

MAT742 Hyperbolic Geometry Seminar

HS23

1 Schedule

Date	Topic	References
18.09.23	Introduction (given by Yuriy)	
25.09.23	Möbius maps and the upper half-plane model	Walkden §2-5 (selected parts)
02.10.23	The Poincaré disk model	Walkden §6
09.10.23	Gauss-Bonnet and examples of tessellations	Walkden §7
16.10.23	Fuchsian groups	Walkden §12
23.10.23	Fundamental domains	Walkden §13
30.10.23	Dirichlet domains	Walkden §14 (+ some examples from §15)
06.11.23	The Farey tessellation	Series CFHG §1
13.11.23	Continued Fractions	Aslanyan §8
20.11.23	Continued fractions from cutting sequences	Series CFHG §2 (or Schwartz chapter 19)
27.11.23	Closed hyperbolic surfaces	Bonahon §4.5.1 & §5.2 and Series HG §7.1
04.12.23	NO SEMINAR	
11.12.23	Hyperbolic surfaces as quotients - cusps and funnels	Bonahon §5.4-5.5 and Series HG §7.2
18.12.23	Introduction to Teichmüller space and moduli space	Schwartz chapters 20 & 21 (or Petri §7-9)

References

- Charles Walkden, Hyperbolic Geometry (online lecture notes),
https://personalpages.manchester.ac.uk/staff/charles.walkden/hyperbolic-geometry/hyperbolic_geometry_1920.pdf
- Caroline Series, Continued Fractions and Hyperbolic Geometry (online lecture notes),
<http://homepages.warwick.ac.uk/~masbb/HypGeomandCntdFractions-2.pdf>
- Vahagn Aslanyan, Number Theory (online lecture notes),
<https://vahagn-aslanyan.github.io/numbertheory.pdf>
- Richard Evan Schwartz, Mostly Surfaces, Amer. Math. Soc., 2011, available online at
<https://www.math.brown.edu/reschwar/MathNotes/surface.pdf>
- Francis Bonahon, Low-Dimensional geometry: from Euclidean Surfaces to Hyperbolic Knots, Amer. Math. Soc., 2009 (available in the UB Naturwissenschaften)
- Caroline Series, Hyperbolic Geometry (online lecture notes),
<http://homepages.warwick.ac.uk/~masbb/Papers/MA448.pdf>
- Bram Petri, Teichmüller Theory (online lecture notes),
http://www.math.uni-bonn.de/people/bpetri/t_tt/Teich190704.pdf

2 Organisation

- The seminar takes place on Mondays 10.15-12.00 in H28. There is no seminar on the 4th December.
- Each talk should be 90 minutes long, including some time for short exercises (see next point)
- Each talk should include two (easy!) 3-5 min. exercises on the topic integrated somewhere during the talk.
- We should meet briefly around 2 weeks before the talk to discuss what to include, and again at the latest on the Wednesday before the talk where you show me the plan for your talk.
- The deadline for the report is two weeks after the talk.

3 Tips for giving a seminar talk

Content

- Don't just copy the reference word for word - understand what it says, then put it away and try to present the material in a way that makes the most sense to you.
- Don't make the talk too technical! Prioritise intuition and ideas over proofs and try to avoid long computations.
- The more pictures the better (at least in geometry).
- Examples are always helpful! Choosing an example that is both sufficiently simple and sufficiently representative can be hard - often what works is to start with the simplest example you can think of, and then doing a more complex one.
- Point out the things that are particularly interesting and unexpected.
- It is much better to present a smaller amount of material in a way that the audience can understand than a larger amount of material so quickly that nobody can follow.
- Making connections to previous talks is good.

Presentation

- Try to talk to the audience rather than to the board.
- Try to keep the board organised, and cycle the boards you are using so you're not immediately erasing/hiding what you just wrote. If there is a key definition or formula or something else you'll need to refer to throughout the talk, you could leave it up somewhere it's visible and not erase it.
- It can be helpful to pause regularly and ask the audience for questions.
- Practice your talk and pay attention to the timing - and don't forget to keep track of the time during the talk itself.