

CS195H, Spring 2015

Tentative Syllabus

Part I: Curves in the plane

- 1.23 Grid-curves
- 1.28-1.30 Topology, intuition, and motivating examples; homotopy of grid curves continued
- 2.04-2.06 Regular homotopy; the Whitney Graustein Theorem

Part II: Surfaces

- 2.11-2.13 Topology of (simplicial) surfaces; classification of surfaces
- 2.20 The topological Gauss-Bonnet theorem; decomposing surfaces by tree and co-tree

Part III: Curves in Surfaces I

- 2.25-2.27 Maps of curves to surfaces; the fundamental group; maps of surfaces to the plane; covering spaces
- 3.04-3.06 Framed curves that bound

Part IV: Homology and Cohomology

- 3.11-3.13 Polyhedra, simplices, complexes, boundaries, chains, coefficients, orientation, simplicial manifolds
- 3.18-3.20 Simplicial mapping and invariance of dimension
- 4.01-4.03 Brouwer's theorem; Sperner's lemma. Introduction to homology
- 4.08-4.10 More homology; some Eilenberg-Steenrod axioms
- 4.15-4.17 Cohomology and cup products

Part V: Curves in Surfaces II, applications

- 4.22-4.24 Homotopy of curves on surfaces
- 4.29-5.01 The index theorem for vector fields; a short intro to morse theory; small languages for immersed curves