~~UNDERGRADUATE MATH SEMINAR~~ Steinmetz Symposium!

In deference to the annual Steinmetz Symposium, **Friday, May 10**, there will not be a separate math seminar this week. Instead, we encourage you to attend the session in Mathematics (as well as many others!).

Session II   Mathematics - Bailey 207, moderated by Professor Christina Tønnesen-Friedman

- 10:50   **Ryan Baldwin**   Boundary Value Problems Related to Extremal Kaehler Metrics
- 11:10   **Allegra Dawes**   Geometric Group Theory and Hyperbolic Groups
- 11:30   **Julia Greene**   Geometric Constructions, Origami, and Galois Theory
- 11:50   **Paige Isser**   Examining Relationships Between Cancer Diagnosis Rates and Demographic Factors in New York State
- 12:10   **Niuniu Zhang**   Category Theory and Universal Properties

There are also talks based on math theses in other sessions:

Session I   Finance – Karp 001

- 9:00   **Robert Righi**   The Shifting Dynamics of International Currency Reserves

Session I   Developmental Biology – Wold 128

- 9:40   **Vanessa Raskin**   Computational Analysis of the Developing Spiral Intestine in *Leucoraja erinacea*

Pieces from Theses, by Robert Righi

Robert's thesis was supervised by Professors Jue Wang (Math) and Eshi Motahar (Economics).

As a double major, I found that I was quite nervous during my junior year about how my thesis was going to play out. I was unsure about the rules within the two departments (math and Economics) that applied to doing a joint thesis and if I would even logistically be able to combine the disciplines. So my first piece of advice if you are in the same situation is to ask questions early on. Meet with the chairs of each department, ask about the requirements, and outline what you are looking to do. This not only helps you understand what needs to be done, but also enables you to be more knowledgeable when approaching potential advisers.

My second piece of advice is not to worry about getting an adviser. If you are doing a joint thesis, find someone whose work interests you and who is able to accept a thesis student. For a more conventional thesis, there will be an email detailing topics to choose from (this includes taking a writing seminar). Your adviser may or may not be a professor that you have worked with in the past. However, the Math Department is terrific and you will get a great adviser. I was fortunate to be able to write my thesis under the direction of Professor Motahar in the Economics Department and Professor Wang in the Math Department. Both were extremely helpful and enthusiastic about the project which made conducting the research enjoyable. I cannot thank them enough for the work that they have done in helping me through the process of writing a thesis.

Our work looked at the shifting dynamic of reserve currencies (significant amounts of currency held by governments and commonly used in international transactions). In particular, we looked at this dynamic after the formal recognition of the Chinese renminbi as a reserve currency by the International Monetary Fund in 2015. We used a method termed "workhorse regressions" to analyze the co-movement of international currencies with the five major reserve currencies. This involved running more than 150 difference in logs

regressions (one for each country) and analyzing the coefficients on each reserve currency. The coefficients represent the weight, or influence that each reserve currency had on exchange rate movement of every individual country's currency over that given time.

This allowed us to assign each country's Gross Domestic Product to a reserve currency based on what reserve currency had the largest weight. Doing so allowed us to calculate the "sphere of influence" each major reserve currency had over a given time frame. The sphere of influence is how much of the global GDP is impacted by exchange rate movements of a particular reserve currency over a given time. We could then compare our results to what previous work had found for past time frames. The United States dollar has historically been the most dominant reserve currency, and we found that it still is. However, our work revealed a diminishing role of the dollar compared to other historical periods. This can be explained by various economic and political phenomena including changes in volume of trade and foreign investment. If you would like to learn more about my project I will be giving a talk on Steinmetz day.

Thesis has truly been an enjoyable experience, as has all of my time at Union. Finally, I would like to thank the Math Department for all of the work that they have done for me. I will greatly miss seeing you all in class and bugging you in your office. I would like to finish with one more piece of advice for future thesis students: enjoy the time that you have in front of you, it goes by quickly.

Fall Term Preregistration: Petitioning Begins Saturday, May 11

It is time to start planning your fall term course schedule, as the petitioning process starts on Saturday, May 11 and runs through Tuesday, May 14. For this registration period, the following math courses are petition course:

- **All Calculus courses from Math 100 through Math 115, that is, MTH 100, 110, 113, and 115**
- **Math 219 – Discrete Mathematics.** In this course, topics studied may include graph theory, partially ordered sets, the Four-Color Theorem, and more. As a 200-level course, Math 219 is appropriate for students coming from Math 199, as well as more advanced students.
- **Math 248 – Intermediate Topics in Mathematics.** This course will be taught by a trio of professors: **Jeff Hatley, Kathryn Lesh,** and **Bill Zwicker**. Each professor will choose an area of mathematics that they enjoy and might use in their own research. As with Math 219, this course is appropriate for students coming from Math 199, as well as more advanced students.
- **Math 336 – Real Variable Theory.** This core course is **required** for math majors. In this course, students are taught some of the theoretical underpinnings of the calculus of functions whose domain lies within the set of *real* numbers.

Problem(s) of the Newsletter – May 6, 2019

Last week's problem: Unfortunately, no correct solutions to last week's problem were submitted. However, a solution to last week's problem has been posted at the newsletter sites in Bailey Hall.

This week's problem: Here's a problem that was found on a blackboard in the Math Common Room. Let's take it as this week's PON.

Professor Friedman (friedmap@union.edu) will accept solutions until midnight Friday, May 10.

If $3x - y = 12$, then what is $\frac{8^x}{2^y}$?