

Intended for students who have completed MATH 770 and 771

Topological spaces: metric and order topologies, quotient topologies, subspace topologies.

Simplicial complexes.

CW complexes.

Topological and smooth manifolds: classification of closed surfaces, projective spaces, knots and links, charts, atlases, (smooth) partitions of unity, tangent bundles, diffeomorphisms, local diffeomorphisms, immersions, embeddings, submersions, manifolds with boundary.

Topological properties:

Separation axioms: T_0 , T_1 , T_2 = Hausdorff, regular, normal

Compactness: Tychonoff's Theorem, related concepts (sequential compactness, paracompactness)

Connectedness, path connectedness

Elementary homotopy: the fundamental group, covering spaces, the Seifert-VanKampen Theorem.

Euler characteristic.

Differential forms: cotangent bundles, integration, Stokes' theorem, de Rham cohomology.

References:

Munkres, James R., *Topology* (2nd Edition)

(available in pdf from <http://www.maths.ed.ac.uk/~aar/papers/munkres2.pdf>)

Guillemin, Victor and Pollack, Alan, *Differential Topology*

(available in pdf from

[http://www.mat.unimi.it/users/dedo/top diff/Guillemin-Pollack_Differential topology.pdf](http://www.mat.unimi.it/users/dedo/top%20diff/Guillemin-Pollack_Differential%20topology.pdf))