MAA Ohio Section Fall 2023 Program [Brasee Hall (BH)]

Friday, October 20th			Saturday, October 21st		
12:00-4:00	Registration	BH North Lobby	8:00-10:00	Registration	BH North Lobby
12:00-1:00	CONCUR (Curriculum)	BH 209	8:00-10:00	Book Vendor & Exhibits	BH 3rd Floor Lobby
Committee Meetings	CONSACT (Section Activities)	BH 212	8:00-8:50	Coffee and Pastries	BH North Lobby
	CONTEAL (Teacher Education & Licensure)	BH 227	8:50-9:25	Committee on Local Arrangements	BH 302
1:00-4:00	Vendor & Book Exhibits	BH 3rd Floor Lobby	9:00-9:10	Welcome and Announcements	BH 211
1:15-1:30	Welcome and Announcements	BH 211	9:10-10:10	Invited Address: "How to Turn Your Knots from Blah into Fabulous" Allison Henrich	BH 211
1:30-2:30	Invited Address: "Polynomial Pandemonium and Majestic Matrices" Emily Hoopes-Boyd	BH 211	10:10-10:20	Break	
2:30-2:50	Break		10:20-11:15	Contributed Paper Sessions	BH 209/212
2:50-3:50	Invited Address: "A Bayesian Mindset: FRom Everyday Reasoning to Modeling" Sandra Hurtado Rua	BH 211	11:15-11:30	Break	
4:00-5:15	Contributed Paper Sessions	BH 209 212	11:30-12:30	Invited Address: "Group Work and Project Based Learning- An Alternative Approach" Jillian Morrison	BH 211
5:15-6:00	Social Time	BH Art Gallery North Lobby	12:30-12:45	Closing Remarks	
6:00-7:00	Banquet		1:15-3:10	CONSTACT Afternoon Workshop	
7:00-8:00	Invited Address: "Math is…" Allison Henrich				

Invited Talks

Dr. Emily Hoope Boyd
Title: Polynomial Pandemonium and Majestic Matrices
Abstract: If we graph the simplest quadratic, we see that its range, or its image, consists of all positive numbers and zero. Let us extend this idea by instead evaluating polynomials on square matrices whose entries come from the complex numbers. A version of the L'vov-Kaplansky conjecture states that the image of a multilinear polynomial evaluated over matrices, with entries from the complex numbers, is a vector space, which is an algebraic structure that much is known about. We will consider this problem in a slightly different context by adding in some elements to the complex numbers that are not necessarily commutative. We will see how the existence of such elements changes the structure of our polynomials and their images. The talk will be accessible to anyone interested in mathematics.

Dr. Sandra Hurtado Rua
Title: A Bayesian Mindset: From Everyday Reasoning to Modeling
Abstract: In this talk we introduce the field of Bayesian statistics from the conditional probability concept. Bayesian methods combine prior knowledge (prior information) along with data to model and continuously update beliefs (probability) about some event. This area of statistics is based on the work of Thomas Bayes (18th century) but it was not popular until 50 years ago. The development of computer based MCMC methods, combined with increases in computing power and the availability of software for Bayesian computation are major contributors to the significant growth.
Bayesian analysis brings a flexible framework to incorporate prior information when available. When non-informative priors are considered, inferences based on Bayesian and classical methods also provide results that are often very similar. It is proving especially useful in approaching complex problems, including clinical research, design and analysis of experiments, and engineering problems.

Dr. Allison Henrich
Title: Math is…
Abstract: If you talk to a random adult and mention your interest in math, you'll likely hear a response like: "I was never good at math," or "You must be smart! I'm not a math person myself." Many people come to have negative associations with math, identifying the subject with very specific objects, equations, or procedures and feeling inadequate when faced with quantitative questions. I wish people could experience math as I have been lucky enough to experience it—as a fun, creative outlet that I can explore with friends. In this talk, we'll think about different perspectives on what math is, and I'll share some stories from my own life that led me to love the subject, devoting my career to studying it and helping others develop their own positive relationships with math.

Title: How to Turn Your Knots from Blah into Fabulous
Abstract: Are you tired of tying boring old shoelace knots? Frustrated with messy knots in your spaghetti that are impossible to undo? Wish you could make friends and influence people with your amazing knot-tying ability? Then come to this spectacular knot (un)tying workshop! You'll learn to harness the power of mathematics and the fourth dimension to unlock the secrets of knots. Discover how to make tangled up messes magically disappear and make knots apparate out of thin air. But wait! There's more! Impress your friends and family with fancy phrases, like "persistent tangle" and "Reidemeister moves." Make your rivals wish they had come to the MAA Ohio Section Meeting! Come join us, and all your wildest dreams will come true.

