Title: Tate's Thesis
Text: "Fourier Analysis on Number Fields" by Ramakrishnan and Valenza
Prerequisites: Graduate algebra and analysis; algebraic number theory will be helpful but not essential

Description:

In his 1950 Ph.D. thesis, John Tate developed a powerful new approach to the theory of zeta functions, of which the Riemann zeta function is the most familiar example. It was known to Riemann that his zeta function, defined straightforwardly for complex numbers z with real part greater than 1, posseses an analytic continuation to the entire complex plane (except for a pole at 1), and that the resulting function satisfies a striking functional equation. Hecke extended these results to a more general class of zeta functions (now called Hecke L-functions), although the corresponding functional equation is rather more complicated. Tate reinterpreted Hecke's work by combining abstract Fourier analysis with the adelic approach to algebraic number theory; as a consequence, one obtains a transparent explanation of the factors appearing in the functional equation. This sets the stage for the modern theory of automorphic forms and representations, which we will take up if time permits.