

MATH 81300: TEICHMÜLLER THEORY
THE GRADUATE CENTER, FALL 2015

The course is as an introduction to some aspects of Teichmüller theory. We will review basic properties of quasiconformal maps of the unit disk and quasisymmetric maps of the unit circle. We will also discuss basic hyperbolic geometry of the hyperbolic plane and hyperbolic three space. Then we will introduce Teichmüller space of arbitrary Riemann surfaces and study basic metric properties of the Teichmüller spaces. The main topic will be Thurston's boundary to the Teichmüller space of a compact surface. We will describe Thurston's construction of the boundary using lengths of simple closed geodesics in the hyperbolic metric as well as Bonahon's construction using geodesic currents. Then we will consider Masur's results on ends of Teichmüller geodesics on the Thurston's boundary, and possibly more recent results. If time permits, we will discuss recent results on Thurston's boundary for infinite surfaces using geodesic currents and convergence of Teichmüller geodesics.

Course Material:

1. L. V. Ahlfors, *Lectures on Quasiconformal Mappings*, D. Van Nostrand Company, Inc., Princeton, New Jersey, 1966.
2. F. Bonahon, *The geometry of Teichmüller space via geodesic currents*, Invent. Math. **92** (1988), no. 1, 139 – 162.
3. A. Fathi, F. Laudenbach and V. Poénaru, *Thurston's work on surfaces*, Translated from the 1979 French original by Djun M. Kim and Dan Margalit. Mathematical Notes, 48. Princeton University Press, Princeton, NJ, 2012.
4. F. Gardiner and N. Lakic, *Quasiconformal Teichmüller theory*, Mathematical Surveys and Monographs, **76**. American Mathematical Society, Providence, RI (2000).
5. H. Hakobyan and D. Šarić, *Vertical limits of graph domains*, to appear, Proc. Amer. Math. Soc.
6. H. Hakobyan and D. Šarić, *Limits of Teichmüller geodesics in the Universal Teichmüller space*, Preprint.
6. O. Lehto and K. I. Virtanen, *Quasiconformal Mappings in the Plane*, Second Edition, Springer-Verlag, Berlin, Heidelberg, New York, 1973.
7. H. Masur, *Two boundaries of Teichmüller space*, Duke Math. J. **49** (1982), no. 1, 183–190.
8. D. Šarić, *Thurston's boundary for Teichmüller spaces of infinite surfaces: the geodesic currents and the length spectrum*. Preprint.