

**Math 145B (001) Introduction to Topology  
Spring Quarter 2015**

**Topics to be covered**

**0. Review**

- 0.1 Metric and Topological Spaces (Munkres: 12, 13, 16, 17, 20, 21; Crossley: 3.1–3.2, 3.4)
- 0.2 Continuity (Munkres: 18; Crossley: 2.1–2.4, 3.3)
- 0.3 Homeomorphisms (Munkres: 16, 18; Crossley: 5.1)
- 0.4 Topological Properties (Munkres: 23, 24, 26, 27; Crossley: 4.1–4.3)
- 0.5 Products (Munkres: 14, 19; Crossley: 5.3)
- 0.6 Components (Munkres: 23, 25)

**I. Complete Metric Spaces**

- I.1 Definitions and Basic Properties (Munkres: 43, 45, 46)
- I.2 The Contraction Lemma (Munkres: 43, 45, 46)
- I.3 Completions (Munkres: 43, 45, 46)

**II. Constructing and Deconstructing Spaces**

- II.1 Disjoint Unions (Crossley: 5.2)
- II.2 Quotient Spaces (Munkres: 22; Crossley: 5.4)
- II.3 Scissors and Paste Theorems (Munkres: 16, 18; Crossley: 5.4)

**III. Homotopy**

- III.1 Homotopy (Munkres: 51; Crossley: 6.1)
- III.2 Homotopy Equivalence (Munkres: 58; Crossley: 6.2)
- III.3 The Circle (Munkres: 52, 54; Crossley: 6.3)
- III.4 The Brouwer Fixed Point Theorem (Munkres: 55; Crossley: 6.4)

**IV. Homotopy Groups**

- IV.1 Pointed Spaces (Munkres: 51; Crossley: 8.1–8.2, 8.5)
- IV.2 Algebraic Structure (Munkres: 52; Crossley: 8.1–8.3)
- IV.3 Simple Examples (Munkres: 54; Crossley: 6.3, 8.3)
- IV.4 Change of Base Point (Munkres: 52)

**V. Further Topics**

- V.1 Homotopy and Line Integrals (Munkres: 65, 66)
- V.2 Graph Complexes (Munkres: 64; Crossley: 7.1)
- V.3 Chain Groups and Fundamental Groups (Crossley: 9.1)
- V.4 Euler Paths