Course Syllabus for 18.937: Topics in Geometric Topology

Course Description Our goal in this course is to cover some topics related to the classification of manifolds. Our emphasis will be on manifolds of low dimension (≤ 3) and cases where it is possible to obtain very precise information (such as computing the homotopy type of diffeomorphism groups).

Text Useful references for some of the topics we will cover include the book of Kirby and Siebenmann ("Foundational Essays on Topological Manifolds, Smoothings, and Triangulations") and the book of Hempel ("3-Manifolds"). More specific references will be suggested in individual lectures.

Course Website http://www-math.mit.edu/~lurie/937.html

Prerequisites Familiarity with the basic machinery of algebraic topology (including the theory of simplicial sets) and a bit of complex analysis.

Possible Topics:
- Characterizations of 2-dimensional manifolds.
- Classification of surfaces.
- Diffeomorphism groups of surfaces and mapping class groups.
- Piecewise linear topology (a quick overview).
- Milnor's theory of microbundles.
- Smoothings and triangulations of manifolds.
- Prime decomposition of 3-manifolds.
- The loop and sphere theorems.
- Seifert-fibered 3-manifolds.
- Incompressible surfaces and Haken manifolds.
- Hyperbolic 3-manifolds and Mostow rigidity.