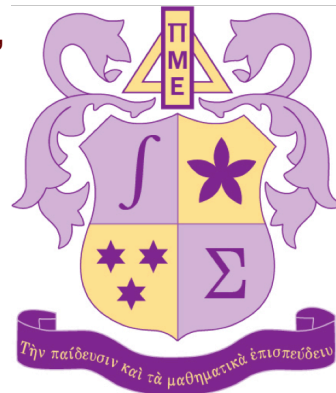


Math Department Senior Sendoff

Among the events and activities impacted by COVID-19 this trimester is graduation. While nothing can replace the traditional graduation ceremony, the math department is hosting a Zoom session, on **Sunday, June 14** from **1:30-2:00 pm** (following the college-wide virtual conferral of degrees) to congratulate its graduates and to wish them well as they go forward. If you wish to join this virtual celebration, email mathchair@union.edu for the Zoom link.

Eight Students to Be Inducted Into Math Honors Society, Pi Mu Epsilon

On Friday, June 5, eight students will be inducted to the Union College chapter of a national undergraduate math honors society, Pi Mu Epsilon. The purpose of this organization is the promotion and recognition of scholarly activity in the mathematical sciences among student at the academic institutions that have been chartered as Chapters of the Society. The honorees are **Hayley Coakley, Caroline Hirt, Cara LaPorta, Emily Rosenlof, Abigail Soroka, Jason Stack, Kristina Tully, and Daniel Resnick**. Congratulations!



Pieces from Theses

The last contribution to this column is from **Abigail Soroka**. Her senior thesis, “The Mathematics of Marriage and Divorce,” was advised by **Professor Alan Taylor**.

“So, what do you want to look into?” The first question of my first meeting of my senior thesis. Up until this point, any work that I had done had some kind of guidance to it. Weekly homework assignments given out by professors always had some kind of rubric attached, exams were always based on completed work throughout the term, and even if I was given leeway on the topic for a project, my professor had always explained what he or she expected in the final outcome. For the first time, I had complete control over what I wanted to research, how I wanted to research it, and what I wanted my final product to look like. It was definitely nerve-wrecking. Each step of the way I was questioning whether I was understanding the math involved, whether I was looking into beneficial information, etc. Professor Alan Taylor, my thesis advisor, and I realized that this fear of doing it incorrectly was holding me back on the work that I was doing, so while I had enough information to write my 30-page thesis, the pages just weren’t coming. Professor Taylor, however, taught me a valuable lesson: you can always rewrite, but if you have an empty page, there can be no movement forward. On a week night in week five or week six, right after hearing this from Professor Taylor, I went to Schaffer Library and did not leave until my first fifteen pages were done, and once I had something the rest flowed. Our advisors have confidence in us even if we don’t have that confidence ourselves, and this push from Professor Taylor was exactly what I needed to hear to get me through the end of the term. Our weekly meetings became less of me doubting myself and more of a conversation between two individuals who love math, building upon each other’s thinking. For the first time, I felt like I was making a real difference in the math world, rather than just learning about it. My senior thesis is my proudest academic achievement at Union, and it was an honor and a privilege to work with Professor Alan Taylor, even if it was just for one term.

Due to the circumstances coinciding with COVID-19, I was not able to present at Steinmetz Symposium this spring, but to give a brief overview of what my senior thesis was, here is my Steinmetz abstract: While marriage and divorce seem like complete opposites, both involve pairing: people with people in the former and, alas, people with objects in the latter. In this presentation, we bring together two disparate

Continued on next page

subfields of mathematics – matching theory and fair division – to explore the connection via various theorems in mathematics and we identify the strengths and weaknesses of the methods in successful pairings (whether it be people with people or people with objects). In order for any of these processes to work, we must develop a way to record individual preferences and we must define what we mean by a successful pairing. Voting theory offers us several ways to optimize decisions that require a consideration of the preferences of individuals over a large range of possible choices. When discussing matching, approval voting leads to the theoretical result known as Hall's Marriage Theorem, which matches individuals based on approval preference. The Borda count leads to the practical Gale-Shapley Algorithm, which matches individuals based on rankings and top preference. When discussing fair division, cumulative voting leads to both the theoretical result known as the Conway-Selfridge procedure (which separates a good evenly among three individuals) and the practical process of Adjusted Winner (which divides property or numerous goods among two individuals, as in a couple going through divorce). In each area we give an important real-world application to show that the mathematics goes beyond the theorems and metaphors: a pairing of students to colleges (in the context of matching) and a peaceful resolution of ownership between Israel and Palestine in the Middle East (in the context of fair division). Finally, the question of whether honesty is the best policy to create an optimal pairing is examined through the lens of Vickrey Auctions, an auction form in which one can prove that honest bids will never be regretted.

After completing my senior thesis, I definitely view the decisions we make about who to support for Class President, who we want to date, or where a group of friends will go for dinner in a different light.

Spring 2020 Math Final Exam Schedule

Course #	Course Name	Professor	Day	Date	Time
MTH*102*01	Calculus with Precalc 3	Khatami, L	Tue	6/9	8:30 AM-10:30AM
MTH*112*01	Calculus 2: Integral Calc	Khanmohammadi, E	Wed	6/10	8:30 AM-10:30AM
MTH*115*01	Calculus 3: Diff Vector Calc	Klangwang, J	Mon	6/8	7:00PM-9:00PM
MTH*115*02	Calculus 3: Diff Vector Calc	Klangwang, J	Mon	6/8	7:00PM-9:00PM
MTH*115*03	Calculus 3: Diff Vector Calc	Johnson, B	Mon	6/8	8:30 AM-10:30AM
MTH*117*01	Calculus 4: Integral Vector	Jauregui, J	Thu	6/11	8:30AM-10:30AM
MTH*117*02	Calculus 4: Integral Vector	Friedman, P	Tue	6/9	8:30 AM-10:30AM
MTH*117*03	Calculus 4: Integral Vector	Gasparovic, E	Thu	6/11	8:30AM-10:30AM
MTH*130*01	Ordinary Differential Equation	Hatley, J	Wed	6/10	8:30 AM-10:30AM
MTH*130*02	Ordinary Differential Equation	Khanmohammadi, E	Tue	6/9	8:30 AM-10:30AM
MTH*199*01	Intro to Logic & Set Theory	Jauregui, J	Wed	6/10	7:00PM-9:00PM
MTH*199*02	Intro to Logic & Set Theory	Gasparovic, E	Wed	6/10	7:00PM-9:00PM
MTH*224*01	Geometry	Friedman, P	Wed	6/10	8:30 AM-10:30AM
MTH*332*01	Abstract Algebra 1	Johnson, B	Tue	6/9	8:30 AM-10:30AM
IMP*121*01	Int Math/Physics 2 W/Lab	Wang, J	Mon	6/8	8:30 AM-11:30AM
STA*164*01	Strategies of Experimentation	Hoerl, R	Mon	6/8	8:30 AM-10:30AM
STA*364*01	Big Data Analytics	Hoerl, R	Tue	6/9	2:30PM-4:30PM

GOOD LUCK ON YOUR FINALS! THEN ENJOY THE SUMMER!!