# Department of Mathematics

## 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 Brenda Johnson** and **Christina Tønnesen-Friedman** will be coordinating the 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, etc. The seminars will typically be held on Thursday during common lunch, with pizza beforehand.

**DATE:**       **THURSDAY, September 12**

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

**Location:**    **12:50 – 1:45** Seminar in **Bailey 207**
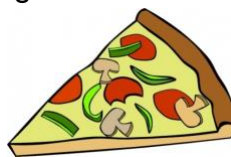
In this seminar, Union College Professor of Mathematics, Emeritus, **William Zwicker**, who is also affiliated with the Murat Sertel Center for Advanced Economic Studies, Istanbul Bilgi University, will present the following talk.

Professor Bill Zwicker

### Title: The Hypergame Paradox – or –
### *I Stubbed My Toe on the Foundations of Mathematics*

Abstract: I was making up an exam question on Game Theory for a course at Union College, when I accidentally discovered a new paradox in mathematics. A paradox arises from two arguments, both seemingly correct, that contradict one another. A shallow paradox involves a cheap trick – a flaw in one of the arguments. Like the famous 1901 paradox of Bertrand Russell, the Hypergame Paradox is of the deeper kind that has no trick, but instead forces us to reconsider fundamental questions: what are the most basic truths of mathematics, from which everything else follows?

## Math Department Welcomes Three New Faculty

This fall, the math department is excited to welcome three new faculty members, **Professors Sean Carney, Grant Moles,** and **Fanhui Xu**. Each of them has written an article to introduce themselves.

From Professor Carney: *I am thrilled to join the Union College math department. Before arriving here, I moved around quite a bit; I got my undergraduate degree from the University of Michigan in 2014 before getting my PhD in mathematics from The University of Texas at Austin in 2020. I then worked for three years at the University of California, Los Angeles before spending last year at George Mason University in Fairfax, VA, near Washington D.C. Moving around can be tiring, but it is exciting to explore different parts of the country.*

*My research field is generally in applied and computational mathematics. What does this entail? When scientists, engineers, and mathematicians want to understand the natural world, typically the basic laws of physics (for example, "force equals mass times acceleration", or, "heat goes from hot to cold") are applied to the situation of interest. These laws are often stated in the language of mathematics. In most*

*situations, the mathematical equations that result are too difficult to be solved using "pen-and-paper", and instead we have to resort to approximate solutions with the aid of a computer. The process of efficiently generating such "computational" approximations is a large and fascinating area of mathematics.*

*When I'm not working, I like to exercise--I especially like to play (and watch) basketball and tennis. Other interests include hiking, cooking (and eating), and language learning. I am particularly interested in improving my conversational skills in Spanish and Mandarin Chinese.*

From Professor Moles: *I'm so excited to join the Mathematics Department at Union! I'm looking forward to getting to know the other faculty members, the students, and the Schenectady area.*

*I was born and raised in the tiny town of Cook, NE (population ~300). After graduating from Johnson County Central High School (Go Thunderbirds!) in 2016, I started my undergraduate education at the University of Nebraska at Omaha (Go Mavs!). I started off as solely an Electrical Engineering major, but after being encouraged to complete some interesting and challenging problems in my first calculus course, I almost immediately added Mathematics as a second major. When my undergraduate advisor first suggested to me the idea of getting a PhD in math, I thought he was crazy. Nevertheless, when I graduated with my B.S. degrees in Mathematics and Electrical Engineering at the height of COVID in 2020, my next step was a graduate program in Mathematical Sciences at Clemson University (Go Tigers!) in South Carolina. I studied for four years under the advisement of Dr. James Coykendall before receiving my doctorate in August 2024. Union is my first stop as a newly-minted PhD!*

*My research interests lie at an intersection of Commutative Algebra and Algebraic Number Theory. Specifically, I study the factorization properties of orders in algebraic number fields. In the integers, we all know the classical result that every positive integer (other than 1) factors uniquely into a product of prime numbers. My research delves into what happens when we leave this familiar context and explores when and how unique factorization fails. Recently, I have also started looking into relationships that arise between rings and particular types of subrings. Though this question arose from looking into factorization properties, I'm excited to see what directions it might lead moving forward! Despite the abstract nature of the objects I research, my Electrical Engineering degree has surprisingly come in handy – programming languages, especially MATLAB, have proven to be invaluable (if unexpected) research tools.*

*In addition to math, I enjoy singing, biking, listening to music and podcasts, writing and playing Dungeons & Dragons, and collecting Pokémon. I especially like sharing these hobbies with my friends and family, in particular my adorable nieces and nephew! I'm always happy to discuss math or my hobbies (or brag about how cool my niblings are!), so feel free to ask if you see me.*

From Professor Xu: *I am very excited to become a member of Union College! I was born and raised in China, where I earned both my bachelor's and master's degrees in mathematics. Later, I completed my PhD in mathematics at the University of Southern California. Before joining Union, I held a postdoctoral position at Carnegie Mellon University and was a lecturer at Harvard University.*

*My research interests lie at the intersection of probability and analysis, two key areas of mathematical research. I focus on partial differential equations, which are essential in physics and engineering, and stochastic processes, which model random events. Recently, I've been exploring how introducing randomness into mathematical models can offer deeper insights into real-world phenomena.*

*I truly enjoy studying and discussing mathematics, and I believe that's why teaching has become a passion for me. Outside of work, I love visiting museums and spending time in nature. And like many, I never turn down a delicious meal, though I'll admit I'm much better at enjoying food than cooking it!*

## 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.