

MSCS



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Department of Mathematics, Statistics, and Computer Science
St. Olaf College, Northfield, MN 55057
April 28, 2023 | Volume 51, No. 21

Research Seminar

Title: **Sneetch Theory: Coupled Oscillators and How Dislike of the Other Can Generate Cliques**

Speaker: Dr. Joseph Johnson

Date: 4/28/23 , 3:30 pm

Place: RNS 310

Coupled oscillators are objects that move in a circle, and their speed depends on both their natural frequency and their reaction to the other oscillators. There are two types of reactions: attractive, when oscillators move closer together, and repulsive, when they move apart. In this discussion, we'll explore whether and when cliques can form among oscillators that all repel each other. Along the way, we'll draw a loose analogy to a classic Dr. Seuss story.

Dr. Joseph Johnson is an assistant professor at Carleton College, where he is currently teaching Partial Differential Equations during the Spring term. He earned his Ph.D. in Applied Mathematics from Northwestern University and focuses on using mathematical and computational tools, such as differential equations and agent-based modeling, to study social and biological systems. Dr. Johnson is currently exploring ways to incorporate social effects into the standard agent-based model of segregation. In his free time, he enjoys

watching football, playing Pokemon, and finding amusing videos on TikTok.

Colloquium

Title: **Still Working When the Warehouse Burns Down: Mathematics of storing data**

Speaker: Dr. McKenzie West ('11)

Date: 5/2/23 , 3:30 pm

Place: RNS 310

As we store more data and rely more on cloud servers, a fear of data corruption or loss becomes more prevalent for more people, companies, and government. In 2021, a warehouse fire in Paris caused millions of websites, government portals, and bank systems to shut down. Just last month, data corruption was blamed for the canceling of over 1000 flights. More regularly, servers need to be taken offline for maintenance. We ask how can data be stored so that we can still access our information despite interruptions like these. One way to solve this problem would be to simply have several servers that have the same exact data. However this method is very inefficient. Another method is to use polynomial interpolation: a degree n polynomial is determined by $n + 1$ points. Specifically, if we have $n + 2$ points,

we can lose one and still have enough to recover the polynomial. Now that we have interpolation, we get to be creative about the polynomials and the points. That's where number theory comes in! In this talk, I will provide some examples of the work I have done in selecting just the right points to make recovering lost data possible while trying to be efficient.

Math Bio Symposium

We formally invite you to the annual Math Bio Symposium! Twelve senior Math Bio concentrators will be presenting their research projects in a **poster session** from 4:00pm to 5:00pm in Regents 401U, the 4th Floor Northwest Lounge. There will be snacks!

Then, at 7:30pm through 8:30pm in Regents 290, our invited speaker - Dr. Allison Shaw, an Associate Professor of Ecology, Evolution, and Behavior at the University of Minnesota - will present her view of Mathematical Biology.

Math Bio Symposium Talk

Title: **How Perspective Shapes Theory in Biology**

Speaker: Dr. Allison Shaw

Date: 5/4/23 , 7:30 pm

Place: RNS 290

In biology, theory provides the scaffolding that we use to put empirical studies into context. Theory (both mathematical and conceptual) can also be used to draw parallels across different systems, reconciling seeming differences. At the same time, research in biology (theoretical or otherwise) is shaped by the identities, perspectives, and experiences of the scientists who conduct it.

Perspective shapes the questions we ask, the systems we work in, and the processes we choose to explore (as well as the ones we choose to ignore). In this talk, I will give two examples of how our lab has developed theory to resolve apparent conflicts in the empirical literature - one on how parasite infection shapes

animal migration, and one on the interplay between mutualistic interactions and organismal movement. In the third part of the talk, I will give examples of how researcher identity and experience shapes science.

2023 MSCS Senior Banquet

Hey Seniors! Please join us for our MSCS Senior Banquet on Thursday, May 11th! Please RSVP using the google form sent by Prof. Roback, the link can also be found [here!](#)

Apply for Distinction in Mathematics

The application for Distinction in Mathematics is open. Please check your emails for the application! The application is due on Friday, May 5 at 5:00pm. The following criteria are necessary but not sufficient conditions, however under extraordinary circumstances a student not satisfying all three criteria might be considered for distinction.

