

Knot Theory and Low-Dimensional Topology

Spring 2023

Time: Thursdays 4–6 pm. The first organizational meeting is on March 2.

Place: College of Science M5024

Leaders: YI Ning (Mathematics) and ZHANG Pengxu (Physics)

Mentor: ZHU Yifei, College of Science M705, zhuyf@sustech.edu.cn

QQ Group and Webpage: 583106974, [Seminar on Knot Theory](#)

As a Course for Credit (optional): [MA423 Seminar in Geometry and Topology](#)

Topics:

This reading seminar will focus on knot theory and its interaction with other objects and tools in low-dimensional topology, which is the study of manifolds of dimensions two, three, and four.

There will be two parts in this seminar. The first half is to discuss some classical invariants and basic results in knot theory, from some basic definitions and examples of knots, to classical invariants such as knot genus, knot group, Alexander polynomial, Jones polynomial, etc.

The second part samples some topics in geometric topology, aimed to introduce applications of knot theory in low-dimensional topology, as well as tools from low-dimensional topology used to construct invariants of knots and links. Possible topics are Dehn surgery and 3-manifolds, the classification of low-crossing knots or slice knots, knot Floer homology and Khovanov homology, quantum invariants of knots and 3-manifolds, depending on participants' interests.

Our coverage will not be directly from a single text. Here are some useful references. See more to be updated on the website.

References

- [1] W.B. Raymond Lickorish, *An introduction to knot theory*, New York, NY: Springer, 1997.
- [2] Richard H Crowell and Ralph Hartzler Fox, *Introduction to knot theory*, volume 57. Springer Science & Business Media, 2012.