Syllabus for Topology Preliminary Exam

(Based on MATH 631, Topology)

Topological Spaces and Continuous functions: Topological spaces, open sets, closed sets, basis, sub-basis, subspaces, product topology, limit points, sequences or nets, convergence, continuous functions, homeomorphisms, metric spaces. Examples including: Euclidean spaces and subspaces.

[M, Ch. 2, Sections 12-21] or [B, Ch. 1, Sections 1-3, 6, 8]

Connectedness and Compactness: Definitions and properties of continuous images, subsets of R and R^n with these properties, sequential and limit point compactness, equivalence of compactness notions for metric spaces, counterexamples in abstract spaces, local compactness, compactifications, Stone Cech compactification, compactness of arbitrary products of compact spaces.

[M, Ch. 3, Sections 23, 24, 26-29, Chapter 5, 37,38] or [B, Ch. 1, Sections 4, 7, 9, 11].

Countability and separation axioms: First and second countability, Hausdorff spaces, regular spaces, completely regular spaces, normal spaces, Urysohn's Lemma, Tietze Extension Theorem.

[M, Ch. 4, Sections 30-35] or [B, Ch. 1, Sections 5, 10]

Fundamental Groups: Homotopy of paths, fundamental group, induced homomorphisms, fundamental group of a product, fundamental group of the circle, covering spaces and lifting.

[H, Ch. 1, Sections 1, 3]

Suggested Texts for Material:

[M] Munkres, Topology, Second Edition, Prentice Hall 2000 (ISBN 0-13-181629-2)

[B] Bredon, Topology and Geometry, Springer 2010 (ISBN 978-1-4419-3103-0)

[H] Hatcher, Algebraic Topology, Cambridge 2001 (ISBN 978-0-521-79540-1)