

## UNDERGRADUATE MATH SEMINAR

The next seminar of the term will be

**DATE:** TUESDAY, February 4

**Time &** 4:45pm – Refreshments in Bailey 204

**Location:** 5:00pm – Seminar in Bailey 207

This seminar will be a homecoming for **Andrew Mackenzie**, Union College class of 2009. While at Union, Andy was a double Math and Economics major. Currently, he is in his third year of a graduate program in Economics at the University of Rochester.

### TITLE: Randomization and Disposal of a Prize

**ABSTRACT:** We're asked to inform the public by awarding a prize to an expert. For example, the prize might be an interview on TV, or maybe it's funding for a website. The problem is we don't know which expert to choose! Fortunately, each expert has an informed opinion about which of his colleagues would be the best choice, so our plan is to gather and use these opinions - provided we're confident that nobody has strategically deceived us. Is this possible? Can we do this while protecting voter privacy? If the opinions form a consensus about who should win (or who shouldn't), can we be sure to follow it? And if there are any problems, could we address them by awarding the prize randomly, or by sometimes refusing to award the prize at all?

### What Are the Connections Between ... ? by Professor William S. Zwicker

- Majoring in both mathematics and economics at Union
- Andrew Mackenzie (our next seminar speaker)
- Professor William Thomson (a seminar speaker at Union, six years ago)
- The new display on research in the mathematics of voting (mahogany case, 2nd floor Bailey)
- The Economics Ph.D. program at the University of Rochester

This Tuesday, February 4, at 5PM, the speaker for the Union Undergraduate Math Seminar will be **Andy Mackenzie**. Andy graduated from Union in 2009, as a double Math/Econ major. His talk is jointly sponsored by Union's Economics and Mathematics Departments, and deals with the problem of incentives for strategic dishonesty that arise in a rather special type of voting, wherein an expert panel must choose one of their own to receive some honor; for details, see the abstract (in this newsletter).

If you come to this talk, you may be "closing the loop," because six years ago Andy was in your shoes. I had invited William Thomson to speak at Union's undergraduate mathematics seminar. Thomson is a mathematical economist from the University of Rochester, well known for his research in Game Theory and Social Choice Theory (voting and collective decision-making). He is also famous as an influential teacher – the Ph.D. program he helps run, at Rochester, is known for its high quality and mathematical emphasis, and for the many young, research-active economists trained there (and scattered all over the world). I invited Andy to attend the seminar, and to speak privately with William Thomson after the talk.

After graduating from Union, Andy spent some time working for ZS Associates (a consulting firm). Eventually, however, some natural force (perhaps akin to gravity) sucked him into the path

predicted years ago by everyone who had known him as a student, and Andy applied to Ph.D. programs in both Mathematics and Economics. As you might have guessed, today he is at the University of Rochester, in his third year as an Economics Ph.D. student . . . where he is studying with William Thomson, among others.

To give you an idea of how well Andy is doing as a Ph.D. student, here is an excerpt from an email that William Thomson sent me last May:

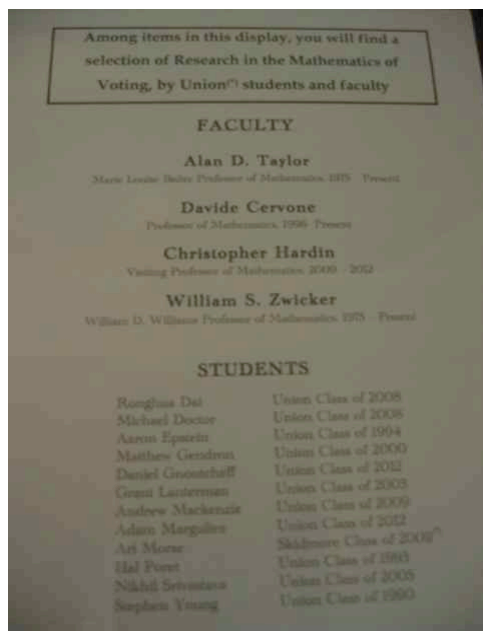
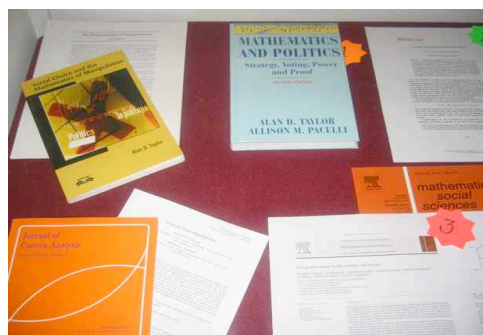
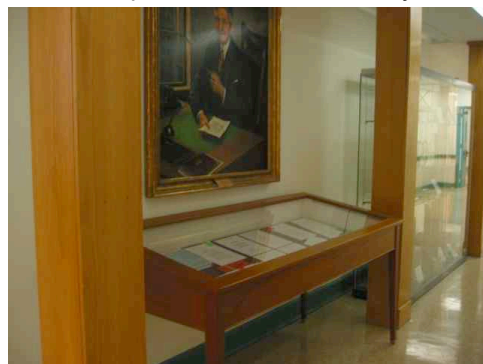
Hi, Bill: I hope you are well.

