

Invariants of Knots and Links

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Lecture 1: Invariants of Knots and Links. We plan to review definitions of the Alexander polynomial using Kauffman states and grid diagrams. These approaches then lead to knot Floer homology; we sketch the definition of these groups.

Lecture 2: Knot Floer Homology. We define knot Floer groups through grid diagrams, verify their main properties and apply these tools in solving some geometric problems, including the Milnor conjecture for torus knots.

Lecture 3: The Upsilon Function of Knots. Applying the appropriate version of knot Floer homology and some ideas from homological algebra, a function-valued knot invariant can be derived. This function can be conveniently used in the study of the smooth concordance group. We show some illustrative examples of such results.