

Knots and Braids

September 7 - 11, 2020

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Abstract

A (mathematical) knot is a subset of points $K \subset \mathbb{R}^3$ homeomorphic to a circle. We can imagine a knot as a knotted piece of string with both endpoints glued together. Ambient isotopy is an equivalence relation on knots, i.e., two knots are equivalent if they can be deformed into one another.

Some natural questions arise: Given a knot, is it really knotted? (i.e., can it be deformed into the unknot?) How many different equivalence classes of knots exist? How to know if two given knots belong to the same equivalence class? In order to answer such questions, we need link invariants.

In this course we will give an introduction to Knot Theory and link invariants, with special emphasis on polynomial link invariants (Alexander-Conway, Jones and HOMFLYPT polynomials) and homological invariants.

We will also introduce braid groups, and show the relation between knots and braids (Alexander's Theorem and Markov moves) and present some knot invariants defined from their braid representations. Finally, we will study some special families of links and their main properties.

Referencias:

1. C. C. Adams. *The Knot Book: an elementary introduction to the Mathematical Theory of knots*. American Mathematical Soc., 1994.
2. P. Cromwell. *Knots and Links*. University Press, Cambridge, 2004.
3. W.B.R. Lickorish. *An introduction to knot theory*. Springer-Verlag, New York, 1997.
4. D. Rolfsen. *Knots and Links*. Publish or Perish, 1976.