

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 Colloquia

Title: **Using Mathematics to Think Clearly about Sustainable Harvesting of Natural Resources**
Speakers: Professor. John Pastor
Biology Department
University of Minnesota, Duluth
Date: Monday, October 19th
Time: 4:00pm
Location: RNS 310

About the talk: There is much discussion about sustainability of natural resources and whether we are approaching so-called tipping points where systems change abruptly and become unsustainable. Mathematics can help us think more clearly about these problems. The mathematical ideas underlying "sustainability" and "tipping points" are equilibrium, stability, and bifurcations. I will show how these help us understand whether different harvesting policies of a population are sustainable. The unharvested population will be described by a logistic growth curve, from which we will subtract various functions representing different harvesting strategies. Depending on the harvesting strategy, particular levels of harvesting may cause populations to go extinct or collapse to low levels. Although the underlying theory makes use of differential equations, I will demonstrate the basic ideas graphically.

Note: This talk is sponsored by Biology, Environmental Studies, and MSCS.

Title: **Baseball and Probability**
Speakers: Matt Richey
St. Olaf College
Date: Tuesday, October 20th
Time: 1:30pm
Location: RNS 210

About the talk: No sport is more dependent on random chance than our great American pastime. Over the years, baseball strategists have come up with a variety of ploys aimed at increasing run production. These include the sacrifice bunt, stealing, and hit and run. However, the efficacy of these strategies have not been carefully scrutinized – their popularity depends more on tradition than analysis. As well, there are various ways of assessing individual batter effectiveness (think of batting average, home runs, on-base percentage, etc). Again, most of these have rarely been assessed in light of the ultimate goal of batting, namely scoring runs. In this talk, we will introduce an intuitive probabilistic framework for assessing offensive performance. We will use this framework to assess some of the different baseball strategies and individual hitter performance (we will answer the question: Who is the best hitter in baseball?). No advanced mathematics is required, but some

familiarity with the rules of baseball will be assumed.

About the speaker: Matt Richey is originally from Kentucky and received his B.A. from Kenyon College and his Ph.D. from Dartmouth. He came to St. Olaf in 1986 and has been here ever since. His areas of research are Applied Mathematics, Mathematical Computing, and Bayesian Computational Statistics. In addition, Matt has designed and implemented software for industry and is a consultant to the college's efforts to redesign the student information system. In his spare time (the little that remains) Matt enjoys running, listening to music, and cooking. He is also involved in a life-long effort to correct the commonly held belief that the sacrifice bunt in baseball is an effective strategic ploy. So far, he has failed.

Spring Computer Science Courses (offered every other year)

Computer Science 276: Programming

Languages: This course studies design and implementation issues behind the semantics of programming languages with emphasis on implementation of common features found in most languages. Students construct their own interpreters for an example programming language incorporating the various language features they study throughout the course. Includes programming language semantics and syntax, programming language translation, implementation of control structures and memory structures. For further information, see Rich Allen.

Computer Science 315: Bioinformatics: This course provides an introduction to the field of bioinformatics. Topics include sequences of DNA and RNA and the "central dogma," comparing sequences, predicting sequences, predicting species; computational techniques such as substitution matrices, sequence databases, dynamic programming; and bioinformatics tools such as FASTA and

BLAST. This course counts toward CS major, Mathematics major, Biology major, and Biomolecular Science concentration. For further information, see Rich Allen.

Spring MSCS Independent Study (special offering)

What do match.com, eHarmony, iPhoto's *Faces*, iTunes *Genius*, Facebook friend suggestions, roommate selection, and medical diagnosis all have in common? They all rely on classification! And classification depends heavily on all three disciplines in MSCS. You are invited to explore classification from the collaborative perspective of Mathematics, Statistics and Computer Science in an Independent Study next semester. We will be exploring classification in the application area of face recognition. Students need only have course "expertise" in one of the three areas of Math, Stats or CS.

Prerequisites: [Math 220 & Transition course] **or** [Stat 272] **or** [CS 251 & prior or current enrollment in one additional course after 251]

If you are interested please contact Olaf Hall-Holt, Julie Legler, Steve McKelvey, or Katie Ziegler-Graham for more details.

