Math 541: Topics in Topology: Hyperbolic 3-manifolds
Spring 2020

Instructor: Dr. William Worden
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Office: Herman Brown Hall 420
Classroom, time: TBA, MWF 10-10:50pm
Course webpage: www.wtworden.org/teaching/541/

Office Hours: TBA.

Textbook: *Hyperbolic Geometry and Knot Theory* by Jessica Purcell. Available in PDF form from Jessica Purcell's website: http://users.monash.edu/~jpurcell/hypknottheory.html.

Course Topics: The first part of the course will cover Part 1 of Purcell's book. This includes decompositions of knot complements into ideal polyhedra; basics of hyperbolic 2- and 3-manifolds; (G, X)-structures on 3-manifolds; the developing map and complete structures; hyperbolic structures and Thurston's gluing equations; discrete subgroups of $\mathrm{PSL}(2, \mathbb{C})$ and the thick-thin decomposition; Mostow-Prasad rigidity; deformation of complete structures and hyperbolic Dehn filling space.

   The second part of the course will explore topics from other chapters of Purcell's book and elsewhere. Some possible topics to cover: hyperbolization and geometrization (Purcell 8.1-8.2); the Thurston norm on second homology; pseudo-Anosov maps and fibered hyperbolic 3-manifolds; The ending lamination theorem for $S \times \mathbb{R}$; veering triangulations.

   As the course progresses, adjustments may be made to the planned material (translation: I'm not sure if we will have time for all of this, but we'll see what happens).

Exams: There will be no exams.

Homework: There will be occasional homework. The homework will not be graded, but you may hand it in if you would like feedback, and there may be selected assignments that will be required to be handed in. In any case, you are expected to attempt the homework problems, preferably by working on the problems collaboratively. I will use the computer program SnapPy throughout the course to demonstrate examples, and the homework will likely include problems that requires learning some of the basics of SnapPy.

Attendance: You are expected to attend class.

Grading: The grade will largely be based on attendance. Missing class 1-3 times is reasonable and will not affect your grade. Students who miss 4-6, 7-9, 10-12, or >12 should expect grades of B,C,D, and F, respectively. Some adjustment to these grades may be made based on homework. Exceptions to the attendance policy may be made on a case by case basis.

Disability Support: Students who think they may need accommodations in this course because of the impact of a disability should give me a written letter from the Disability Resource Center within the first two weeks of the course.