Real and complex analysis

1. Lebesgue integral.
2. Borel measures on locally compact spaces and their characterization. Application: Lebesgue measure on $\mathbb{R}^n$.
3. L^2 and absract Hilbert spaces.
4. Fourier series.
5. Stone–Weierstrass theorem.
6. Products of measures and Fubini theorem.
7. Banach spaces. Banach–Steinhaus and Hahn–Banach theorem. Applications: diverging Fourier series, Poisson integral.
8. Complex measures and Radon–Nikodym theorem.
9. Baanch algebras.
10. Characterization of commuttaive C^*-algebras.

Prerequisutes

Familiarity with the notions of uniform continuity and uniform convergence; modest familiarity with rudiments of point set topology (topological spaces, compactness, etc.).