The derived category of constructible sheaves. Verdier duality.
2. Intersection cohomology and perverse sheaves.
3. The perverse cohomology and some related theorems.
4. The decomposition theorem.
5. Some recent development. Ngo's support theorem