

# STEM Project from Dr. Wei-Kai Lai

## Project Introduction

In this project we will study Knot Theory and use it to analyze commonly used knots from fisherman and/or boy scout, like Bowline, Reef Knot, Anchor Bend, Figure-eight Knot, and Boatswain's Noose. We will first analyze its crossing number, the composition of the link, and then compare the unknotting number with the actual moves we need to unknot them. We have 17 different samples of links and knots. For this project, we would like to analyze at least the commonly used 5.

## Expectation for Students

Students will first need to study the basic knowledge of Knot Theory through textbooks and papers, understand some concepts like crossing number, unknotting number, and Reidemeister moves, and link. Students will then use this knowledge to analyze some commonly used knots by fisherman or boy scout. A public presentation is required for students working on this project, either in Discover USC or a Math conference. By preparing a presentation, students will also learn how to organize the results we find, and explain it to others systematically.

## Requirement for Applicants

Students who are interested in Math are encouraged to apply. However, students must have at least one Math course foundation after MATH 111 to work on this project.