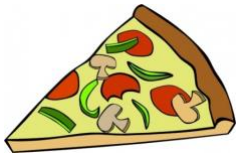
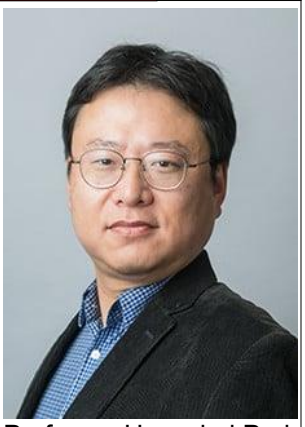
Department of Mathematics

January 12, 2026

UNDERGRADUATE MATH SEMINAR





Professor Hyunchul Park

Welcome back, and Happy New Year!

The first seminar of the winter term will be

DATE: **THURSDAY, January 15**

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

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

In this seminar, **Professor Hyunchul Park**, chair of the math department at SUNY New Paltz, will present the following talk:

Title: When Probability Meets Functional Analysis (and Vice Versa)

Abstract: This talk explores the rich interplay between probability theory and functional analysis through accessible examples and applications, aiming to provide a broad perspective for undergraduate students.

We begin with a classical problem in functional analysis: understanding the space of continuous functions on an interval, C[a, b], equipped with the uniform norm. Using tools from elementary probability, specifically the binomial distribution, we show that the set of polynomials is dense in C[a, b]. This leads to a simple and elegant proof that C[a, b] is separable.

Next, we reverse the perspective and apply functional analytic ideas to probability. We define the conditional expectation of a random variable using projections in Hilbert space, a technique grounded in functional analysis. We then present two important applications of conditional expectation:

a) The Lévy-Itô decomposition, which describes the structure of sample paths of Lévy processes, random processes with independent and stationary increments.
b) The construction of stochastic integrals for continuous semimartingales, including Brownian motion. Using stochastic integrals, we introduce stochastic dynamical systems driven by Lévy processes and analyze exit time problems in systems perturbed by both Brownian motion and jump processes.

Four Union Students Participate in 86th Annual Putnam Competition

After a fall term of training sessions under the tutelage of **Professor Grant Moles**, on Saturday, December 6, four brave Union students, **Nolan Blake, Duy Hung Dang, Hunter Gould,** and **Talha Khan,** participated in the 86th annual William Lowell Putnam Mathematical Competition. This is the preeminent math competition for North American college and university students and has been called the most difficult math contest in the world.

The competition consists of two three-hour sessions. In each session, there are six problems to solve. Each problem is scored on a 0-10 scale, so the maximum score is 120 points. The Putnam draws thousands of math-oriented participants, and the median total score is typically 0 or 1 points! out of 120!

Want a taste of Putnam? Here is the second session's first problem: *Suppose that each point in the plane is colored either red or green, subject to the following condition: For every three noncollinear points A, B, C of the same color, the center of the circle passing through A, B, and C is also this color. Prove that all points of the plane are the same color.*

If you enjoy learning about and working on such problems, reach out to Professor Moles (molesg@union.edu) as the Putnam Exam Preparation squad will continue to meet this term.

The Advent of Code!

In December, **Professor Grant Moles** coordinated Union's participation in this year's Advent of Code. What is that? From its website, https://adventofcode.com/2025/about, "*Advent of Code is an Advent calendar of small programming puzzles for a variety of skill levels that can be solved in any programming language you like. People use them as interview prep, company training, university coursework, practice problems, a speed contest, or to challenge each other.*

"You don't need a computer science background to participate - just a little programming knowledge and some problem solving skills will get you pretty far. Nor do you need a fancy computer; every problem has a solution that completes in at most 15 seconds on ten-year-old hardware."

Three students, **Duy Hung Dang, Hunter Gould,** and **Talha Khan**, completed at least one of the puzzles, with Hung leading the Union crew by solving 18 of the 24 available puzzles. Professor Moles reports that "it was a fun competition that inspired some interesting discussions and helped all of us (me included) improve our coding and problem solving skills."

Students – Join the MAA. It Is Now FREE for you!

Through the Union College Math Department's institutional membership, students are now able to become members of the Mathematical Association of America (MAA) for free! Student members receive online subscriptions to **all** MAA Journals, including The American Mathematical Monthly. Additionally, they have accesses to exclusive professional development resources, community networking opportunities, and more. As their website says, "MAA membership is your portal to the community of mathematicians and mathematical educators all focused on advancing mathematics at the collegiate level and providing you with opportunities to build your network of professionals and peers."

Follow this QR code for instructions on how to join the MAA

For instructions on how to join, follow the link below or the QR code above. Hey, what have you got to lose? It's free! https://www.union.edu/document/maa-student-membership

Free Tutoring in Calculus Courses!

The math department runs a Calculus Help Center (CHC) that offers **free, peer tutoring** in support of its calculus courses: Math 105, 110, 112, 113, 115, 117 and IMP. This is a no-appointment, drop-in service staffed by skilled, patient, and kind upper-class students: **Ananya Gupta, Ramissa Khan, Nabeel Naqvi, Dang Nguyen, Avi Paudel,** and **Jonah Sagarin.** The hours/location information is below.

Calculus Help Center: free peer tutoring in calculus

Sunday through Thursday nights
7:30-10:00pm
Sorum House Seminar Room