

MSCS Mess

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St. Olaf College, Northfield, MN 55057

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Math vs. Bio Capture the Flag

The **Third Annual Math vs. Biology Capture the Flag** event will be taking place on the quad this Friday, October 24th. Team Math will wear red and Team Bio will wear green. Meet on the front lawn of Regents at 7pm to help the math department continue its winning streak!

Fall Speaker Colloquium presented by Pi Mu Epsilon

There is going to be a Fall Speaker Colloquium on Monday, November 17th, organized by Pi Mu Epsilon. The speaker is one of our very own MSCS professors! A clue about the identity of the professor will be released in each week's Mess. Here are the clues so far!

1. This MSCS professor prefers blackboards over whiteboards.

2. This MSCS professor's favorite fall activity is to shuffle his or her feet through the leaves.

Cast your guess on the the 3rd floor of RMS!

Remember your IMaP Forms!

Any one listed as a math major needs to make sure that you have submitted an IMaP (Individualized Mathematics Plan) form. An IMaP outlines a complete, coherent program of study consistent with the goals of the individual student. The courses included in a student's IMaP are determined after consultation with an MSCS faculty member and approved by the department chair.

You can find the form online on the Math website under forms or stop by RMS 307 and pick one up.

Seniors should ensure this is done before registration begins and it is not too early for juniors and sophomores to have this form submitted as well.

Forms should be turned in to the MSCS main office, RMS 307.

Problem-Solving Group

The problem-solving group will be meeting again on Monday, from 6:00 to 7:00 pm in RNS 206. Everyone is welcome and we hope to see you there. If you are interested in problem-solving but can't make it to the meeting, you can find the problem sets and solutions on the group's website: <http://pages.stolaf.edu/diveris/category/problem-solving/>.

Upcoming Course Descriptions

Still not sure what courses to take this Interim or next semester? Here are a few of the MSCS-related options being offered. Note that this is *not* an exhaustive list. More courses can be found online.

Interim

- CS 300: Parallel and Distributed Computing
- Educ 170: Urban Schools and Communities
- Math 220: Linear Algebra
- Math 390: Practicum

Spring Semester

- Bio 291A: Exploring BioMath
- CS 251: Software Design and Implementation
- Educ 290: Educational Psychology
- Math 236: Mathematics of Biology
- Math 340: Complex Analysis
- Math 352: Abstract Algebra II
- Math 382A: Algebraic Combinatorics
- Math 382B: Analytic Functions
- Math 396: Directed Undergraduate Research

Interim Classes

Parallel and Distributed Computing

Most software is written as if computers still had only one core circuit for carrying out machine instructions even though laptops, desktops, and even smart phones typically have at least 2-8 cores each. This is because so many software developers never learned about parallel computing (e.g., having multiple cores) and distributed computing (e.g., cluster or cloud computing). But now training in PDC has become a standard expectation of a CS major education. This course provides you with the understanding and hands-on experience you need for programming and using parallel and distributed computing. Besides mastering concepts and programming these technologies yourself, you will learn programming patterns that professionals use to solve problems with PDC, in the context of useful applications to other fields.

Prerequisite: CS 251, or permission of instructor. Counts as a “Systems” core course or an elective in the CS major. Note: This is the last CS elective that will be offered in 2014-15, and PDC isn't planned again until 2017-18. For more info, contact Dick Brown (rab@stolaf.edu).

Urban Schools and Communities

For those interested in math education, this course is a good way to explore teaching. You'll spend time in the Twin Cities being part of a middle or high school mathematics classroom. Students participate as tutors and classroom assistants during the school day and then assist in various after-school and community programs.

The course is open to first-years and sophomores only, with no prerequisite. It satisfies the MCD requirement. For those pursuing a teaching license, it counts towards your Interim field-experience requirement. 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.

Linear Algebra

This is the same linear algebra course that your peers took during the semester, but you'll have much more fun studying systems of equations and vector spaces during January in Minnesota. Despite what the Class & Lab says, the class will typically meet 10:40-12:00, then again 1:00-3:00, sometimes only 4 days per week. It may seem like a long time to be in math class, but it goes by quickly and you're sure

to have a good time. Professor Dietz will lecture a little, you'll do problems, play cards, Professor Dietz will lecture a little more, you'll do problems, everyone will have tea and cookies, etc. Please sign up! For more info, email Jill Dietz (dietz@stolaf.edu)

Math Practicum: Real Math in the Real World.

The Mathematics Practicum (Math 390) is an interim course that gives you the chance to work on real life math problems in cooperation with local (Twin Cities and Rochester) companies and nonprofit organizations. The course typically begins with a visit to the offices of the sponsoring organization, a chance to meet the people with a serious interest in the problem. Three weeks of hard on-campus work on the problem follow. The course ends with group presentations given to executives at the company offices.

The entire course is an intense group project. Groups of between four and six students work on one problem that is separate from the problems being tackled by other groups. The course faculty will be helpful, meeting with each group daily, but will not be actively engaged in the research. Faculty will be present at, but will not participate in, the final presentation to corporate personnel. The course involves hard work, but is unusually satisfying.

The course is primarily intended for junior and senior mathematics majors. Enrollment is limited to approximately 15 students. Admission to the course is by permission of the course faculty (Professors Vandiver and McKelvey). Watch your email and the Mess for details on the application process, which will begin shortly.

