

# SWIMM CASUAL RESEARCH SYMPOSIUM

Spring 2022

Friday, June 3rd, 5:30pm–7:00pm in 384-H

## Shuffling Cards and Markov Chains

Mackenzie Simper

Markov chains are a special type of random process which can be used to model many natural processes. This talk will be a gentle introduction to Markov chains, giving basic properties and many fun examples.

## The math behind juggling

Claire Macnamara Morton

Juggling may seem like just a fun hobby, but we can actually think about it mathematically. In this talk, I'll give an overview of juggling patterns with some examples of different tricks. I'll also discuss juggling notation. Finally, I'll explain how we can use this notation to think about juggling as a graph, which allows us to discover new juggling patterns. By the end of the talk, you'll know all about juggling and have the skills to invent your own valid juggling patterns (even if you don't know how to juggle)!

## Algorithms Using Local Graph Features to Predict Epidemics

Yeganeh Ali Mohammadi

We study a simple model of epidemics on networks: each node infects its neighbors independently with a probability  $p$  and then recovers from the disease. What information is needed for general networks to predict the size of an outbreak? Is it possible to make predictions by accessing small subgraphs? We answer the question in the affirmative for a class of 'well-connected' graphs.