

Math 8750: Topology of Manifolds, Spring 2023

Syllabus

INSTRUCTOR: Slava Krushkal (KER 321), e-mail: krushkal@virginia.edu

CLASS MEETINGS: TuTh 12:30 - 1:45, New Cabell 064.

OFFICE HOURS: Wednesday 4 - 5, and by appointment.

Text: The course will rely on multiple references. One of the reference texts is “*An introduction to knot theory*” by W.B.Raymond Lickorish, Graduate Texts in Mathematics, Springer, 1997, ISBN: 038798254X

Prerequisites: One semester of Differential Topology (such as Math 7820) and one semester of Algebraic Topology (such as Math 7800) are a sufficient background for this course.

Course material: The main goal of the class is to give an introduction to geometric and quantum topology in low (2, 3, 4) dimensions. On the quantum topology side, topics will include the structure of (colored) Jones polynomial of knots and links, and quantum invariants of 3-manifolds.

On the geometric side, topics will concern knot and link theory (the Alexander polynomial, Milnor’s invariants) and topology of 3- and 4-dimensional manifolds, such as Heegaard decompositions of 3-manifolds, Waldhausen’s theorem, the Sphere theorem, the Loop theorem; incompressible surfaces; various special 2-complexes important in 4-manifold topology: Casson towers, Whitney towers, capped gropes.

Homework: Homework will be assigned on a regular basis.

The course grade will be determined by class participation and homework.