Math 215B: Differential Topology

Syllabus (Sketch)

Winter term, 2020

Stanford University

**Week 1:** Fiber Bundles: Vector bundles, Lie groups and principal bundles, bundle algebra
REF: Ch. 2

**Week 2:** Differentiable manifolds, tangent bundles, embeddings and immersions, manifolds with boundary, regular values and transversality
REF: Ch. 3, sections 1, 2

**Week 3** More on tangent bundles, Differential forms, Connections and Curvature
REF: Ch. 3 section 3.3

**Week 4:** Classification of Bundles
REF: Chapter 4, sections 4.1, 4.2, 4.4

**Week 5:** Embeddings and Immersions in Euclidean space existence (Whitney embedding theorem), obstructions, ”turning a sphere inside out” ala Smale
REF: Chapter 6

**Week 6:** Tubular neighborhoods, transversality, and intersection theory
REF: Chapter 8

**Week 7:** More on intersection theory, degrees, and linking numbers
REF: Chapter 9

**Week 8:** Classical Morse Theory
REF: Chapter 11

**Weeks 9, 10:** Spaces of Gradient flows and applications: the classifying space of a Morse function, Floer theory
REF: Chapter 12