TOPOLOGY/GEOMETRY PRELIMINARY EXAMINATION SYLLABUS

April 24, 2005

Topology, Math 6342

1. Topological and metric spaces, open and closed sets, continuity, homeomorphisms, product topology, nets and convergence.
2. Normal, regular and completely regular spaces, Urysohn's Lemma and its consequences, and countability axioms.
3. Connectedness, path connectedness, and their local variants.
4. Compactness, Tychonoff's Theorem, compactifications, and local compactness.
5. Quotient spaces, metrizability(separable case), paracompactness, space of continuous functions, and Tietze extension theorem.

Geometry, Math 7350

1. Manifolds, the inverse function theorem, the implicit function theorems, rank theorem, partitions of unity and submanifolds.
2. Tangent bundles, vector fields and Lie derivatives, and Frobenius theorem.
3. Differential forms, tensors and tensor fields on manifolds; exterior algebra, orientation, integration on manifolds, and Stokes' theorem.

References

J. Munkres, Elementary Topology, Prentice Hall, 2000

J. Munkres, Analysis on Manifolds. Addison-Wesley Publishing company.

W. Boothby, Differentiable Geometry and Riemannian Geometry, Chapters 1-6.

S.S. Chern, W.H. Chen and K.S. Lam, Lectures on Differential Geometry, World Scientific, ISBN 981-02-3494-5.