

Virtual Steinmetz Symposium Website Now Live!

This year's Steinmetz Symposium, the 30th annual such event, was moved online due to the COVID-19 pandemic and the closure of the campus. As per an email from Chad Orzel, the Director of Undergraduate Research, "The Virtual Steinmetz Symposium website is now live, with over 200 video presentations, digital posters, and recorded performances for you to check out, showcasing the amazing work that our students and faculty have been doing over the last year:

<https://digitalworks.union.edu/steinmetzsymposium/steinmetzthirty/#browse>

"[T]his symposium is a chance to recognize and celebrate the dedication and collaboration of our student and faculty researchers, who year in and year out produce amazing work. Even in the face of a global pandemic that's keeping us apart, you've done great things, and we're very pleased to share them with the Union community and the broader Internet.... So, we invite you to explore the site, enjoy the presentations, and engage with the student presenters through the comments features."

There are several math talks in the Steinmetz Symposium this year, including

- **Ryan Baldwin**, [Extremal Kähler Metrics on Ruled Surfaces](#)
- **Qinying Chen**, [Multi-object analysis of volume, pose, and shape using statistical discrimination](#)
- **Bhuwan Gokhool**, [Practical Efficiency of Password Authenticated Key Exchange Protocols](#)
- **Ziyi Hu**, [Counting With Groups](#)
- **Mushan Zhong**, [A geometric measure for quantifying gerrymandering](#)

Meichai Chan also has a contributed poster, [Student Evaluations as a Predictor of Teaching Effectiveness](#).

Congratulations to all of the Steinmetz participants!

Calculus Help Center: Tutoring Positions Available¹, Fall 2020

The Math Department is now accepting applications for vacant Calculus Help Center (CHC) tutoring positions. Tutors in the fall work in the CHC one fixed night per week, Sunday through Thursday, from 7:30-10:00pm.

Qualifications: Calculus through Math 115 with grades of no less than A-. Preference will be given to students who

- have also completed Math 117 (with a grade of no less than A-),
- are considering becoming a math teacher or pursuing graduate work in mathematics, and
- have other tutoring experience (not necessary, though).

To apply for a position, send an email to Professor Paul Friedman (friedmap@union.edu) expressing your interest, listing your mathematical background, including coursework (term, professor, and grade) and tutoring experience (if any), and discussing why you think you would be a good tutor.

Application deadline: Friday, May 29 at NOON.

¹ While we do not know exactly the form the CHC will take, we anticipate being able to run it in some way.

Senior Writing Experience

Kallan Piconi contributed the following article about her Senior Writing Experience in Math 487, the Senior Writing Seminar.

For my senior thesis experience, I decided to take the Senior Writing Seminar with Professor Johnson. I really enjoyed this small class setting of five students because we were able to learn more intensely about abstract algebra together, then we each branched out to investigate our own abstract algebra-related topics. Throughout the process we were able to share our ideas and progress with our peers- effectively making our thesis experience more inclusive and supportive. That said, I would like to thank Professor Johnson for the incredible job she did running a seminar that made each of us feel independent and supported at the same time.

In terms of my topic, I decided to research card tricks. Most card tricks performed by magicians leave the audience perplexed and confused. What the audience often does not realize is that many card tricks rely on shuffling techniques that are closely related to permutation group theory. My paper worked to explain the mathematical logic behind a few card tricks commonly performed by magicians. I analyzed perfect shuffles such as the faro shuffle and the horseshoe shuffle to demonstrate some interesting mathematical properties of shuffles.

Throughout my experience researching my topic and writing my paper, I got to learn about mathematical applications that interested me – in turn bringing my math career at Union to an exciting end. Having completed the seminar, I would recommend it to any Union student that is looking to write their thesis in a group environment where they are supported by their peers while writing about their own independent topic.

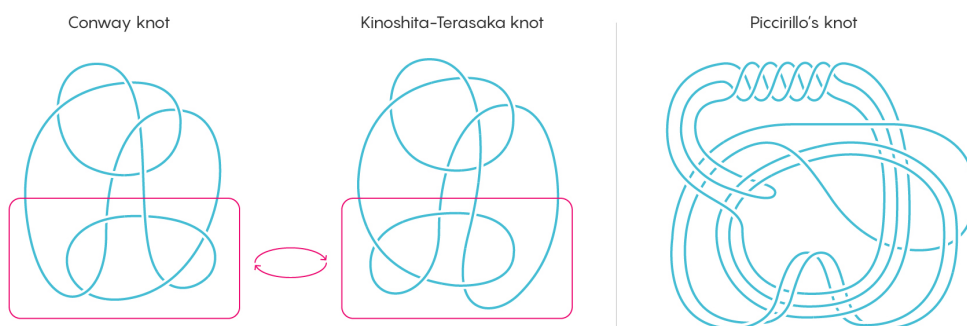
Graduate Student Solves Decades-Old Conway Knot Problem ... in Less Than a Week!

As reported by math and science author, Erica Klarreich, in *Quanta Magazine*, Lisa Piccirillo recently solved a decades-old problem in knot theory: is the Conway knot a “slice” of a higher-dimensional knot? From the article, “Sliceness” is one of the first natural questions knot theorists ask about knots in higher-dimensional spaces, and mathematicians had been able to answer it for all of

the thousands of knots with 12 or fewer crossings — except one. The Conway knot, which has 11 crossings, had thumbed its nose at mathematicians for decades.” Piccirillo’s work, showing the Conway knot is not a slice, was published in February in *Annals of Mathematics*, perhaps the most prestigious math journal. Her work on this problem, as well as her other work in topology, has landed her a tenure-track position at MIT starting this summer. The link to the full article is below.

A Knotty Problem

When researchers wanted to prove that the Conway knot is not “slice,” they were hamstrung by its close resemblance to another knot called the Kinoshita-Terasaka knot, which is slice. Then Lisa Piccirillo figured out how to make the Conway knot a new, more complicated companion knot.



The Conway knot and the Kinoshita-Terasaka knot are mutants, meaning you can transform one into the other by flipping the part of the knot within the red box.

Piccirillo devised a knot with the same “trace” as the Conway knot, then used this new knot to ascertain the Conway knot’s slice status.

<https://www.quantamagazine.org/graduate-student-solves-decades-old-conway-knot-problem-20200519/>