QUALIFYING EXAM IN TOPOLOGY

SYLLABUS

December 1995

The Topology exam covers essentially the material taught in Topology I (MTH 3105) and Topology II (MTH 3107). The required topics are listed below. All these topics are covered in [1] and [2]. However, some students may find it helpful to read the other suggested texts, where more examples and somewhat different approaches can be found.

- Topological spaces and continuous functions, compactness and connectedness, path-connectedness, separation axioms.
- Fundamental group, covering spaces, Van Kampen Theorem.
- Simplicial complexes, simplicial homology.
- Classification of compact surfaces, computation of their fundamental groups and of their homology groups.
- Singular homology theory: axioms, homological algebra, homology with coefficients, Mayer-Vietoris sequence, degrees of maps, Euler characteristic.
- CW-complexes, cellular homology.
- Examples: projective spaces, grassmanians, lens spaces, cross-products.
- Applications: Jordan Curve Theorem, Borsuk-Ulam Theorem, Lefschetz Fixed Point Theorem.

References

[1] M. A. Armstrong, *Basic Topology*, UTM, Springer-Verlag, 1983.

[2] G. Bredon, *Topology and Geometry*, GTM **139**, Springer-Verlag, 1993.

[3] W. S. Massey, *A Basic Course in Algebraic Topology*, GTM **127**, Springer-Verlag, 1991.

[4] J. R. Munkres, *Topology – a First Course*, Prentice-Hall, 1975.

[5] J. R. Munkres, *Elements of Algebraic Topology*, Benjamin-Cummings, 1984.