

## Mapping Class Groups Fall 2017, Ken Bromberg

This course will be an introduction to some basic topics about the mapping class groups with some more advanced topics towards the end. The first two thirds of the course should be very accessible to anyone who has completed the first year graduate courses. Good references for this part of the course are [FM] and [Min]. In the last third of the course we will cover two more advanced topics: Bonahon's theory of geodesic currents for surface groups ([Bon]) and Mirzakhani's work on the Weil-Petersson volume of moduli space ([Mir1]) and counting estimates for simple closed geodesics on hyperbolic surfaces ([Mir2]).

I will also be running this semester's Stallings Seminar. This will be a good time to cover some of the results that will be used without proof during the course.

For students who have not yet completed their oral exam their will be assigned homework.

Some topics that we will cover in the early part of the course include:

- Definitions
- Finite generation/presentation of the mapping class group
- Nielsen-Thurston classification of elements
- train tracks; measured laminations
- the curve graph
- the Nielsen realization conjecture

## References

- [Bon] Francis Bonahon. The geometry of Teichmüller space via geodesic currents. *Invent. Math.* **92**(1988), 139–162.
- [FM] Benson Farb and Dan Margalit. *A primer on mapping class groups*, volume 49 of *Princeton Mathematical Series*. Princeton University Press, Princeton, NJ, 2012.
- [Min] Yair N. Minsky. A brief introduction to mapping class groups. In *Moduli spaces of Riemann surfaces*, volume 20 of *IAS/Park City Math. Ser.*, pages 5–44. Amer. Math. Soc., Providence, RI, 2013.
- [Mir1] Maryam Mirzakhani. Simple geodesics and Weil-Petersson volumes of moduli spaces of bordered Riemann surfaces. *Invent. Math.* **167**(2007), 179–222.
- [Mir2] Maryam Mirzakhani. Growth of the number of simple closed geodesics on hyperbolic surfaces. *Ann. of Math. (2)* **168**(2008), 97–125.