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