

Geometry and Topology Preliminary Exam Syllabus

The Ph.D. written preliminary examination in Geometry and Topology will be based on material covered in Math 547 and Math 549. The exam will contain four questions from each course (a total of eight). The score will be based on the three best answers from each section. Two perfect answers from each section are sufficient for a best possible score of 1 on the prelim.

Math 547: Four questions will be drawn from Math 547. Possible topics include any material covered in Chapter 0, 1 or 2 (including their appendices) of Hatcher's *Algebraic Topology*. This material includes the fundamental group, covering spaces, homology theory and applications.

Math 549: Four questions will be drawn from Math 549. Possible topics include any material covered in *Differential Topology* by Guillemin and Pollack. This material includes smooth manifolds, transversality, intersection theory and integration. Unlike the book though, the exam will not be restricted to submanifolds of \mathbb{R}^n ; the exam will also cover the notion of an abstract smooth manifold (as an atlas of smooth charts on a topological manifold), their tangent spaces and the usual Whitney embedding theorem.

Math 547: The following problems on the posted sample exams rely on the material in Chapter 0, 1 and 2 of Hatcher.

1997: 1, 3, 4, 5, 7

1998: 1, 2, 5, 6, 8

2000: 1, 2, 3, 7, 8

2002: 3, 5, 7, 8

2004: 1, 2, 3, 4, 5

2005: 1, 2, 5, 8

2006: 1, 2, 3, 4, 5

2010: 5, 6, 7

2011: 5, 6, 7

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