Algebraic Topology (M24)

Ivan Smith

Algebraic Topology permeates modern pure mathematics and theoretical physics. This course will focus on (co)homology, with an emphasis on applications to the topology of manifolds. We will cover singular and cellular (co)homology; degrees of maps and cup-products; cohomology with compact supports and Poincaré duality; and Thom isomorphism and the Euler class. The course will not specifically assume any knowledge of algebraic topology, but will go quite fast in order to reach more interesting material, so some previous exposure to chain complexes (e.g. simplicial homology) would certainly be helpful.

Pre-requisite Mathematics

Basic topology: topological spaces, compactness and connectedness, at the level of Sutherland's book. Some knowledge of the fundamental group would be helpful though not a requirement. Hatcher's book and Bott and Tu's book are especially recommended for accompanying the course, but there are many other suitable texts.

Level: Basic

Literature

1. Bott, R. and Tu, L. *Differential forms in algebraic topology.* Springer, 1982.

2. Hatcher, A. *Algebraic Topology.* Cambridge Univ. Press, 2002.

3. May, P. *A concise course in algebraic topology.* Univ. of Chicago Press, 1999.

4. Sutherland, W. *Introduction to metric and topological spaces.* Oxford Univ. Press, 1999.

Additional support

The course will be accompanied by four questions sheets, which will involve applying the general theory to do explicit calculations and solve geometric problems.