## UNDERGRADUATE MATH SEMINAR

The next math seminar of the term will be

**DATE:**      <mark>**THURSDAY, September 29**</mark>

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

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

In this seminar, **Professor Holley Friedlander** of the Department of Mathematics at **Dickinson College** will present the following talk.

Professor Holley Friedlander

## Title: Arithmetic of Apollonian Circle Packings

**Abstract:** The concept of an Apollonian packing dates to Hellenistic Greece when astronomer Apollonius of Perga discovered the following theorem: Given an arrangement of three circles such that every pair is mutually tangent, there are precisely two circles tangent to all three.

Start with four mutually tangent circles. In the space between any three, add the (unique) circle tangent to all three. Repeat this process of successively adding new circles to every new threesome of circles ad infinitum and one obtains an infinite configuration of circles known as an Apollonian circle packing. If each of the four initial circles has integer curvature, then amazingly all the circles in the packing must have integer curvature. For such a packing, there are many questions a number theorist might ask. For example, are there infinitely many circles with prime curvature? In this talk, we introduce and discuss the arithmetic of Apollonian circle packings.

## Math Club and Putnam Exam Preparation (PEP Squad) to Meet on Tuesday

Come join the Math Club on **Tuesday, September 27** at common lunch, **1:00pm**, in Bailey 204, the Math Common Room, as its members discuss ideas and strategies for approaching some really fun and challenging math problems to help themselves prepare for this year's William Lowell Putnam Mathematical Competition, aka, The Putnam Exam. This competition is held in two three-hour blocks on the first Saturday in December.

If you cannot attend but would like to know more about the Math Club or would like to be put onto its mailing list, contact the Math Club President **Livi Gwinnett** (gwonneto@union.edu). For more information about the Putnam Exam, please contact **Professor Greg Malen (**maleng@union.edu) or stop by his office, Bailey 206-B.

## Some Math Faculty Summer Highlights

Continuing a feature from last week's newsletter, here are a few bullet points about the activities of some the math faculty this past summer.
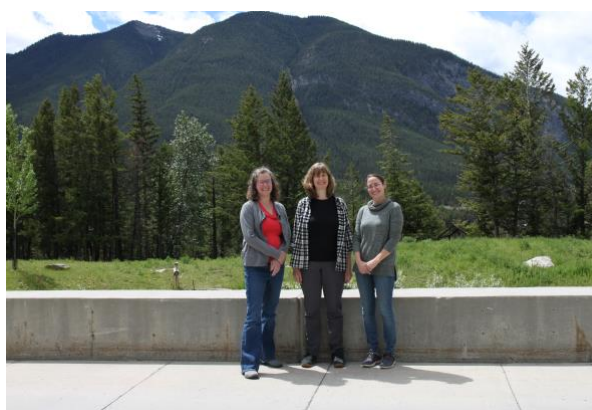
- **Professor Paul Friedman** taught a calculus course as part of the Academic Opportunity Program (AOP). In addition, he worked on the math placements of the incoming students. Outside of these Union activities, he was able to take a few trips, visiting Salem, MA, some sites around the Schenectady area (his favorite is Grafton Lake State Park), and going on an Alaskan cruise.
- Outside of working on his math research, **Professor Jeff Jauregui** made some progress toward his goal of hiking all 46 of the Adirondack High Peaks, now having completed 16. Only 30 to go!

Professor Jeff Jauregui on a hike up a high peak.

- **Professor Brenda Johnson** wrote, "I was able to work in person with collaborators for the first time since 2019! Two collaborators (Kristine Bauer of the University of Calgary and Sarah Yeakel of the University of California at Riverside) and I spent a week at the Banff International Research Station working on a project on abelian functor calculus, operads, and Faa bicategories. Before the week in Banff, I attended and gave a talk at the conference on Foundational Methods in Computer Science at the University of Calgary's Kananaski Field Station. Both Banff and Kananaskis are in the Rocky Mountains, so in addition to doing lots of mathematics, I saw lots of beautiful scenery and interesting wildlife. On a separate trip, I visited a collaborator at the Ecole Polytechnique Federale de Lausanne in Switzerland to work on a project to generate functor calculi from comonads.

- **Professor Kim Plofker** spent most of the summer here at Union, mostly in struggling to finish a draft of a very recalcitrant co- authored volume on Medieval Mathematics for the forthcoming Bloomsbury Cultural History of Mathematics series. She blames it all on Harry Potter, without whose massively best-selling adventures Bloomsbury Publishing would never have been able to afford their Cultural Histories project and she would not have been landed with this book. Nonetheless, she also enjoyed watching and feeding many interesting caterpillars, one of whom turned into this beautiful Spicebush Swallowtail.



Above: from left to right, Kristine Bauer, Brenda Johnson, and Sarah Yeakel.

Below is the conference picture from Foundational Methods in Computer Science conference. Can you find Union's **Professor Brenda Johnson** and **Professor Emerita Susan Niefield?**



## Black Heroes of Mathematics Conference

The International Centre for Mathematical Sciences (ICMS) is holding the Black Heroes of Mathematics Conference 2022 on **October 4-5.** This conference is attendable online(!), though since it is based in Great Britain, some of the talks are in the early morning in our time zone.

For registration and program information, visit the conference website:

https://www.icms.org.uk/events/2022/black-heroes-mathematics-conference-2022



**Professor Kim Plofker** and a gorgeous Spicebush Swallowtail butterfly.

## Calculus Help Center: free calculus tutoring!

The math department runs a Calculus Help Center (CHC) that offers *free, drop-in, tutoring* in calculus courses through Math 117. It is Sunday through Thursday, 7:30-10:00pm in the Sorum House seminar room.