

Topics in Geometric Function Theory

Autumn 2013, Winter 2014

Math 581C, 10:30-11:20, MWF

Don Marshall, Autumn

Math 582C, 12:30-1:20, MWF

Steffen Rohde, Winter

This two quarter course will develop the basic theory of conformal maps, and introduce discrete conformal maps, a topic of growing importance in analysis, geometry and probability.

Specific topics include the Koebe distortion theorems, harmonic measure and the Beurling projection theorem, capacity and potential theory, extremal length, multiply connected domains, the Koebe-Andreev-Thurston circle packing theorem, quasiconformal maps and the measurable Riemann mapping theorem, and dessins d'enfants.

We will also explore relations between discrete quantities (such as the effective resistance of electric networks) and their continuous counterparts. Such relations are at the heart of the convergence of discrete lattice processes to continuous processes such as SLE, and we will touch upon such connections.

This course will be of use to students in analysis, geometry, and some branches of probability. Some of the results we cover are of interest in combinatorics. Prerequisites: Complex Analysis 534/5/6 and basic real analysis.