Winter 2018 Math 205B: Real Analysis
(Functional Analysis)

The following is a rough and tentative schedule of the course. The schedule is very likely to change as we go along.

The section numbers refer to the corresponding sections in the textbook (Reed–Simon, Functional Analysis). We will cover most of Sections I – VII, and the section on the Fourier transform, but various subsections will be skipped.

- **Week 1:** Introduction, Arzela–Ascoli Theorem, Introduction to Hilbert spaces (§I.2, I.6, II.1)
- **Week 2:** Riesz lemma, orthonormal bases (§II.2, II.3)
- **Week 3:** Banach spaces, duals, Hahn–Banach theorem (§III.1, III.2, III.3)
- **Week 4:** Operations on Banach spaces, Baire category theorem and its consequence (§III.4, III.5)
- **Week 5:** Topological spaces, compactness, Stone–Weierstrass theorem, Midterm (§IV.1, IV.2, IV.3)
- **Week 6:** Weak topologies on Banach spaces, locally convex spaces, Fréchet spaces (§IV.5, V.1, V.2)
- **Week 7:** Schwartz functions and tempered distributions (§V.3), Fourier transform (§IX)
- **Week 8:** Bounded operators, adjoints, spectrum (§V.1, V.2, V.3)
- **Week 9:** Compact operators (§VI.5, VI.6)
- **Week 10:** Spectral theorem (§VII.1, VII.2)