

UNDERGRADUATE MATH SEMINAR

This week's seminar will be back in its usual location

DATE: **Thursday, April 25**

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

Location: **1:00** – Seminar in **Bailey 207**

In this seminar, **Professor Emeritus Julius Barbanel** from the Union College Mathematics Department will present the following talk.



Professor Emeritus
Julius Barbanel

Title - **Who Discovered Integral Calculus: Archimedes and the Method of Exhaustion**

Abstract: Isaac Newton and Gottfried Leibniz (both working in the late 17th and early 18th centuries CE) are generally considered to be the inventors of calculus. We will argue in this talk that part of the credit for this discovery should be given to the ancient Greek mathematician Archimedes (who worked in the 3rd century BCE). Archimedes pursued two lines of research involving areas and volumes. These approaches, known as the Method of Exhaustion and the Mechanical Method, can be viewed as early examples of ideas that we think of as being part of integral calculus. We will focus on Archimedes' Method of Exhaustion.

Pieces from Theses, by Paige Isser

Paige's thesis was supervised by Professor Jue Wang

As a chemistry and mathematics double major, junior year I had to make a decision about which department I wanted to conduct my thesis in. I felt that my time in the chemistry department had already exposed me to the type of laboratory work that a chemistry thesis would consist of, and although I have valued the theoretical course work that I have experienced in mathematics, I decided that I wanted to explore the world of applied mathematics that was still foreign to me. Discussing my interests in medicine and data analysis with Professor Wang, we came up with my idea of finding correlations between cancer data, specifically breast and prostate cancers, and demographic and environmental factors throughout New York State. Although this idea isn't necessarily new or groundbreaking I was able to delve into a few mathematical techniques that were new to me.

Once I collected and cleaned the data from online resources such as the New York Department of Health, and the United States Census Bureau I analyzed the information in a more qualitative manner at first. I used ArcGIS, a mapping software, to visually make inferences as to which variables of interest had any correlation. These visuals provided me with insights on the best variables to run correlation tests as well as new ways to group my data to find the most significantly significant results. I also analyzed the data in a quantitative fashion as well. Through both correlations and regressions I was able to determine some important factors that influenced the rate of cancer incidence within a certain population. My results were very interesting, but the true highlight of my learning experience was acquiring these new skills I can use to evaluate data in the future.

While I originally thought that conducting my thesis would be a summary of sorts to my mathematical education thus far, in my case the experience really just opened my eyes to a field that I potentially want to explore further. These new found interests lead me to research opportunities in the data

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science field for post-graduation. I am currently enrolled in my first statistics class to add to the data analysis techniques that I developed. For these reasons I am very grateful for my courage in choosing to conduct a project that I had very little previous related experience and knowledge.

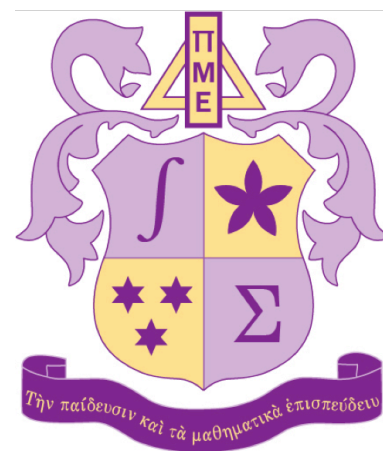
My advice to underclass students is to keep your options open. I came to Union as a chemistry major, and it only occurred to me at the end of my sophomore year that I should add a math major when I was consistently taking math classes for no reason other than interest in the material I was learning. When it comes to thesis a good approach may be to think of a class that you wish you could have taken, and do it on your own. Originally, I was scared of the idea of designing a project, because I am not very creative, but with the guidance of advisors I was able to partake in an experience that was both stimulating and inspiring.

Pi Mu Epsilon – Math Honors Society Accepting Applications

Pi Mu Epsilon (PME) is a national undergraduate math honors society. In Spring 2013, a chapter of PME was established at Union College. Now we are looking to induct new members who have demonstrated an ability and interest in mathematics consistent with PME's purpose and goals.

To be considered for membership into Union's chapter of PME, a student must have

- taken at least two math courses at the 200-level or above;
- a minimum campus-wide GPA of 3.0 and a minimum GPA of 3.0 in all math courses that can be used to fulfill a math major;
- a demonstrated engagement and involvement, while at Union College, in the promotion of mathematics at Union College and/or broader community, (examples include, but are not limited to, active involvement in the Union College Math Club, in the Hudson River Undergraduate Mathematics Conference, in the Calculus Help Center, in math tutoring through the Kenney Center; regular attendance at the Union College Math Department Seminar);
- an interest in joining PME, demonstrated by writing a few paragraphs/mini-essay in an email to **Professor Paul Friedman** (friedmap@union.edu) explaining your interest, your qualifications, and how you have supported and will continue to support the purpose and goals of PME. This email must be received by **noon on Friday, April 26th**.



The national initiation fee for PME is \$30. This covers the administrative cost of membership and also a one-year (two issue) subscription to the MPE Journal. Members of MPE can also purchase other PME items such as tassels for graduation, t-shirts, etc. For more information, go to the website pme-math.org.

Problem(s) of the Newsletter – April 22, 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 fun one that asks you to think about factorizations:

Let $\tau(n)$ denote the number of positive integer divisors of n . Find the sum of the six least positive integers n that are solutions to $\tau(n) + \tau(n + 1) = 7$.

Professor Friedman (friedmap@union.edu) will accept solutions until midnight Friday, April 26.