

# MSCS



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

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## Weekly Colloquium

Title: **Integer Partitions:  $1 + 1 = 2$  and the Subtleties Therein**

Speaker: Brandt Kronholm, St. Mary's College of Maryland

Date: Tuesday, April 26

Time: 1:30pm

Location: RNS 390

The partitions of a number are the ways of writing that number as a sum of positive integers. For example, the five partitions of 4 are:

4,  $3 + 1$ ,  $2 + 2$ ,  $2 + 1 + 1$ , and  $1 + 1 + 1 + 1$  and we write  $p(4) = 5$ .

How do we compute  $p(n)$  for any natural number  $n$ ? Euler developed several methods for computing partition numbers, but they aren't really formulas. One formula is less than 100 years old and you wouldn't believe it even if you saw it. Another formula is only a few months old.

The restricted partition function  $p(n, m)$  enumerates the number of partitions of a non-negative integer  $n$  into exactly  $m$  parts. For example, the two partitions of 4 into exactly 2 parts are  $3 + 1$  and  $2 + 2$  and we write  $p(4, 2) = 2$ . Moreover,  $p(n, m)$  is like a little brother function to the unrestricted partition function  $p(n)$  in that  $p(n) = p(n, 1) + p(n, 2) + \dots + p(n, n)$ . Is there a formula for  $p(n, m)$ ?

Around the same time that the formula for  $p(n)$  was formulated, the great Indian

genius Ramanujan observed that  $p(n)$  had unexpected divisibility properties:

$$p(5n + 4) \equiv 0 \pmod{5}$$

$$p(7n + 5) \equiv 0 \pmod{7}$$

$$p(11n + 6) \equiv 0 \pmod{11}$$

Fifty years later one more divisibility property modulo 17 was discovered. Are there any others? Does  $p(n, m)$  have similar divisibility properties?

This talk will introduce the theory of partitions from the ground up and segue into a discussion of classic and recent results on divisibility properties for  $p(n, m)$  and  $p(n)$ . The content of this talk will be accessible to students who have had or are currently taking calculus.

## Kleber-Gery Lecture Thursday, April 28

Every year the Departments of Economics and MSCS invite a prominent scholar to campus to give the Kleber-Gery Lecture, a special evening lecture for students and faculty from both departments. The lecture is funded by the Kleber-Gery Lecture Fund, established by an alumnus of St. Olaf College in honor of Professors Emeriti Richard Kleber and Frank Gery. This year's speaker is Dick DeVeaux from William College, who will be giving both a general lecture as well as a special joint MSCS-Econ colloquium talk. Both talks will be on Thursday, April 28.

## About the Kleber-Gery Speaker

Dick DeVeaux is a professor at Williams College (<http://www.williams.edu/go/math/rdeveaux/>). As he mentions on his webpage: "I am an applied statistician interested in data mining methodology and its application to problems in science and industry. These methods include artificial neural networks, and such techniques as decision trees, MARS, and boosting algorithms such as MART. I am also interested in model selection and other problems for large data sets." Dick is an engaging public speaker, and he has great examples from numerous consults and short courses he has done with major companies. In the true liberal arts spirit, he also teaches a dance course periodically at Williams, given his background as a professional dancer.

## MSCS - Econ Colloquium

Title: **Data Mining: Under the Hood**  
 Speaker: Dick DeVeaux, Williams College  
 Date: Thursday, April 28  
 Time: 3:30pm  
 Location: RNS 410

Data mining has been defined as a process that uses a variety of data analysis and modeling techniques to discover patterns and relationships in data that may be used to make accurate predictions and decision. Statistical inference concerns the same problems. Are the two really different? Through a series of case studies, we will try to illuminate some of the challenges of data mining and highlight some of the differences between data mining and traditional statistical analysis. Recently, effort has been focused on the ensemble methods of bagging and boosting that combine lots of smaller models. We'll describe some of the recent developments in these areas and illustrate their use via some case studies.

## Kleber-Gery General Lecture

Title: **Data Mining: Fool's Gold? Or the Mother Lode?**  
 Speaker: Dick DeVeaux, Williams College  
 Date: Thursday, April 28  
 Time: 7:00pm  
 Location: TOM 208

Can government agencies really track what you are doing? Do credit card companies know what you are going to purchase before you do? And what about social networks; how much of your information do you want available – and what are they doing with it? In this talk for the general public, Dick DeVeaux will share some of his experiences as a data mining and statistical consultant for groups as varied as American Express, the National Security Agency, and the offices of the Attorney General of Vermont and the Comptroller's Office of NY State. We'll talk about the methods analysts use to mine these large data repositories, what the limits are, and what the future might hold.

Coffee and Dessert Reception to follow around 8:00 PM outside TOM 280.



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