

MSCS



Mess

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Department of Mathematics, Statistics and Computer Science
St. Olaf College, Northfield, MN 55057

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This Week's Colloquium

Title:	The Cat's Cradle, Stirring and Topological Complexity
Speaker:	Jean-Luc Thiffeault University of Wisconsin, Madison
Date:	Tuesday, November 3 rd
Time:	1:30pm
Location:	RNS 210

About the talk: There are several physical situations, where the ways in which a loop can 'tangle' is of prime importance: a simple example is the game of cat's cradle, and a more significant example is the question of how a fluid behaves when stirred.

In this talk, we will discuss how elementary topology gives us constraints on the types of mappings that can occur on a surface, i.e. we'll discuss how we can use elementary topology to predict the behavior of a surface (such as, for example, the possible ways in which the surface of a two-dimensional fluid can be stirred).

Note: no previous knowledge of topology will be required for this talk.

About the speaker: I did my undergrad at McGill and got my PhD in Austin, did a postdoc at Columbia, then was faculty for 4 years at Imperial College London. Two years ago I moved to Wisconsin. Maybe you could say that I recently relocated to Minneapolis,

much like Brett Favre. (Ok, so only temporarily.)

Some Special Spring Mathematics Courses

Every semester we offer many 200- and 300-level courses. Most are familiar or clearly described in the college catalog. (You can click on catalog descriptions from the online Class and Lab.) Here is information about three courses that may be less familiar or change from offering to offering. For more information on any of them, be in touch with the instructor.

Math 236: Mathematics of Biology (Urmila Malvadkar)

Connections between mathematics and biology are abundant. In Math 236 we will explore some of these connections, and use mathematics to answer biological questions. Although the course is particularly applicable to students interested in the natural sciences, the mathematical techniques in this course are widely applicable to many disciplines, and many are not taught in standard mathematics courses. The ability to translate problems from a natural science, social science, or even humanities (yes, mathematics can be applied to just about anything) into abstract equations is an important skill for everyone. This course will help you develop that skill.

Math 282: History of Mathematics (Kay Smith)

This course is a survey of the development of mathematics from ancient times to the early twentieth century, in both western and non-western cultures. Assignments will include reading original sources, doing problems related to the math we are studying, and a research project.

Prerequisite: Mathematics 220 or permission of instructor.

Math 382: Matrix Theory (Adam Berliner)

Matrices are fundamental objects in many areas of mathematics, science, and engineering. In this course we'll take a step beyond elementary linear algebra (where matrices are applied mainly to systems of linear equations), to explore other interesting properties of matrices, such as eigenvalues and eigenspaces, the Jordan Canonical Form, and the famous Cayley-Hamilton Theorem. In particular, we will look at several topics in a combinatorial way, using graphs to help us better understand certain properties of matrices, such as the determinant. Toward the end of the semester groups of students will have the chance to choose topics of special interest and research them more deeply.

Prerequisites: Math 220 and any one of Math 242, 244, and 252.

A Special Spring Bio/Math Course

Bio 291C: Exploring Bio Math

Interested in learning more about how mathematics is used in all areas of Biology, from health to forensics, from bio informatics to natural resource management? Want to get perspectives from lots of great professors from both the MSCS and Biology departments? Think it would be fun to spend a couple of relaxed evening hours each week (Thursdays) discussing ideas with like minded folks?

If yes, consider the 0.25 credit Bio 291C: Exploring Bio Math. Don't let the Biology

listing or the number scare you. This course is meant for folks with one introductory college level (or advanced high school) Biology course and a past or concurrent enrollment in Calculus II (or equivalent). Of course, if you bring more to the table, all the better for us all.

This course will meet weekly from 7:00pm to 9:00pm on Thursday evenings. Each meeting will be centered around a reading, typically a journal article combining interesting issues at the interface of mathematics and biology, with one to three weeks spent on a single article. The point of the course is for biologists to learn about the power mathematics can bring to biological investigations and for mathematicians to learn about some cool applications in biological settings. The discussion will be led by a string of professors from both MSCS and Biology, including Steve Freedberg, Julie Legler, Steve McKelvey, and John Schade. Jay Demas from Physics will also be presenting important biological material.

If you have any questions, please contact Steve McKelvey or any of the other course faculty.

Words from Hungary (The BSM St. Olaf Chronicles)

Due to Fall Break disrupting the MSCS Mess' weekly regularity, we have not one, but two (2!) articles from St. Olaf students in Hungary. Enjoy!

Last week, Dan Mork'11 wrote:

Taking a break from school and exploring a bit, as Sarah said last week, is certainly important. The math is very exciting and intense here as you have heard, but I will not bore you with the details, it's something you must experience for yourself. Instead, this week I present you with an important lesson I have learned during my time here. The following story takes place when visiting a Hungarian friend I met this summer in Norway. She offered me some toast and paprika to eat, and that's when the trouble started. Here's a poem:

A Magyar Paprika

By Dan Mork

O, Magyar paprika, you innocent pepper
lying on the counter like a big brown heifer.
Your brothers and sisters and next of kin,
look much more dangerous with their multicolored
skin.

