Group Comps

Come support your friends and classmates in their comps talks next week! Group comps will take place on **Tuesday, February 13** and **Wednesday, February 14**. Take a look at what they'll be speaking about below, then be sure to stop by and support them while they demonstrate what they've learned; you're likely to learn something new yourself as well!

**Tuesday, February 13**

**Title:** Binary Quadratic Forms: Properties, Groups and Ideals  
**Presenters:** Sophie Boileau, Alejandro González, Grace Hanson, Ammy Lin, Hugh Shanno  
**Time:** 3:00-4:00pm  
**Location:** Olin 141

**Abstract:** Close your eyes, and pick your favorite integer (ours is 73). Can you find two other integers whose sum of squares adds up to your favorite number? For example, we found that $3^2 + 8^2 = 73$. In this talk, we will explore these sums of squares, which are a type of binary quadratic form, and the integers they can represent. A binary quadratic form is defined as a function in the integers of the form $ax^2 + bxy + cy^2$. We will explain the properties these structures have and the connections binary quadratic forms have to the algebraic class group. Along the way, we will discuss the idea of equivalence between different binary quadratic forms and formulate efficient methods for determining whether a given integer $n$ is representable by a given binary quadratic form. We also delve into the idea of the class number, utilizing the discriminants of binary quadratic forms to determine both the number of differing binary quadratic forms of the same discriminant and even more efficient methods of determining representability.
Title: Avoiding Atlantis’s Fate
Presenters: Erin Watson, Annelise Sokolow, Thien Bui, Elena D'Avanzo, Kenton Young
Time: 4:00-5:00pm
Location: Olin 141

Abstract: The lost Titan submersible in the news last year was a tragic accident. Is the tourist submersible industry too risky, or can tragedy be averted with mathematical modeling? This is one of the questions asked at this year’s Mathematical Contest in Modeling (MCM). The MCM is an intense four day applied mathematics competition featuring messy real-world problems whose solutions require a wide variety of mathematical and scientific tools. In this talk, we'll discuss mathematical models for projecting the location of a damaged submersible and the design of optimal search plans based on these projections. Along the way, we'll introduce you to the MCM, the process of mathematical modeling, and discuss our experiences preparing for and participating in this contest.

Title: Under the soil and under the sea
Presenters: Evan Lauer, John Eichelberger, Josh Grossman, Aidan Lee-Gilligan, Alexander Zhu
Time: 5:00-6:00pm
Location: Olin 141

Abstract: Can a small group of students solve an unsolvable problem? Can they do it in four days? Mathematical modeling is the process of solving the unsolvable, and the Mathematical Contest in Modeling (MCM) requires this solution in just 96 short hours. Our talk will submerge you into the muddy world of mathematical modeling and present models to solve two challenging problems: predicting the growth and movement of decayer fungi (under the soil), and determining the ideal search strategy for a missing submersible (under the sea). Come learn about ocean current uncertainty, missing submersible search strategies, mycelia, and the amazing mathematical ideas that illuminate them.

Wednesday, February 14

Title: Incorporation of Nonspatial Policing Information into Spatial Models
Presenters: Evan Christensen, Miles Frisch, Helen Moses, Sammi Sheridan
Time: 5:00-6:00pm
Location: Olin 141

Abstract: The incorporation of nonspatial variables into inherently spatial models is a challenge which has become increasingly relevant in recent years, especially in the field of policing. Experts in the field have proposed multiple ways of dealing with the combination of spatial and nonspatial data into spatial models, such as the k-Groups model developed by Quick et al. (2015) and the Two-Stage model proposed by Kelling and Haran (2022). In this paper, we aim to establish a baseline understanding of the field of spatial statistics, explain existing methods of incorporating nonspatial data into spatial models, and compare and contrast the two selected strategies. In order to do so, we utilize a police use of force data set from Minneapolis, Minnesota. We use predictive Gaussian processes to improve computational speeds and Markov Chain Monte Carlo Bayesian computing methods to obtain estimates for model parameters. We then estimate the intensity of use of force incidents across Minneapolis. The k-Groups method models the intensity of use of force incidents as a function of spatial variables differentiating by groups formed with combinations of categorical nonspatial variables. The Two-Stage method models (1) the spatial intensity of use of force events (LGCP) and (2) the probability of our mark (weapon or no weapon) influenced by a combination of our nonspatial variables, spatial variables, and their interaction. Finally, we discuss the benefits and drawbacks of each method.
Big Data Summer Institute
University of Michigan - School of Public Health

Transforming Analytical Learning in the Era of Big Data
An Undergraduate Summer Institute in Biostatistics (SIBS) at the University of Michigan

JUNE 17 - JULY 26, 2024

APPLICATION Now Open! Deadline to apply is March 15, 2024

Michigan Biostatistics is recruiting undergraduate students who are interested in quantitative studies, big data, and human health to join us this summer for the Big Data Summer Institute -- and we could use your help! If you know any current first-year, sophomore, or junior undergraduate students who you think would be a good fit for this full-time, in-person six-week summer program, please share this email with them to let them know about this tremendous opportunity!

This full-time, in-person six-week summer institute will introduce undergraduate students to emerging challenges at the intersection of Big Data, Statistics, and Human Health.

