

1 Introductory texts

These are elementary (in the sense of requiring few prerequisites) books which tend to give broad overviews of swathes of theory.

- Francis Bonahon, *Low-Dimensional Geometry* (AMS Student Mathematical Library). Undergraduate introduction to Thurston's geometrisation theory and Fuchsian and Kleinian groups
- Bernard Maskit, *Kleinian Groups* (Springer Series of Comprehensive Studies 287). Classical theory of Kleinian groups with view towards uniformisation theory. Requires some knowledge of Riemann surfaces.
- David Mumford, Caroline Series, David Wright, *Indra's Pearls* (Cambridge). Elementary introduction to Fuchsian groups and their moduli theory. Combinatorial and computational study of limit sets.
- William Thurston, *Three-Dimensional Geometry and Topology (Vol. 1)* (Princeton). Classic introduction to geometrisation.
- Albert Marden, *Hyperbolic Manifolds* (Cambridge). Very nice modern (2016) overview of Kleinian groups and hyperbolic geometry including discussion of post-Thurston results like the ending lamination conjecture. Highly recommended.

2 Manifold theory

More in-depth books on 3-manifold geometry.

- William P. Thurston, *Three-dimensional manifolds, Kleinian groups and hyperbolic geometry* (Bull. Am. Math. Soc., New Ser. 6, 357–379 (1982)). Nice survey paper.
- William Thurston, *The Geometry and Topology of 3-Manifolds* (preprint). Classic introduction by the originator of the modern theory. library.msri.org/books/gt3m/
- John Ratcliffe, *Foundations of Hyperbolic Manifolds* (Springer GTM). Doorstop with more details of some parts of hyperbolic geometry found in Thurston but with very limited explanation; this is a book to look things up in, not to read. Nice historical notes.
- R. Benedetti and C. Petronio, *Lectures on Hyperbolic Geometry* (Springer Universitext). Details on rigidity results, the thick-thin decomposition, hyperbolic volumes. Quite dense.
- Canary, Marden, Epstein, *Fundamentals of Hyperbolic Manifolds* (LMS lecture notes 328). Details on laminations, convex hull quotients, etc.
- Jennifer Schultens, *Introduction to 3-Manifolds* (AMS GSM 151). Very elementary introduction to 3-manifold topology.
- John Hempel, *3-Manifolds* (Princeton Annals of Mathematics series). More advanced pre-Thurston topology (e.g. Heegard splittings, triangulations)

3 Knot theory

- Richard H. Crowell and Ralph H. Fox, *Introduction to Knot Theory* (Dover). Useful to read classical papers e.g. those of Riley
- John Stillwell, *Classical Topology and Combinatorial Group Theory* (Springer GTM 72). Topology and knot theory in relation to combinatorial group theory (elementary reference).
- Jessica Purcell, *Hyperbolic Knot Theory* (AMS GSM 209). Modern (2020) introduction to hyperbolic knot complements

4 Dynamics

- Curtis McMullen, *Riemann Surfaces, Dynamics and Geometry* (lecture notes). <https://people.math.harvard.edu/~ctm/papers/home/text/class/notes/rs/course.pdf>
- Curtis McMullen, *Renormalization and 3-Manifolds which Fiber over the Circle* (Princeton Annals of Mathematics series).
- Dennis Sullivan, *Quasiconformal homeomorphisms and dynamics I–III* (three papers, various journals, part III with McMullen).

5 Arithmetic

- Colin Maclachlan and Alan W. Reid, *The Arithmetic of Hyperbolic 3-manifolds* (Springer GTM 219). You should already know basic hyperbolic geometry, e.g. as found in Thurston’s lecture notes.
- John Voight, *Quaternion Algebras* (Springer GTM 288). Perhaps friendlier than Maclachlan-Reid but less geometric.
- J.-P. Serre, *A Course in Arithmetic* (Springer GTM 7), Chapter VII.

6 Groups and uniformisation

- Michael Kapovich, *Hyperbolic Manifolds and Discrete Groups* (Birkhäuser). Heads towards a proof of Thurston’s geometrisation theorem for Haken manifolds. Links to the p -adic theory.
- Katsuhiko Matsuzaki and Masahiko Taniguchi, *Hyperbolic manifolds and Kleinian groups* (Oxford). More geometric, heading towards Kleinian moduli spaces.
- S. L. Krushkal’, B. N. Apanasov, N. A. Gusevskii, *Kleinian groups and uniformization in examples and problems* (AMS). Complex analysis. Many examples of groups. List of open problems quite outdated.
- Komori, Markovic, Series, *Kleinian Groups and Hyperbolic 3-Manifolds* (LMS lecture notes 299), and Minsky, Sakuma, Series, *Spaces of Kleinian Groups* (LMS lecture notes 329). Collections of papers from the 90’s and 2000’s including the theory of Jørgensen, combinatorics of cusp groups, discussion of ending laminations,...

7 Riemann surfaces, Teichmüller theory

- Hershel Farkas, Irwin Kra, *Riemann Surfaces* (Springer GTM 71). Riemann surface theory from the point of view of complex structures and uniformisation.
- Benson Farb, Dan Margalit, *A Primer on Mapping Class Groups* (Springer). Nice geometric introduction to Teichmüller theory and moduli spaces.
- Y. Imayoshi, M. Taniguchi, *An Introduction to Teichmüller Spaces* (Springer GTM). More useful for the theory of Fuchsian and Kleinian groups than the geometric view of Farb & Margalit.
- Olli Lehto, *Univalent Functions and Teichmüller Spaces* (Princeton). Another point of view, this time from differentials and equivariant functions.
- Kari Astala, Tadeusz Iwaniec, Gaven Martin, *Elliptic PDEs and Quasiconformal Mappings in the Plane*. Very nice self-contained introduction to the λ -lemma and quasiconformal analysis needed for Kleinian and Fuchsian moduli theory (particularly ch.5 and ch.12).