Math 550 - Topology

Course Description from Bulletin: Topological spaces, continuous mappings and homeomorphisms, metric spaces and metrizability, connectedness and compactness, homotopy theory. (3-0-3)

Enrollment: Graduate elective.

Textbook(s): James R. Munkres, *Topology (1st or 2nd ed.)*, Prentice Hall, Inc.

Other required material:

Prerequisites: MATH 400.

Objectives: Students will

1. be able to compare the relative strengths of definitions, including separation axioms and countability axioms, using standard examples and theorems.
2. know the major theorems, their proofs, and examples that demonstrate sharpness.
3. be able to apply theorems and definitions to do routine proofs.

Lecture schedule: 3 50 minute (or 2 75 minute) lectures

This is rather ambitious, in order to do justice to every topic in the old course description

Course Outline: Hours

1. Set Theory and Logic 2
   Review (reading), the axiom of choice, minimal uncountable well-ordered set, the maximum principle, Zorn's lemma
2. Topological Spaces and Continuous Functions 11
   Topological basis, closed set, limit point, Hausdorff space, homeomorphism, the order topology, subspace topology, product topologies, quotient, and metric topologies
3. Connectedness and Compactness 7
   including components, path connected, examples on the real line, limit point compactness, and the one-point compactification
4. Countability and Separation Axioms 6
   First and second countability, dense subset, regular & normal spaces, the Urysohn lemma, the Urysohn metrization theorem, the Tietze Extension theorem

5. The Tychonoff Theorem and the Stone-Cech Compactification 2
6. Metrization Theorems, Local Finiteness, and Paracompactness 4
7. The Fundamental Group 5

   Path homotopy, the fundamental group, covering spaces, the circle, retractions, deformation retracts, and homotopy type

(Exams & wiggle room) (6)

Assessment:	Homework/Quizzes	30-60%
	Midterm	0-30%
	Final Exam	30-70%

Syllabus prepared by: Michael Pelsmajer, with help from M.J.Frank & Xiaofan Li
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