

## UNDERGRADUATE MATHEMATICS SEMINAR

The next seminar of the winter term will be:

**DATE: TUESDAY, January 20<sup>th</sup>**

**Time & 3:45pm** – Refreshments in the Math Common Room, **Bailey 204**

**Location: 4:00pm** – Seminar in **Bailey 207**

In this seminar, **Professor Yibao Xu**, from the Borough of Manhattan Community College, City University of New York, will deliver the following talk:

### **TITLE: Mathematicians and Mathematics in China during the Cultural**

**ABSTRACT:** The Cultural Revolution (1966-1976) is still the most destructive political movement in modern China. During that tumultuous ten years, millions died as a direct consequence of the political struggles. Tens of millions were dislocated. Higher education was abandoned entirely for the first five years. Leading experts in virtually all academic areas were deprived of their right to do research in their areas of expertise. The promising mathematical research done during the first fifteen years of the newly created communist China came to a halt, and faded away.

After briefly describing the mathematical status in Communist China before 1966, the speaker will provide a setting of the Cultural Revolution by showing a 10-minute documentary film. He will then take two leading Chinese mathematicians, Wu Wenjun, or better known in the West as Wen-tsun Wu, and Gong Sheng, as examples, to discuss how the Cultural Revolution affected mathematicians' own personal lives and their research. In order to show how the politics and Marxist ideology determined mathematical research in mainland China in this period, this talk will also discuss Chinese translations of Karl Marx's *Mathematical Manuscripts* and the nation-wide discussion of the *Manuscripts*.

For a preview of upcoming seminars and a list of past seminars, visit <http://www.math.union.edu/~wangj/seminar09w.htm>

## **Pieces from Theses: Mike Topka, '09**

For my math thesis, I was assigned the topic of continued fractions, advised by Professor Niefield. I chose this topic because I had some interest in learning more about continued fractions. The regular courses do not cover this topic, so I wanted to try something new and different. Initially, I had no clue what a math thesis entailed or what to expect. I have seen others before me do it, but it is a totally different experience when you're in the pilot's seat.

I knew my fall senior term was going to be busy, so I wanted to get a head start. Over the summer I had an early meeting to discuss a strategy for math thesis. She helped me get a clearer idea of what to expect during the school year. She also pointed me to some textbooks to read to learn about my topic. There were so many theorems and definitions that were new to me. I took notes just like in class, but this time they were not on the chalkboard.

After I learned a great deal about continued fractions, I wanted to start narrowing down topic

choices. I knew there were several different directions and possibilities to write on continued fractions. Choosing a topic that I liked was perhaps the most difficult task at hand. I met with my advisor and she gave me some general tips on searching the internet for original literature on mathematics. I had never thought there were so many publications each month on new mathematics!

After a few weeks into the term, Professor Niefield hit a gold mine. She had found an interesting paper that involved a topic that I love. Baseball! The paper utilized continued fractions to determine possible batting records that rounded to a batting average. After analyzing the paper several times, we determined that the algorithm used was missing a few records. At that point, we decided to tackle the problem and try and make our own algorithm to enumerate all the possible batting records.

The first step was to create some lemmas and theorems. Making your own theorems is a pretty

cool thing. All my mathematical life I've been learning how to prove and use someone else's theorem, but to come up with my very own was a great experience. Of course, proving your own theorem is not as easy as one would think. The second step was to make sure they work and then prove them. Most of them had to be revised a few times before they were correct.

On top of my math thesis, I was also doing research for my chemistry thesis. It was tough to balance the amount of work required by both disciplines. At times it was very demanding, but my advisor was flexible. Some weeks I had to focus more on class and chemistry, but then I would work harder on the other weeks. Slowly but surely I had written the majority of my thesis by the end of the term. However, after writing up a few theorems my advisor and I found flaws. Since these are new theorems, one cannot simply look up an alternative proof. We had to grind out the details, which was challenging, but definitely a great experience.

As far as writing my thesis, I used a computer language called LaTeX. The advantage was that the quality of the outputted display is much better than a word processor. The disadvantage was that I had to learn a new computer language. After a while, LaTeX became second nature, but I would advise anyone to ask your advisor for help. They know a lot more about the language than you do. Now that I know how to use LaTeX, I'm going to write my chemistry thesis with it.

What I found in my own experience was how cool it was to work on new mathematics. When you write something original you feel like you've accomplished your own work, not just rewriting someone else's. That satisfaction is one of the best feelings and it will make you feel good about all that work you put in.

Some advice I would give to pre-thesis students is to give yourself enough time in your schedule. One thing I learned in this experience was that if something can go wrong, it will. Also keep in good communication with your professor. I could have not been able to do this without the aid of Professor Niefield. As Kate wrote last week, do not be afraid to try new things and write on something you have interest in. Good luck.

## Research Experience for Undergraduates (REUs)

For a current list of programs, go to <http://www.ams.org/employment/reu.html>. To pique your interest, here is a small sampling of the REUs listed there.

Institution	Topics	Dates	Deadline
Arizona State	Math and Theoretical Biology	June 9 - August 7	March 1
BYU	Area Minimization, Steiner Problems, Minimal Surface Problems	June 15 - August 7	March 1
Canisius College	Geometry and Physics and Graphs	June 15 - August 7	February 19
Cornell University	Fractals, Games on Graphs, Groups via Actions	June 8 - July 31	February 26
Willamette Valley Consortium (Oregon)	Number Theory, Geometry, Game Theory, Probability and Statistics, ...	June 15 - August 7	February 23
Williams College	Commutative Algebra, Knot theory, Number and Random Matrix Theory	June 15 - August 14	February 11

## Problem of the Newsletter: January 16, 2009

Unfortunately, no winning solutions were submitted to last week's problem.

**Here is this week's problem:** A runner runs a six-mile course in exactly 30 minutes. Prove that somewhere along the course the runner ran a mile in exactly 5 minutes. (What assumptions are you making?)

Professor Friedman will accept solutions to this problem until 12:00 noon Thursday, January 22<sup>nd</sup>. Email your solution to him ([friedmap@union.edu](mailto:friedmap@union.edu)) or put it in his mailbox in the Math Department's office on the second floor of Bailey Hall.