Department of Mathematics

September 8, 2025

Welcome to the Math Department Newsletter

The math department publishes a weekly newsletter to inform its readership about events in the math department, resources and opportunities for students interested in math, and news from the greater mathematical community. The newsletter is distributed via email and is also posted on the math department's website, https://www.union.edu/mathematics under the Activities tab.

If you would like to contribute to the newsletter, or you have ideas for the newsletter, or you would like to be added to our mailing list, please email **Professor Paul Friedman** at friedmap@union.edu.

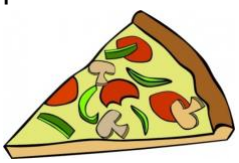
Undergraduate Math Seminar

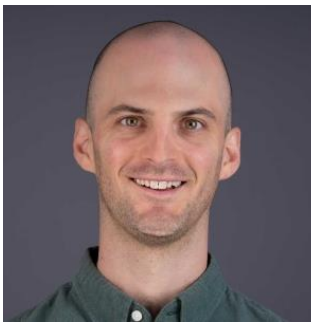
Professors Jeff Jauregui and **Phanuel Mariano** are coordinating this fall's Undergraduate Mathematics Seminar, a weekly series of ~45-minute talks about math – current research, famous older problems, interesting topics from fields outside of the standard curriculum, …. The seminars will typically be on Thursdays during common lunch, with pizza beforehand.

DATE: **THURSDAY, September 11**

Time & **12:30 –** Pizza in **Bailey 204**

Location: **12:50 – 1:45** Seminar in **Bailey 207**





Professor Sean Carney

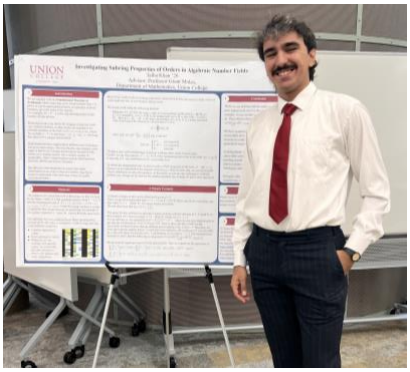
In this seminar, **Professor Sean Carney**, an applied mathematician in the Union College Math Department will present the following talk.

Title: Deep Learning, an Introduction for Mathematicans

Abstract: Deep learning has revolutionized the state-of-the-art in a variety of fields within science, engineering, and technology. Our goal in this talk is to introduce some of the fundamental mathematical concepts central to deep learning. Focusing on the case of "supervised learning" for deep neural networks, we describe how "training" a neural network fundamentally involves solving an optimization problem. Along the way, we explore connections to statistics and probability theory. This talk assumes some familiarity with multivariable functions and partial derivatives.

My Summer Math Research Experience, by Talha Khan '25

I first started attending the Putnam Math group sessions in the Fall of 2024. I would make a few unsuccessful attempts at solving the problems, but still enjoyed the challenge and camaraderie. The sessions were organized by **Professor Grant Moles**, one of Union's newer math professors. In one conversation, I asked if he was looking for students to assist with research. Having seen several friends take on research projects, I thought I should try as well. To my surprise, Professor Moles invited me to join his project, Locally Associated Orders in Real Quadratic Number Fields. At the time, I had no idea what any of those words meant, but I was reassured that the tools from my Number Theory class would be enough to get started.



Talha Khan presenting at the Summer Research Poster Session

I began working in January 2025, supported by Work Study funding. Professor Moles provided a detailed project dossier, and I spent the first few weeks learning background material. Once I found my footing, I began contributing to the project. Initially, I aimed to gain a deeper understanding of

There's more … turn the page!

existing proofs and familiarize myself with the spreadsheet that we would use throughout the project. Soon, we started uncovering new patterns by writing Python code to find results more systematically and analyzing them using our own tools. Professor Moles encouraged me to take ownership of small parts of the work, and before long, I was drafting and refining proofs of my own, while he would spot-check my work. I enjoyed the project so much that I applied for a Summer Research Fellowship to continue it.

This past summer, I was able to dedicate myself fully to research. This gave me the chance to move beyond specific cases and search for general structures. I spent long hours staring at the blackboard and my computer screen, experimenting, organizing results, and polishing arguments until they were clear and rigorous. It was challenging but rewarding to see abstract theory and computation come together. By late summer, our results were strong enough to write up as a paper. Professor Moles and I completed a draft, and we are now trying to get it published. I have also gotten the privilege to share my research at the Summer Research Poster Session, and yearn to share it at more Math conferences in the future.

Life as a summer researcher was unlike any class I had taken. Research was open-ended—some days brought breakthroughs, others frustration—but I always felt like I was learning to think more like a mathematician. I was also part of a supportive community of student researchers, which made the summer both productive and fun.

Looking back, I'm grateful I asked that simple question after a Putnam session. It led to one of the highlights of my time at Union, and I would encourage any student curious about research to take that same chance.

Get Involved in Math Department Activities: Join a Club!

The math department advises several student clubs. To learn more about, and to get involved with, these clubs, reach out to either a student leader or their faculty advisor:

- **Actuarial Science Club.** President Wendy Pham (phama2), advisor **Professor Phanuel Mariano** (marianop).
- **Association for Women in Mathematics.** President Frankie Morone (moronef), advisor **Professor Ellen Gasparovic** (gasparoe).
- **Math Club**. Co-Presidents **Henry Howe** (howeh2) and **Talha Khan** (khant), advisor **Professor Rylan Gajek-Leonard** (gajekler).
- **Putnam Exam Preparation**. Advisor **Professor Grant Moles** (molesg).

The clubs host fun events, social and mathematical – your draw the corresponding Venn diagram of these types!

Look for posters in Bailey Hall as well as announcements in the math newsletters for their upcoming events.

Calculus Help Center: free calculus tutoring!

The Calculus Help Center (CHC) offers ***free, drop-in, peer tutoring*** in calculus courses through Math 117, Sunday through Thursday, 7:30-10:00pm in the SORUM HOUSE seminar room.