Topology Preliminary Exam Syllabus

Department of Mathematical Sciences

University of Cincinnati

(Updated October 2020)

Point-set topology: Topological spaces, closed sets, subspaces, closure, boundary, interior, connectedness, path connectedness, compactness, normal topology, Hausdorff property, continuity at a point (topological continuity and sequential continuity), continuous maps, Urysohn metrization theorem, Tietze extension theorem, quotient topology, weak topology, Baire category theorem, nets, convergence with respect to nets. Fundamental groups: Homotopy of paths, homotopy of maps, fundamental groups, fundamental groups of (i) circles, (ii) spheres, (iii) tori, (iv) Möbius strip, and (v) Klein bottle, free groups, simply connected spaces, covering spaces, homotopy lifting theorem.

This material is covered in MATH 7004.

Texts:
James R. Munkres, *Topology* (second edition), Prentice Hall, 2000.
Allen Hatcher, *Algebraic Topology*, Cambridge University Press, 2002 (Chapters 0–1).
William S. Massey, *A Basic Course in Algebraic Topology*, Springer, 1991 (Chapters 1–5).