If you want to learn more about the course, or the interview process, please contact either Prof. Vandiver or McKelvey. (vandiver@stolaf.edu or mckelvey@stolaf.edu)

Second Semester Classes

Exploring BioMath

Interested in mathematics and biology? Wondering what each subject can contribute to the other? This spring there is a 0.25 credit course entitled Exploring BioMath that addresses these questions in a very low intensity environment. The class meets Thursday evenings for two hours, from 7:00pm to 9:00pm. Faculty from Mathematics, Computer Science, Biology, Chemistry and Physics each teach one to two week segments of the course, giving students a very broad idea of how mathematics and biology inform each other. Each segment is typically organized around

a journal article and a specific application of mathematics to a problem in biology. Topics vary from year to year and have, in the past, included cyclical population explosions in forest pests, evolution of virus strains, and how a single neuron influences decision making. The prerequisites for the course are two: at least one semester of college level biology at St. Olaf or elsewhere, and mathematics through the 1st term of calculus. If you have questions about the Exploring BioMath course, please feel free to contact Becky Vandiver or Steve McKelvey (vandiver@stolaf.edu or mckelvey@stolaf.edu).

Software Design and Implementation

CS 251 serves two key purposes: it provides you with programming proficiency in the C++ language (looks great on a resume) and experience in creating software that is useful for advanced work in almost any field; and it serves as the primary prerequisite for most other CS courses, especially because of its intensive and rewarding final team project. Its a substantial yet fun course to take, taught primarily through group puzzle activities, hands-on programming homework/labs, and the project. Whether its the last (maybe only) CS course you take or the pivotal course in your CS major, SD gives you the valuable skills and experiences you need to create useful software. Two sections of SD are being offered in Spring 2015 **only**, to clear out the backlog of demand.

Prerequisite: CS 121 or 125, or Physics 130, or Math 252, or prior programming experience, or permission of instructor. For more info, contact Dick Brown (rab@stolaf.edu).

Educational Psychology

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.

Anyone interested in becoming a math teacher, or taking a fun class and getting an HBS credit should consider the course. It offers a nice introduction to the Education Department and to the world of education in general. You'll also get some "field experience," where you'll spend some time in actual schools. You really can't go wrong!

The course is only open to sophmores and above. If you have any questions, contact Prof. Matsuura (matsuura@stolaf.edu).

Mathematics of Biology

The interdisciplinary field of mathematical biology combines experiment, mathematical theory, statistics and computation to better understand biological systems. In this course you will engage in all of these areas by collecting data and implementing the essential modeling techniques of formulation, implementation, validation and analysis. The course is taught by a mathematician with a wet-lab taught by a biologist. The labs use discrete and continuous models to study population growth, enzyme kinetics, random walks and glucose homeostasis. No prior laboratory experience is required. Prerequisites: Math 126 or 128, and Math 220. If you have questions, please contact Becky Vandiver (vandiver@stolaf.edu).

Complex Analysis

Students in this course revisit familiar concepts from calculus (limits, derivatives, integrals, series) in the setting of complex numbers. You 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. For more info, contact Marju Purin (purin@stolaf.edu).

Abstract Algebra II

If you loved Abstract I (and who didn't?), you'll love this follow-up course. The class will start by going deeper into group theory, studying group actions and the seminal "SyLOW Theorems." Then you'll go deeper into polynomial ring theory with the goal of studying "Galois Theory," which, in part, describes the zeros of polynomials in terms of groups. This course is essential for anyone planning on going to graduate school in (pure) mathematics, and for the rest of you it'll be just plain interesting. For more info, contact Jill Dietz (dietz@stolaf.edu).

Algebraic Combinatorics

Algebraic Combinatorics is an active and growing area of mathematical research. In this course you will use methods of algebra and combinatorial techniques to study questions arising in Combinatorics, Algebra and Algebraic Geometry. Topics may include symmetric functions, reflection groups, young tableaux and finite geometries. Students interested in pursuing graduate studies in pure mathematics may be particularly interested in this course. Math 252, or permission of the instructor, is required. For more info, contact Kristina Garrett (garrettk@stolaf.edu).

Analytic Functions

This "accelerated" seminar course will cover the standard content of Math 340: Complex Analysis (see description above), but somewhat faster and in greater depth. Once the basics are in place, students will subdivide into project groups of 3 or 4. Each group will choose from a list of additional topics and projects that invite greater depth and specialization. Such topics might include complex dynamical systems, conformal mappings, and others. Participants will use technology (e.g., Mathematica) freely to manipulate and visualize objects in the complex world.

Prerequisite: Math 226 (Multivariable Calculus) and Math 244 (Real Analysis I), or permission of instructor. For more info, contact Paul Zorn (zorn@stolaf.edu).

Directed Undergraduate Research

If you are interested in finding out what mathematics research is all about, think about taking this course. The precise research topic is still undetermined, but it will be something related to algebra, so Math 252 is a pre-requisite. The course is limited to three students who will work together on the project under the guidance of Professor Dietz. If you want to know more, or already know that you are interested, send her an email (dietz@stolaf.edu).

and for Your Reading Pleasure...

a CS Joke

A programmer is at work when her husband calls and asks her to go to the store. He says he needs a gallon of milk, and if they have fresh eggs, buy a dozen. She comes home with 12 gallons of milk.

a Quote

"Only in math problems can you buy 60 watermelons and nobody asks what the heck is wrong with you" -*Unknown*

and a Riddle

What goes up a chimney down but can't come down a chimney up?

(The answer can be found in the next Mess!)

(Last week's answer: a sponge)

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