- a Minimum 3.6 GPA in courses labeled MATH
- b Significant coursework beyond the minimum mathematics major, including at least 3 MATH courses at Level III.
- c Distinguished work in at least one of the following areas:
 - Scholarly inquiry in mathematics or mathematics education, resulting in a paper and public presentation.
 - Independent study in mathematics or mathematics education with a St. Olaf faculty member, resulting in a paper and public presentation
 - Extensive participation and significant achievement in mathematics problem-solving activities and contests. Participation should be sustained over 2 or 3 years; high scores and public presentation of solutions measure achievement

To apply, please complete [this](#) Google form by **Friday, April 28th** (today).

Natural Sciences and Mathematics Honors Day Poster Session

Hello, Everyone. You are invited to register for the 2023 Natural Sciences and Mathematics Honors Day Poster Session. Whether you did research at St. Olaf (last summer or during the current academic year) or elsewhere, you are eligible to participate. Please share this invitation with your family and friends and let them know that we would be delighted to have them join us on campus for this almost-end-of-the-year celebration.

Details

- The celebration will be on **May 6th**, 4-6pm on the 4th floor of the Regents Natural Science [RNS] building.
- Registration deadline 5:00pm, **April 28th** (today)
- Register online [here](#).

If you already happen to have a poster, you can just plan to present it on May 5th. Otherwise, poster printing will be done by the

St. Olaf Print Center. Thanks to the generosity of the Paul and Mildred Hardy Endowed Fund, there will be no cost to you. Posters will be displayed on easels throughout the 4th floor of RNS. You will be assigned a specific poster number and will be able to place your poster on the corresponding easel between 5:00 pm Thursday (May 4th) and 9:00 am Friday (May 5th). Students with odd-numbered posters should plan to present their research (be present at their poster) for discussion/questions from 4:00 – 4:45 pm, and those with even-numbered posters from 5:00 – 5:45 pm.

Please visit the Honors Day Poster Session web page for all the details! If you have any questions, please contact either your advisor or Kathie Towler (RNS260, towler2@stolaf.edu).

Vesuvius Challenge

Interested in machine learning and computer vision? Well now's the time to put your skills to the test! There is currently a [Vesuvius Challenge](#) which involves using these techniques to read preserved scrolls, Herculaneum Papyri. There are prizes of \$700,000, \$50,000 for two sepecific challenges - their requirements are three sentences, give them a look! Additionally there are \$380,000 which have not been allocated to a specific challenge, so stay tuned!

Volunteer/Experience Opportunities

MSCS Student Work Application is Open

The MSCS Student Work Application is open and the deadline is **Friday, April 28th** (today). Once the deadline has passed the information will be shared with the MSCS professors to make the choices. We are hoping to have this all wrapped up before we leave for

summer break. There may be some instances where we will be working on this in September. Here is the [application link](#).

REUs: Summer Research in MSCS

If you are interested in being paid to collaborate on a research project with students

from around the country off campus this summer, keep reading! To look through the programs available for Research Experiences for Undergraduates (REU's), check out this [link](#)! Most of them are done over the course of 8 – 10 weeks during the summer and include stipends around \$4,000. Applications will open in November and most will be due between late January and early March.

Read the eligibility for each because many are restricted to certain years in school, certain majors, or US citizenship. The website has a variety of tabs at the top to help you find pro-

grams that apply to you! In particular, there are lots available for international as well as domestic students!

Most applications require a personal statement about why you would like to participate in the REU as well as letters of recommendation, so start looking into these sooner rather than later.

Make sure to reach out to us (mercur1@stolaf.edu and mainel1@stolaf.edu) if you have any questions!

To submit an article, event, or anything else for publication in the Mess, email hilst1@stolaf.edu; to receive the Mess digitally each Friday, email habero1@stolaf.edu; visit <http://wp.stolaf.edu/mcs/mcs-mess/> for a digital archive of previous MSCS Mess issues.

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