Topologia 2 (Master's degree in Mathematics - ALGANT)
General informations

University of Padova - 2010/11

Lecturer: Corrado Marastoni - `maraston@math.unipd.it`

• **Schedule.** Monday 13:30-15:45 and Thursday 14:30-16:45, room 2AB/40 of the Department of Pure and Applied Mathematics. Lectures start on Monday October 18th 2010, end on Thursday December 9th 2010.

• **Credits.** 6 (for about 48 hours).

• **Web site.** The lecture notes and other documents related to the course are progressively published and downloadable in the following web site of the department: `http://www.math.unipd.it/~maraston/Topologia2` .

• **Short description.** The course aims at providing a basic introduction to the main structures of Algebraic Topology: fundamental group, homology and cohomology spaces. As for the prerequisites, the student is required to have a standard undergraduate knowledge of topology and algebra. The language employed will be generally classical; nevertheless, some modern tools (e.g. categories, homological algebra, sheaves) will be introduced whenever possible to allow a more intrinsic presentation.

• **Syllabus.** • Fundamental group of a topological space. Homotopy. Retractions. Fundamental group. The circle $\mathbb{S}^1$ and the discrete quotients of topological groups. Van Kampen's theorem. Covering spaces. Liftings and the Monodromy lemma. Characteristic subgroup of a covering space. Covering automorphisms. • Cohomology theories. Singular homology and cohomology. CW complexes. Cohomology of de Rham. The Mayer-Vietoris principle. Orientation and integration. Poincaré lemmas. Finiteness, Poincaré duality, relations with singular cohomology. Degree. Künneth formula. Cohomology of Čech.

• **Main references.** Lecture notes (in the above web page). • A. Hatcher, *Algebraic Topology*, Cambridge University Press (2002). Also available in the web site `http://www.math.cornell.edu/~hatcher`. • R. Bott, L. W. Tu, *Differential Forms in Algebraic Topology*. Graduate Texts in Mathematics, Springer Verlag (1982).

• **Examination form.** Oral trial.