But your soft green reminisces fields and forests,
and fragrant flowers purchased from florists.
Though even the forest holds dangers inside
the things behind shadows and in caves that hide.

I often walk through forests unworried
and since in my hunger I felt quite hurried
so I dove straight in and cut you up
into small slivers beginning from the top.

Then without a care in the world
I began eating and this story unfurled
as my mouth caught on fire, my fingers they burned
until, after some water, to my friend I turned.

“What kind of pepper is this?” I urgently asked
“A pepper I eat over a month!” said the Hungarian
lass.
“What have I done?” I wondered aloud
as my head became covered in a fiery cloud.

And this isn't the end of that nightmarish day
even worse comes when into bed I lay.
I rubbed my eyes with my fingers, falling asleep
where oil from the pepper, my fingers still keep.

My eye began to burn, I thought I might go blind
I needed an explanation, which I did finally find
as I paged through the evening in my head,
lying there, in pain, in my bed.

I remembered the green, innocent pepper,
the one I told you reminded me of a big, brown
heifer.
Its seeds and oils turned out to be deadly
ready to compose a horrible medley.

And so on this day I learned a good lesson
that next time I'll go to the delicatessen.
I'm sure to be safe in the foods that they sell,
certainly not a pepper with the fires of hell.

If you travel to Budapest, or Hungary in your life
remember these words and you'll save yourself
some strife.

A Magyar paprika is not to be mistaken
for an innocent puppy yet to be waken.

And never judge a pepper by how its colored or
sized,
after a few bites you might be very surprised.
Instead proceed slowly, one bite at a time
beginning opposite the stem and working up to the
rind.

Follow these directions and you'll evade pain
caused by the kind of pepper that's insane.
And now I leave you faithful readers of The Mess,
on your homework and exams, I wish you success!

And this week, Jeff Stamp'11 writes:

Midterms are just finishing up here in
Budapest, but amidst all the mathematical
fervor, it might be refreshing to talk about some
of the cultural opportunities Budapest (and this
area of Europe) has to offer. I have only
scratched the surface with my wanderings, but I
may be able to give you a sense of the
possibilities; I'll start with the city itself.

As far as fine arts go, the National Gallery
is hard to beat. I am far from knowledgeable
when it comes to art, but the National Gallery
had a very impressive collection. We were only
able to see a portion of the 19th/20th-century
works, but it was obvious you could spend days
meandering through the various eras of art and
not get bored.

If you are interested in music, I have also
been to a wonderfully quaint baroque concert in
a small catholic church down town that was
quite good. According to the schedule from
which I picked the concert, they run quite
regularly throughout the year.

There are also a number of historical sites
and museums of interest. The National
Museum has a very complete history of
Hungary (their history is a bit depressing) told
through artifacts, maps, and original
documents. I have also been to the “Terror
House”, the headquarters of the secret service

during Nazi and Communist occupation. Like I said, this is only a small portion of Budapest's cultural offerings.

If you are looking to get outside the city and see Europe, there are some great opportunities nearby. I spent three quite busy days in Vienna with a couple friends (yes, in between – and through – the math, you do make friends here) between the language class and the beginning of math classes back in early September. You could easily spend much more time in Vienna than this, but even a taste of what this city has to offer is quite gratifying. The highlights of my visit were: St. Stephen's Cathedral (12-century Gothic), Schünbrunn Palace (former Hapsburg residence), and the National Cemetery (burial place of Beethoven and Mozart, among others).

I also just returned from a holiday weekend in Austria. October 23rd is a (rather raucous) holiday in Hungary, as it is the anniversary of the 1956 failed revolution against communist rule. My functional analysis teacher told us all about the rioting, where it typically occurs, and how violent it gets (according to him, not dangerously so). We were warned by our program director to avoid certain areas of the city on this past Friday, and advised to take the opportunity and leave Budapest all together. I was lucky enough to take in the opening race of the alpine skiing World Cup circuit in Sölden, Austria. Wow, what an experience! Even if you do not care for ski racing (or know nothing about it) Sölden is still a beautiful place to visit. The view of the Austrian Alps from the base of the ski area is simply breathtaking, and I recommend anyone travelling through Austria to find a shuttle bus up to a similar high-point in elevation to see these impressive mountains. The town of Innsbruck was also interesting just to wander around.

So those are just some examples of what I have done on long weekends. I have heard of people travelling to Prague, Copenhagen, Moscow, various places in Poland, Romania, and Croatia, as well some Italian cities (mostly

Venice). Travel is a great way to not only see more of the world, but to get away from the math for a while, something I have found to be a necessity every so often. Well that's all from me. Thanks for reading!

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If you would like to submit an article or math event to be published in the Math Mess, e-mail sotirov@stolaf.edu.