Dr. Jillian Morrison
Title: Group Work and Project Based Learning - An Alternative Approach
Abstract: Project based learning is a great way to allow students to deep dive into engaging projects and active exploration through complex projects. Assigning these projects in groups help students develop collaborative skills that can be useful, especially in the workplace. However, students often complain about sharing effort, authority, autonomy, and credit when working together. Traditionally, group work has been designed so that the members of the group work together on various tasks to achieve the final product. This could mean that each member works on a different task to complete the project. This makes it tricky to decide how to equally share up the different aspects of the work which creates frustration for students and instructors. On the other hand, this alternative approach ensures that every member of the group completes the same task, but they use their different skills to assist each other to complete the overall task. This helps to address some of the concerns that are usually faced in traditional group work. I will discuss what I have tried, what worked and what didn't work.

Contributed Talks Friday 4:00-5:15pm

	Chair: Axel Brandt	
BH 209 4:00-4:15	Brian Shelburne Wittenberg University	3528 – An Oppenheimer Number?
BH 209 4:20-4:35	Christopher Swanson Ashland University	Enumeration of Peak Sidelobe Level Equivalence Classes for m-ary Phase Codes of Length N
BH 209 4:40-4:55	Leah McNabb Purdue University	An Introduction to Quadrature Domains and the X Marks the Spot Problem
BH 209 5:00-5:15	Marc Schilder Ohio Northern University	The A-Polynomial and Knot Volume
	Chair: Avishek Mallick	
BH 212 4:00-4:15	Avishek Mallick Marshall University	Modeling Heterogeneous Count Data
BH 212 4:20-4:35	Anna Davis Ohio Dominican University Nick Shay Columbus State Community College.	Integrating Manufacturing Concepts into Introductory Statistics
BH 212 4:40-4:55	Marepalli Rao University of Cincinnati	Rewarding Mediocrity? A game on British TV [Part 1]
BH 212 5:00-5:15	Neelakshi Chatterjee University of Cincinnati	Rewarding Mediocrity- A game on British TV [Part 2]

Brian Shelburne
Wittenberg University
Title: 3528 – An Oppenheimer Number?
Abstract: In the book American Prometheus, the basis for the movie Oppenheimer, there is a curious story about Oppenheimer and the number 3528. In recalling an address for a party Oppenheimer remembers the street name but only that the house number has the property that the two leading digits and the two trailing digits have a common factor: 35, 28, 7. Now while there are many 4-digit numbers where the two leading and two trailing digits share a common factor, the integer 3528 also has three other properties which Oppenheimer might have been unaware of.

In this presentation we'll reveal the other three properties and ask are there any other such Oppenheimer numbers and if so, what are they?

Christopher Swanson
Ashland University
Title: Enumeration of Peak Sidelobe Level Equivalence Classes for m-ary Phase Codes of Length N
Abstract: An m-ary phase code is a vector of length N with entries selected from the mth roots of unity. Such phase codes with low peak sidelobe level (PSL) have applications in radar and communications. The PSL is invariant under a group of mappings, and thus the minimal PSL can be found by testing a single representative of each equivalence class. We use Burnside's Lemma to enumerate the PSL equivalence classes.

Leah McNabb
Purdue University
Title: An Introduction to Quadrature Domains and the X Marks the Spot Problem
Abstract: We define quadrature domains in the complex plane using only integrals and finite sums. We then discuss the X Marks the Spot problem for quadrature domains: Suppose we bury treasure on an island with smooth boundary. It is known that we can encrypt the location of the treasure as a point in a nearby quadrature domain. Can we now decrypt the location of the treasure using properties of quadrature domains? We also expand on the X Marks the Spot problem to study
other functions associated with quadrature domains.

Marc Schilder
Ohio Northern University
Title: The A-Polynomial and Knot Volume
Abstract: One of the major problems in knot theory is distinguishing two knots. To this end, invariants, such as polynomials, volumes, etc, are investigated with surprising and interesting connections between them. In this talk, I will discuss one of the possible connections: how the A-polynomial of a knot appears to be connected to the hyperbolic volume of a knot complement, especially for satellite knots

Avishek Mallick
Marshall University
Title: Modeling Heterogeneous Count Data
Abstract: In this talk, I will discuss the idea of modeling heterogeneous count data. We will look at different facets of data fitting like estimation techniques and criterion for assessing goodness-of-fit. A substantial portion of the talk will be about modeling a specific
type of heterogeneity resulting in inflated count data. We will be looking at lots of real world examples. This talk is intended for a general audience and thus should be appropriate for Mathematics undergraduate and graduate students.

Anna Davis
Ohio Dominican University
Nick Shay
Columbus State Community College.
Title: Integrating Manufacturing Concepts into Introductory Statistics
Abstract: In response to the demand for skilled technicians to join the semiconductor workforce in Ohio, Ohio Dominican University, in collaboration with manufacturing and mathematics faculty from four Ohio institutions, created a set of interactive modules addressing statistical process control. These modules can be used in an introductory statistics course to support student understanding of distributions, probability, and the Central Limit Theorem. In this presentation we will demo the modules and discuss how they can be incorporated into a typical statistics classroom. This work was sponsored by Intel through OTN NEO Consortium of Intel Partners, led by Lorain County Community College.