Lectures will be led by a diverse group of stellar biostatistics, statistics, electrical engineering, and computer science faculty at the University of Michigan. Faculty from biomedicine and public health will present their perspective of big data.

Working in teams, students will participate in mentored big data research projects.

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UConn Sports Analytics Symposium

The registration for the 5th UCSAS is open!

Revamped and rescheduled for Spring, the 5th UCSAS maintains its unique focus on students at various educational levels - from graduate and undergraduate to pre-college - who have an interest in sports analytics or data science more broadly. Organized by the Connecticut Statistical Data Science Lab, UCSAS aims to: 1) showcase sports analytics to students at an accessible level; 2) train students in data analytics with application to sports data; and 3) foster collaboration between academic programs and the sports industry.

- **Keynote Presentations**
  - Nathan Chan, Statistics and Data Science Student, Yale University; Olympic, World, and US Champion in Figure Skating
  - Kristin Morgan, Assistant Professor of Biomedical Engineering, University of Connecticut
  - Esteban Navarro Garaiz, Technical Product Manager, Zelus Analytics

- **Panel Discussion: Sport Analytics for Life: Many Different Paths**
  - Luke Benz PhD Student in Biostatistics, Harvard T.H. Chan School of Public Health
  - Emily Wright, Data Scientist - Volleyball Canada Beach National Teams
  - Two more panelists are to be finalized.
• **US Olympics and Paralympics Committee Data Challenge**
  Over 30 teams submitted solutions aimed at helping the USA Olympic Men’s and Women’s Artistic Gymnastics teams optimize their success for Paris 2024. Finalists, chosen by the data challenge judging committee, will be invited to present their work in the poster session, with travel support provided. The winners will be announced at the closing ceremony.

• **Poster Session**
  We invite submissions from all, especially students (pre-college, undergraduate, or graduate, with travel support), with interesting works on any topics of sports analytics. A student poster award, decided by the Student Poster Award Committee, will be presented at the closing ceremony. The poster session also serves as a networking mixer. Abstract submission deadline is 11:59 pm, Friday, March 15, 2024.

• **Invited Sessions**
  - Session 1: Athlete welfare from Korey Stringer Institute
  - Session 2: Olympic Sports
  - Session 3: NFL Big Data Bowl Finalists
  - Session 4: Sports Analytics Beyond the Field

• **Training Workshops**
  Seven workshops at four levels are offered in four concurrent tracks in the afternoon of Friday, April 12, 2024. They provide training from jumpstart to advanced sports analytic skills.
  - Introduction to R (Fusheng Yang)
  - Introduction to Python (Charitarth Chugh)
  - Basketball Analytics (Mathew Chandy)
  - Baseball Analytics (Patrick Cummins)
  - Web Scraping for Sports Data (Tyler Hinrichs)
  - TensorFlow in Sports Analytics (Hari Patchigolla)
  - Causal Inference in Sports Analytics (Dr. Kevin Cummiskey)

• **Registration**
  The symposium is open to anyone with an interest in sports analytics. Speakers and poster presenters get free registration. The deadline for in-person registration is **April 5, 2024**. Register at [https://statds.org/events/ucsas2024/registration.html](https://statds.org/events/ucsas2024/registration.html)

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**Jobs and Internships**

**CAOE Summer Experience in Quantitative Experience**
Transportation Security Administration (TSA). Due March 12

We are excited to announce that the Center for Accelerating Operational Efficiency (CAOE), a Department of Homeland Security (DHS) Center of Excellence, is currently accepting applications for the **CAOE Summer Experience in Quantitative Analytics (SEQAL) 2024**. This STEM-based paid program offers a unique opportunity for students to delve into significant data analytics training and engage in real-world problem-solving.
**Program Details:** This four-week virtual research experience requires no travel and is packed with valuable content. Participants will engage in approximately six hours of activities every weekday, from Monday through Friday, spanning the program’s duration from June 3 to June 28, 2024. The program includes live expert-led workshops, group interactive problem-solving, and data processing.

**Participants can expect:**
- $3,000 stipend for participation in the program
- Tackling real-world problems faced by the Department of Homeland Security
- Learning new tools and methodologies, including data analytics, decision analysis, simulation, and operations research, with a focus on developing a stochastic simulation model
- Networking opportunities with students, faculty, and technology experts nationwide
- The research experience will culminate in students presenting their analysis, results, and recommendations to CAOE leadership.

**Key Info:**
- Deadline to apply: **March 12, 2024**
- Program Dates: **June 3 – June 28, 2024**
- Location: Virtual
- To Apply: Interested candidates can apply by filling out the [application form](#).

**Requirements:** To be eligible, applicants must meet the following criteria:
- U.S. Citizenship
- At least 18 years old at the start of the program
- Full-time students currently enrolled in a bachelor’s degree program in engineering, computer science, math, technology, or science with a solid mathematical foundation
- Completion of the first academic (freshman) year and continuing in fall 2024 as an undergraduate student (sophomore, junior, or senior)
- Minimum GPA of 3.25
- Access to a computer with a webcam and microphone

Don't miss the chance to be part of this highly anticipated program. Apply now and embark on a journey of knowledge, skill development, and networking. We look forward to welcoming you to the CAOE Summer Experience in Quantitative Analytics (SEQAL) 2024!