I thought you would be happy to know that Andy gave a superb presentation in my class today. His topic was a recent *Econometrica* paper by Holzman and Moulin. He spoke for two hours, without any notes . . . I have rarely, if ever, seen a second-year student have such control of his material and present with such clarity.

William

**The Mathematical Theory of Voting at Union** The mahogany case in the second-floor hall of Bailey Hall contains a changing display featuring ongoing mathematics research by Union faculty and students. Currently, the focus is on the rather long history (almost twenty-five years) of research at Union into the mathematics of voting. You will find the names of the eleven Union students (so far) who have written theses and papers on this topic, and of the four Union faculty who have published research articles (too many to fit in the case) as well as three books on the subject. One of these books is the **Mathematics and Politics** text written by **Professor Taylor**, which is used as a textbook at number of colleges and universities, including Union, in Mathematics 60.

Some of these research publications were co-authored by Union students. You will find the most recent such article, **Voting with Rubber Bands, Weights, and Strings** in the case. Its authors include five former Union undergraduates (along with a former Skidmore student) who worked with **Professors Cervone and Zwicker**. Two of the authors are the most recent Union students to write senior theses on the mathematics of voting – **Daniel Gnoutcheff and Adam Margulies**, each Class of 2013.



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Voting with rubber bands, weights, and strings

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How does our current research display fit in with Andy's visit? Andy Mackenzie is one of the eight authors of that paper. Notice that Andy's seminar presentation will also be on the mathematics of voting (although the topic is quite different from that of the voting with rubber bands paper in the display case). That should be no surprise, because voting theory is highly interdisciplinary, attracting researchers in economics, mathematics, and political science.

Finally, for those of you who may be considering graduate school, here are some of Andy's comments about Rochester's program – its international scope (Rochester's program is influential, in part, because it attracts and trains students from all over the globe) and what it is like to be a student there:

I started my program with other students from China, Turkey, Mongolia, Portugal, Romania, Spain, South Korea, and the United States. India and England are also represented in the year above. China is very well represented. Turkey is also particularly well represented - we get a lot of students from Bilkent.

The late Lionel McKenzie, the father of our department, has been called "the father of mathematical economists in Japan" and was awarded the Order of the Rising Sun by the Japanese government - so while I'm not sure any student at the moment is from Japan, our department has an excellent relationship with the country. William has a visiting student from Japan right now, and our group recently hosted several students from Osaka for a small conference.

William also recently had a visitor from Argentina, and will soon have a visitor of Mexican nationality from a Spanish university - my previous and next roommate!

As far as background [of entering students] goes, there's really a variety. The first year is a hefty workload, and if you haven't seen topics others have, then that's more on top of the pile for you. That said, at the end of the first year, pick a colleague. I promise that person knows things that you don't and vice versa. And even for the core topics everyone should know, your colleague will feel more confident about certain topics than you and vice versa. Really, what's most important is your ability and motivation to learn something you need to know - by reading up on your own, or by knowing the right person to ask for help. So while I can say it would be helpful to know set theory and linear algebra and the central limit theorem coming into the first year...you're not going to learn the first year curriculum before you come and do the first year.

## Math Problem Solving Contest at Union College: Saturday February 8

The eighth annual **University of Rochester Math Olympiad** will be held on **Saturday, February 8** from **9:30am to 12:30pm** in **Bailey 207**. This contest consists of four proof-based problems to be solved over the three hour time period. And ... **CASH** prizes are awarded: \$250 for first place, \$200 for second place, and \$150 for third place. If you would like to participate, please contact either Professor Friedman or Professor Zimmermann in Bailey 107 D or C, respectively.

## Problem of the Newsletter: January 31, 2014

**Last week's problem:** Congratulations to alumnus **Brandon Bartell '10** for solving last week's problem. A solution to the problem has been posted on the bulletin boards around Bailey Hall.

**This week's problem:** Let  $k$  be the smallest positive integer with the following property: There are distinct integers  $a, b, c, d, e$  such that the polynomial  $p(x)=(x-a)(x-b)(x-c)(x-d)(x-e)$  has exactly  $k$  nonzero coefficients. Find, with proof, a set of integers  $a, b, c, d, e$  for which this minimum is achieved.

**Professor Friedman** (friedmap@union.edu, Bailey 107D) will accept solutions to this problem until noon on Thursday, February 6.