Words from Hungary (The BSM St. Olaf Chronicles)

This week, Sarah Sprague'11 writes:

A train leaves from Budapest at 3:10 PM traveling 120 km/h. Fortunately, there is no train approaching from the other direction, so the 6 BSM students on board arrive in Vienna happy, on time, and unharmed. After some aimless wandering, a wonderful dinner, and a chance meeting with a man yodeling on the street, the students decide it is time for them to head to their hostel. One train ride, one missed bus, and one long trek up steep hills and through unlit paths disguised as roads later, they arrive and check-in, only to be presented

with a problem that is right up their alley of expertise: In how many ways can 6 students (four guys and two girls) distribute themselves between 2 rooms containing 4 beds each? The answer is not what they expect: Only one. And they guessed wrong the first time, sending the four guys into a room which already contained a now rather upset girl, recently awakened. A quick shuffle and several apologies set everything right, and the students go to sleep.

The next morning brings breakfast, a beautiful view, and a bus ride. Here there is another quandary: the bus they want runs in a loop, in both directions. Fortunately, this means either bus will take the students to the stop they want, but which one will take them there faster? One arrives sooner, but has a longer route between their boarding location and destination, the other arrives later but travels a shorter distance. After some deliberation and a proposal to race, which is immediately discarded as only 1 person really knows where the group is headed, they all pile onto the first bus that arrives, opting for motion over patience whether it truly gets them there faster or not.

The morning journey takes them to the *Schönbrunn gardens*, which was once occupied by the Hapsburg empress Maria Theresa (the mother of Marie Antoinette) who extensively refurbished and remodeled the palace, and at another time was used as a summer residence by Elizabeth known as Sisi (wife of Franz Joseph I), beloved by Hungarians for, among other reasons, her effort to actually learn and use their language. The gardens themselves are extremely beautiful. The students find a hedge maze and several labyrinths, one of which containing a puzzle that is of particular interest, detailed below:

Our story continues with anecdotes of not very much interest, including much walking, some sleeping, some more walking, and a little bit of eating thrown in here and there. The students return home on another train, this time traveling faster than 120 mph, and conclude

that a vacation is a nice thing to have every once in a while.

Thus this episode of the St. Olaf BSM chronicles concludes with a word of advice: play.

+2	-4	-3	+4	+2
+3	+1	-2	-3	+4
-4	+2	●	-1	+3
+4	-1	+3	-2	+1
-2	+3	+1	-3	-4



Version 1 Rules: Starting from the arrow space, you can move n spaces left, right, up, or down, where n is the number of spaces indicated on the square a move begins. (ignore the positive and negative signs) The aim is to land in the center circle. (for instance, you can move 1 space from a square marked 01; 2 from a square marked two, etc.) You must stay on the board. (No flying, sorry.)

Version 2: Using the same rules for movement, keep track of a running total, adding and subtracting as you go. (for instance, you start on +1, and add 1, for a running tally of 1; moving to -3 gives a tally of -2, etc.) The aim is to have 0 points when you land in the center.

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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.

To Be or Not To Be ... (A Math/Stats/CS Major or Concentrator)

What: The MSCS Department's annual gala
This year with a **scavenger hunt** and **Prizes!**

When: Wednesday, October 21, 2009 7:00-8:30pm

Where: Regents Hall of Mathematical Sciences

Who: You (and your friends, roommates, pets,...)

Why: Because you love (or will soon) the mathematical way of life

It's time for the MSCS department gala celebration of **why** mathematics (and its relatives) should be part of your life and **how** you can make that happen.

We will

- show off our beautifully renovated building
- show how to put together **MSCS majors/concentrations** that complement your other interests
- show which courses go well with **other majors**
- show you some of the **special course offerings** in MSCS
- show you the different parts of the MSCS program (**math, stats, cs, math ed**)
- introduce **MSCS faculty** and **staff**.
- **feed** you (**popcorn and ice cream sundaes!**)

This is a great time to ask that burning question about how mathematics, statistics, and computer science fit your interests and academic plans.

Be there!

Paul Zorn

Chair, Department of Mathematics, Statistics, and Computer Science