MATH IN THE REAL WORLD
HALF-DAY WORSKHOP
DEPARTMENT OF MATHEMATICS AND STATISTICS
WINONA STATE UNIVERSITY
OCTOBER 9, 2018

Students will have the chance to attend multiple sessions of interest to them. Titles and abstracts of the potential sessions are below. Please have students rank interest in these sessions by taking this Qualtrics Survey.

The math of social justice

Increasingly, mathematics is being used to tackle problems pertaining to social justice. In this session we will explore, through fun interactive activities, how seemingly minor social bias can give rise to segregation among city neighborhoods. We will also illuminate the mathematics that can help society achieve equal representation in democratic voting systems.

Reasoning with chance

This session investigates the tossing of a miniature toy pig whose probability outcome is unknown. Students play golf with toy pigs to determine the likelihood of each pig landing position and explore the toy pigs' experimental probability.

Whose water is it? Game theory applied to sustainable resource sharing

Abstract: When two or more states share the same natural resource (such as the Colorado River or any freshwater source), conflicts arise. Game theory can help negotiators analyze and resolve these conflicts. In this session, students will play mathematical games that simulate the challenges of sustainable resource-sharing.

What is π for a square? How big is infinity? and other burning questions

We will journey into the mathematical mind by exploring the following questions: When is a good time for mathematical yoga? (The answer is now) What is pi for a square? (Hint: it is not 3.14) How big is infinity? (Which one is bigger, the set of natural numbers or the set of rational numbers?

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The beauty of chaos

The field of Chaos Theory had its official beginning in 1975, when Dr. Jim Yorke from the University of Maryland wrote a paper entitled, "Period 3 Implies Chaos." Since then, this field has literally exploded onto the world scene, with applications in literally every field of natural science, technology, economics, and even the social sciences. We will take a tour of this field of study, explaining how it has revolutionized our understanding of the world, and leaving you wanting more.

Deception analysis: How can we catch a liar using statistics?

Forensic investigators sometimes use deception analysis to determine whether a suspect is lying. In this session, we will discuss how statistics can be used to detect deceptive or fraudulent behavior. Examples from actual criminal investigations will be discussed.

Quantifying thrill

Game 5 of the 2017 World Series between the Houston Astros and the LA Dodgers was a classic 10-inning thriller in which both teams blew leads of at least 3 runs multiple times. But Game 6 of the 2011 World Series between the St. Louis Cardinals and Texas Rangers has been called one of the "most exciting World Series games of all time." In this session, we discuss ways to quantify thrill and answer the ultimate question: which game was truly more exciting?

Math, imaging, and 3D printing

3D printed models help entrepreneurs understand new products, engineers understand systems, and doctors remove tumors. While models can be made from geometric shapes, some of the most important and complicated models are built from medical imaging data. In this session, we'll explore how mathematics turns medical images into 3D models of bone, tissue, and disease.

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