

Math 468 Hyperbolic Geometry Spring 2012 1:00 MWF

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My goal in this course is to present enough material on hyperbolic geometry (and a bit of spherical, Euclidean, etc geometry as well) so that the student will be able to appreciate the recent developments in the applications of geometry to the study of low dimensional ($d = 2, 3$) manifolds

I will follow the book:

Low-Dimensional Geometry From Euclidean Surfaces to Hyperbolic Knots by Francis Bonahon

which is based on his 2006 Park City short course for undergraduates dedicated to this goal.

Bonahon asserts that his book can be read by anyone with a knowledge of multivariable calculus and "a somewhat higher level of mathematical sophistication." I would prefer that the student also have some knowledge of group theory and related topology – the fundamental group and covering spaces – mostly so that the material can be put in its proper perspective. Student should feel free to discuss the adequacy of their background with me.

This is a "potpourri" course. As such I will try to keep a balance between mathematical rigor and the intuitive development of ideas. So I will present proofs when they represent techniques basic to the subject and/or elucidate the development of the material, but I will not try to give precise arguments for everything. This is a subject with beautiful pictures ($\gg 10^3$ words) to help explain the results.

Bonahon's book has lots of exercises. I will be suggesting some specifically and will plan some problem discussion sessions.

Finally, I should mention the fascinating book:

Three-Dimensional Geometry and Topology by William Thurston

whose goal is much the same as Bonahon's, but whose "sophistication" demands are considerably higher. I think it would be great if we could make some excursions into this book, but we'll have to see how this develops.