MTH 996: Special Topics in Topology
Dr. E. Kalfagianni

Prerequisite: MTH 868, 869.

This course is based on a selection of topics from Knot Theory and is designed to address graduate students that have completed the Topology Geometry qualifying exam. The topics discussed include: An introduction to knots and links in 3-space and the related theory of braids, knot invariants with an emphasis to invariants arising from representations of braid groups and from representations of Lie algebras (Jones type polynomial invariants, Witten invariants) as well as these arising from the study of the "space of knots" (Vassiliev type invariants).

As time permits we briefly discuss the use of knots in constructing 3-manifolds (Dehn surgery), some aspects of the theory of knots and links in 3-manifolds and its use in understanding the topology of such manifolds. These topics will be covered in more detail, in a course given in a subsequent semester and which is based on a selection of topics from the topology and geometry of 3-manifolds.

Some books used:

J. Birman: *Braids, links, and mapping class groups.* Annals of Mathematics Studies, No. 82. Princeton University Press, Princeton, N.J., 1974

R. Lickorish: *An introduction to knot theory.* Graduate Texts in Mathematics, 175. Springer-Verlag, New York, 1997.

K. Murasugi and B. Kurpita: *A study of braids.* Mathematics and its Applications, 484. Kluwer Academic Publishers, Dordrecht, 1999.

D. Rolfsen: *Knots and links.* Mathematics Lecture Series, No. 7. Publish or Perish, Inc., Berkeley, Calif., 1976

V Prasolov and A. Sossinsky: *Knots, links, braids and 3-manifolds. An introduction to the new invariants in low-dimensional topology.* Translated from the Russian manuscript by Sossinsky. Translations of Mathematical Monographs, 154. American Mathematical Society, Providence, RI, 1997

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