

MSCS Mess

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

October 23, 2015

<http://wp.stolaf.edu/mscs/mscs-mess/>

Volume 44, No. 6

Some MSCS Interim Courses

Math 382: Cryptology and Coding Theory

Instructor: Kay Smith

Cryptology and Coding Theory both deal with the transmission of information. Cryptology focuses on how to make communications secure. Historically cryptology was important in military and diplomatic affairs. While these applications remain important today, cryptology also underpins electronic communication. Coding theory involves detecting and correcting errors when information is sent over a “noisy” channel, for example, sending messages to a satellite. In this course we will study mathematical methods for creating and deciphering secret messages and for adding redundancy to messages to enable error correction. The prerequisite is Number Theory (Math 239) or Abstract Algebra I (Math 252). For purposes of the IMAP, the course can sequence with either of the prerequisites.

Education 170: Schools & Communities (first-years and sophomores only, satisfies MCD)

Are you interested in becoming a math teacher? Have you thought about it, but are unsure if it's the right career path for you? If you've answered "yes" to either of these questions, consider this course. In this course, you'll spend time in the Twin Cities being part of a middle or high school mathematics classroom. You'll participate as tutors and classroom assistants during the school day and then assist in various after-school and community programs. This course is appropriate for anyone with a curiosity or

interest in teaching, especially in the urban setting. There is a pre-registration process, so if you're interested in taking the course, please contact Prof. Matsuura (matsuura@stolaf.edu) as soon as possible.

Some MSCS Spring Courses

Math 340: Complex Analysis

Instructor: Marju Purin

In this course we revisit familiar concepts from calculus (limit, derivative, integral, series) in the setting of complex numbers. We will discover that complex-valued functions of a complex variable have surprisingly interesting behaviors that make the study of these functions quite exciting and imaginative (but certainly not imaginary!). Prerequisite: MATH 220, and MATH 226 or MATH 244.

Math 382: Differential Geometry

Instructor: Joe Benson

In Euclidean geometry, the objects of interest are points, lines, planes, circles, and the like. Differential geometry incorporates the ideas from calculus and linear algebra to study the infinitely more complicated and diverse geometric objects of curves, surfaces, and higher dimensional analogues. A notion fundamental to these objects is curvature, a quantifier of the bend of the object. Gauss defined the curvature of a surface in 1831, and 20 years later, Riemann generalized this idea to objects of more than 3 dimensions. It was

Riemann's influential work that Einstein studied in order to develop his theory of general relativity!

Selected topics will include the geometry of curves in R^3 , Frenet-Serret frames, Gauss and mean curvatures of surfaces, minimal surfaces, geodesics, and the Gauss-Bonnet Theorem. If there is time, we will look at higher dimensional considerations of the preceding constructions. Calculus 2 and Linear Algebra are prerequisites. Ideas from Multivariable Calculus (such as parametrized curves and surfaces) and Differential Equations, would be helpful, but are not required.

Math 364: Combinatorics
Instructor: Tina Garrett

How many ways are there to run up a flight of stairs if you can take them one or two at a time? How can you prove a deep mathematical theorem with only a picture? Who was this Ramanujan guy we hear about all the time? Take Math 362 to find out!

This grueling but awesome course covers basic enumeration, including generating functions, recursion, and the inclusion-exclusion principle. Basic combinatorial objects such as set partitions, permutations, integer partitions, and posets are discussed. Making conjectures and proving theorems combinatorially are emphasized. Prerequisite: MATH 252. Come talk to Professor Garrett if you have any questions about the course.

Math 282: Latent Variables Modeling
Instructor: Jess Bestrashniy

Latent variables methods can be used in a number of settings such as summarizing haplotypes in statistical genetics or determining a measure of self-efficacy in psychological science research. These methods allow us to combine measured variables in a way that accounts for shared information (i.e. correlation) that they contribute to a given mathematical or statistical model. These methods are most often used in settings where combining predictors is preferable to achieve model parsimony or to reflect some underlying construct that is in and of itself difficult to measure, such as self-esteem or anxiety. In this class, we will learn the theory behind

the methods most commonly used in latent variables modeling as well as apply those methods using real-world data and R and Mplus.