Marepalli Rao
University of Cincinnati
Title: Rewarding Mediocrity? A game on British TV [Part 1]
Abstract: The game 'First and Last' on British TV is popular. One game, in the final stages, involves three contestants. Each contestant chooses independently one integer from 0 to 1000. If there are no tied numbers, the one whose chosen number is between the other two wins a cash prize equal to the chosen number. We will discuss this game and winning strategies.

Neelakshi Chatterjee
University of Cincinnati
Title: Rewarding Mediocrity- A game on British TV [Part 2]
Abstract: Three contestants participate in a game for a TV show. Each contestant selects a number from the unit interval (0,1). Whosever number is between the other two, wins a cash prize equal to winning number times 1000 pounds. We will discuss some strategies of choosing a winning number.

Contributed Talks Saturday 10:50-11:45

	Chair:	
BH 209 10:20-10:35	Aurel Stan & Dorin Marghidanu The Ohio State University	A study of the increments of the Holder means of an almost arithmetic sequence
BH 209 10:40-10:55	Anda Stan The Ohio State University	An application of the weighted arithmetic-geometric-harmonic mean inequality to estimate a sum of two exponentials
	Chair:	
BH 112 10:20-10:35	Zijian Diao Ohio University	Can Infinite Repetitions Lead to Irrationality?
BH 112 10:40-10:55	Axel Brandt John Carroll University	Slowing Down for Understanding
BH 112 11:00-11:15	Avinab De & Jake Louis Youngstown State University	Mathematical Model for Predicting Radiation Induced Skin Reactions

Aurel Stan & Dorin Marghidanu
The Ohio State University
Title: A study of the increments of the Holder means of an almost arithmetic sequence
Abstract: We call a sequence, $\{a_n\}$, almost arithmetic, if the sequence of its increments, $\{a_{n + 1} - a_n\}$, converges to a positive limit. For each real number, p, we compute the limit of the increments of the sequence, $\{H_{p, n}\}$, as n goes to infinity, whose general term $H_{p, n}$ is the p-Holder mean of the first n terms of the sequence $\{a_n\}$. When $p = 0$, and the sequence is arithmetic, the sequence of the increments of the 0-Holder means is called the Lalescu sequence.
The limit of the increments of the p-Holder mean sequence, of an almost arithmetic sequence, is also known for every positive value of p.

Anda Stan
The Ohio State University
Title: An application of the weighted arithmetic-geometric-harmonic mean inequality to estimate a sum of two exponentials

Abstract: It is known that the sum of an exponential and another exponential, in which the base and exponent are switched, is always greater than 1. If one of the two exponentials have a base greater than or equal to 1, then the inequality is obvious. The interesting case is when both bases are less than 1. We use a weighted arithmetic-geometric-harmonic mean inequality to find a lower bound and an upper bound for this sum of exponentials. We also look at how close these upper and lower estimates are relative to each other.

Zijian Diao
Ohio University
Title: Can Infinite Repetitions Lead to Irrationality?

Abstract: It is common knowledge that repeating decimals are rational. However, in mixed-base systems where the base varies from digit to digit, we show that the exact opposite is true under a natural assumption on the bases. Central to our argument is a calculus-free technique from a recent elementary proof of the irrationality of e. We will highlight the contrasting impacts of repetitions on rationality in different number systems and showcase how much mileage we can gain without resorting to explicit limit or series analysis.

Axel Brandt
John Carroll University
Title: Slowing Down for Understanding

Abstract: Classes move quickly sometimes. Perhaps the instructor gets overly excited about the content and speeds through things too quickly. Or maybe there are too many topics to cover in a single semester.
In this talk we'll discuss two instructional strategies for slowing things down to facilitate students' deeper understanding: slow reveals and weekly reflections.

Avinab De & Jake Louis
Youngstown State University
Title: Mathematical Model for Predicting Radiation Induced Skin Reactions

Abstract: Late radiation tissue injury occurs in an estimated 5–15% of cancer patients. RT can develop several Radiation-Induced Skin Reactions (RISRs). While surgical intervention is a common treatment of RISRs, it is difficult to predict the extent of damage. We created a mathematical model that simulates RISRs from given radiation parameters after 10 days of treatment. Using data from a clinical trial as a template our model analyzed 30 simulated RISR images and graded them.Stem Cell Therapy is a leading form of treatment for RISRs as it's minimally invasive. Our work involves using clinical data recorded and measuring how cells heal on our simulated tissue samples.The model helps us evaluate if Stem Cell Therapy is a viable treatment option and simultaneously helps us grade RISRs.