

Senior Project Presentation

Erin Bryan

Title: Fox coloring of knots

Advisor: Dr. Mohamed Ait Nouh

Knot theory is an increasingly important field in mathematics, with applications to biology, chemistry, and physics. It is an exciting field subject for mathematical research, with many unanswered questions to explore. In particular, knot theorists have taken interest in the study of coloring of knots as a tool to distinguish between knots.

This talk provides a gentle introduction to Knot Theory starting from 3-coloring, a concept named after **Ralph Fox**, who invented it around 1960 to allow undergraduate students to see that the trefoil knot is non-trivial, and knot theorists generalized it to **Fox p -coloring of knots** as a method for obtaining invariants of knots and links by coloring arcs in a knot diagram.

Amazingly enough, I will show you how the Fox p -coloring and algebra are related by chronically proving three important features:

- (1) it is related to the **Jones polynomial**, an important knot invariant discovered by **Vaughan Jones** in 1985, and
- (2) it is equivalent to the coloring with the **Dihedral group** D_{2p} , and
- (3) it is equivalent to solving a linear system...and more !

