Music is math. Sounds good?
Prof. Giorgio Bornia

Music is the place where sounds meet feelings.
We play music because we feel. We listen to music because we feel.
And guess what? Mathematics - apparently such a cold discipline -
takes part in this emotional process.
We will explore the world of music through mathematics.
In this journey, a good old companion will lead us: the guitar.

A Garden Variety Problem - And Its Impact on Bees and Plant Yields
Morgan Beetler, MS student

How do the types of plants in our garden affect bee activity? How can
we increase our garden's output? We will plant gardens of tomato
plants and flowers in a simulation to make observations and explore
possible answers to these questions and more. We will discuss the
math behind the model the simulation is based on and apply math to
draw conclusions from data we collect.

Parallel lines never meet, or do they?
Prof. Lars Christensen

We learn in geometry class that parallel lines never meet, but every
time we let our eyes follow a straight stretch of highway all the way to
the horizon, we doubt it. Of course mathematics has a way to make
sense of what we see. In projective geometry, two parallel lines do
meet in a point infinitely far away! And, actually, a line and a parabola
always have two intersection points, provided that one looks carefully
and counts properly.

Next Up!
Prof. Raegan Higgins

This will be a hands-on introduction to difference equations. We will
introduce a variety of basic sequences and see how to establish
recursive relationships.

Conic sections
Prof. Arne Ledet

Conic sections -- circles, ellipses, parabolas and hyperbolas -- have various interesting properties, relating to things like focus and direction. Also, they allow us to answer questions like "What does a perspective drawing of a sphere look like?", where the answer is **not** the obvious one.

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Describing the Human Brain
Prof. Travis Thompson

Special proteins play a role in our brain and help to keep everything running smoothly. Much like a baker may burn a batch of cookies from time to time, our brain can make bad versions of these proteins too. A healthy brain quickly dumps these bad proteins in the trash but, as we age, our brains' trash can stops functioning correctly. Unfortunately, if they aren't stopped, bad proteins can go around and convince the good ones to turn bad, too! This leads to diseases like Alzheimer's disease, which we can model with some simple mathematical equations. In this talk we discuss the link between mathematics and Alzheimer's disease and students will act out a set of equations that describe the tension between good and bad proteins in the neuro-degenerative drama that plays out in the aging human brain.

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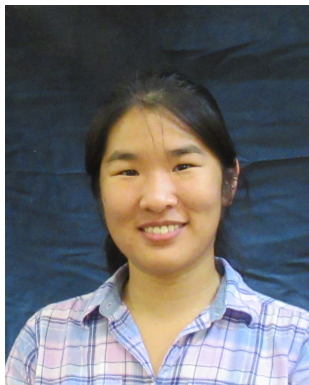
Order from Chaos
Jennifer Wang

A single random process is supposed to be difficult to predict, but an overall pattern of behavior starts to emerge in a collection of random processes. In this workshop, we will be the actors in a human bean machine and generate random data from a Bernoulli process to observe the emergence of order from chaos.