1 Topics

(I) Geometry of real and complex hyperbolic space
Models of hyperbolic space; isometries; totally geodesic subspaces; curvature; volume; configurations of triples and quadruples of points: angle invariants and cross-ratios; geometry of the boundary at infinity: conformal geometry and Heisenberg geometry.

(II) Discrete subgroups and lattices in $\text{Isom}(H^n_\mathbb{R})$ and $\text{Isom}(H^n_\mathbb{C})$
Basic definitions and properties; reflection groups and Coxeter groups; arithmetic groups: theory and examples; non-arithmetic constructions; structure theorems: Selberg lemma, Mostow rigidity, Margulis lemma.

2 Bibliography

References for the class:


• D. Witte Morris; Introduction to Arithmetic Groups. Available at: http://people.uleth.ca/~dave.morris/books/IntroArithGroups.html

Further reading:


• M. Lackenby; Hyperbolic Manifolds. Lecture notes (Oxford 2000). Available at: http://people.maths.ox.ac.uk/lackenby/


• D. Mumford, C. Series, D. Wright (with cartoons by Larry Gonick); Indra’s pearls : the vision of Felix Klein, Cambridge University Press (2002).

• W.P. Thurston; The Geometry and Topology of Three-Manifolds. Lecture notes (Princeton 1980). Available at: http://library.msri.org/books/gt3m/

• ...and references therein...