Convex polytopes

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**Timetable:** 12 hrs. First lecture on January 18, 2016, 14:00, (dates already fixed, see the calendar), Torre Archimede, Room 2BC/30

**Course requirements:** Basic knowledge of the theory of linear programming and polyhedra: this can be achieved by reading Chapters 7 and 8 in [1] or Chapter 3 in [2] before the beginning of the course.

**Examination and grading:** Written exam.

**SSD:** MAT/09.

**Aim:** Polytopes arise in optimization, but have been studied for long time, e.g., in Physics, Chemistry and Biology. We survey some classical and very recent results on the structure of polytopes.

**Course contents:**

1. Definition and examples of polytopes: 3-dimensional polytopes (including Platonic solids), cyclic polytopes, permutahedron, combinatorial polytopes.
2. Representations of polyhedra: $\mathcal{H}$-polyhedra and $\mathcal{V}$-polyhedra.
3. Affine hull, recession cone, lineality space.
4. Facets, vertices and extreme rays.
5. Face lattice of a polytope.
6. Skeleton of a polytope and Balinski’s theorem.

**References:**