This special topics course count towards both the mathematics major and the statistics concentration. Prerequisite: Math 220 and introductory statistics, or permission of the instructor

Education 290: Educational Psychology
(satisfies HBS, sophomores and above only):

Are you interested in becoming a math teacher? Have you thought about it, but are unsure if it's the right career path for you? If you've answered "yes" to either of these questions, consider this course. Students study theories of and research into human behavior, growth, and development. Through lectures, discussions, case studies and field experiences, students analyze the impact of applied psychology upon schools, teachers, and students. Students also examine the interaction between individual characteristics and needs and political, economic and philosophical issues confronting contemporary American students. Required 20-hour field experience.

FNSM Halloween Party!

Next Friday, Oct 30, at 3 p.m. there is going to be the FNSM Halloween Party. It is called Reverse Trick or Treating - meaning that the Faculty will be coming to the students to give them candy.

Faculty will be parading through RNS in costume handing out candy to whomever is in the building. They will make their way up to the 4th Floor Atrium and join everyone for some Cider and Popcorn. This is in combination with a couple of organizations, who also will have cookie decorating going on too!

MSCS vs. Natural Sciences
Capture the Flag

Next Thursday, Oct 29, 8-9 pm, MSCS students get a chance to take on the natural sciences

students in a historic Capture the Flag game. We will meet outside the main entrance to Regents (by the plaza). Come join the MSCS Force!

Winners of To Be or Not to Be Raffle

The winners of the large Pause pizzas:

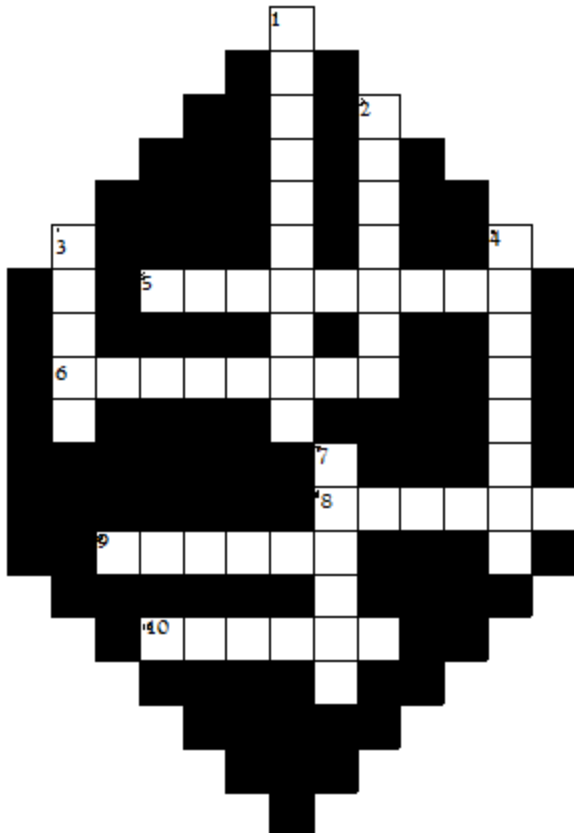
- Caroline Loe
- Olaf Sunleaf
- Sydney Geiger
- Sydney Grossman
- Kyla Pohl

The winners of the BSME Rubik's Cubes:

- Nick Rekuski
- Andrew Petterson

From the Editor

History of Math Crossword
(Solutions next week)



- | Across |
|--|
| 5. Inventor of a famous sequence of numbers. |
| 6. Female mathematician interested in Babbage's analytic engine. |
| 8. A branch of geometry is named after him. |
| 9. Invented "bones" used in mathematical calculations. |
| 10. Invented the first digital calculator and a famous triangle. |

- | Down |
|--|
| 1. Greek who contributed a great deal to trigonometry. |
| 2. Envisioned the first mechanical computer. |
| 3. Made a connection between logic and algebra. |
| 4. Best known for his Theory of Relativity. |
| 7. Contributed to number theory. |

Copyright ©2000 Gisele Glosser. All Rights Reserved.
<http://www.mathgoodies.com>

Editor-in-Chief:	Akina Khan
Faculty:	Thomas Rogers
Mess Czar:	Patty Martinez

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

If you wish to receive a digital copy of the MSCS Mess every Friday, e-mail martinep@stolaf.edu or check it out online!