

MSCS Mess

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

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Faculty Candidate Colloquia and Seminars

The four talks below are for two Faculty Candidates that have applied for the MathBio position. Students are encouraged to attend the Colloquia and Seminars.

About the Candidate: Katie Montovan is an applied mathematician who uses modeling and analysis to better understand animal behavior, ecosystem interactions, and self-organization in biological systems. She grew up in Saint Paul, completed her BA in Mathematics at the University of Minnesota, Morris, and an MA and PhD in Applied Mathematics from Cornell University. Before graduate school she served as a research analyst at the Smithsonian Environmental Research Center for two and a half years. During graduate school, she taught over a dozen sea kayaking courses using experiential education methods that continue to inform her teaching style within the mathematics classroom. She is currently an assistant professor of mathematics at Bennington College in Vermont.

Title:	When Less is More: mathematical models explain surprisingly low parasitism rates for a Finnish wasp.
Speaker:	Katie Montovan
Date:	Monday, February 15
Time:	3:30 pm- 4:30 pm
Location:	RNS 310

About the talk: Imagine you are a wasp that parasitizes butterfly eggs, and that you have found a cluster of 200 host eggs that are ready and not parasitized. Why would you choose (or evolve genetic behavior) to parasitize less than all of the eggs? This is a puzzling question, but add to it that the wasp avoids previously parasitized clusters and the motivation seems downright bizarre. In this talk, I will develop a set of plausible reasons it might be better for the wasp, *Hyposoter horticola*, to parasitize only a third of each host egg cluster it encounters. I will then explain how we used mathematical models and field and lab studies to test each hypothesis and rule out all but one theory in order to explain this behavior. *Cookies and Conversation before colloquium.*

Title:	Using Mathematical Modeling to Understand Animal Behavior
Speaker:	Katie Montovan
Date:	Tuesday, February 16
Time:	1:20 pm- 2:30pm
Location:	RNS 206

About the talk: Mathematical modeling, simulation, and analysis are valuable tools for answering biological questions about evolution, self-organization, and complex ecosystem interactions. For each biological question the appropriate mathematical tools must be carefully employed in order to produce meaningful results. In this talk I will present several of my recent projects to illustrate the process of taking

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a biological problem and making it into a mathematical one, the mathematics used to answer the question, and the biological meaning of the results. I will discuss self-organization in honeybees, evolved behaviors in parasitic wasps and potato beetles, and complex population dynamics in coral reef ecosystems.

About the Candidate: Eric Eager is currently an assistant professor at the University of Wisconsin - La Crosse. He received his PhD in Mathematical Biology from the University of Nebraska - Lincoln in 2012. His research interests include theoretical ecology, stochastic processes, dynamical systems and the scholarship of teaching and learning in the interdisciplinary classroom. In his spare time he enjoys reading nonfiction books, watching documentaries, sports analytics and (chiefly) spending time with his wife Stephanie and their two children, Madeline and Chloe.

Title:	Stochastic Population Dynamics
Speaker:	Eric Eager
Date:	Wednesday, February 17
Time:	3:30 pm- 4:30 pm
Location:	RNS 310

About the talk: Environmental and demographic stochasticity impact the dynamics of all biological populations. Environmental stochasticity, spatiotemporal fluctuations in life history originating from variability in factors such as precipitation, temperature and nutrient availability, generally acts similarly on individuals within similar age and/or stage classes. Demographic stochasticity, originating from the variability in demographic events such as survival, growth and reproduction, acts on similar individuals in different, unpredictable ways. While a complete analysis of population dynamics will acknowledge both sources of variability, different mathematical tools are needed to understand the effects of these distinct forms of stochasticity. In this talk we use various techniques from probability theory to study simple population models incorporating both environmental and demographic

stochasticity. *Cookies and Conversation before colloquium.*

Title:	Modeling, Analysis and Simulation of a Stochastic Population Model for a Disturbance Specialist Plant Population and its Seed Bank
Speaker:	Eric Eager
Date:	Thursday, February 18
Time:	11:30am- 12:30pm
Location:	RNS 206

About the talk: Stochastic models are essential to understanding the population dynamics of plant species that use delayed reproduction to combat environmental uncertainty. One such species is wild sunflower (*Helianthus annuus*), which is a disturbance specialist plant - its seeds do not germinate in the absence of soil disturbance. These soil disturbances can be modeled as a stochastic process, which gives rise to a nonlinear stochastic integral projection model for the population density of *H. annuus* and its seed bank. In this talk I derive and analyze this model, and show that it predicts population dynamics that converge to an invariant probability measure either completely concentrated on the extinction state or completely excluding the extinction state. I will then show through simulation studies the sensitivity of this measure to changes to the soil disturbance profile.

Exploring Biomathematics

Are you interested in knowing more about how math is applied in the sciences, in particular biology? If so, it's not too late to sign up for Bio 291 A: Exploring Biomathematics. It is a 0.25 credit Thursday evening class (7-9pm) designed to introduce math applications in a fun low key manner. It is taught by faculty at the interface of math, stats, biology, some chemistry and even a touch of physics We read something interesting that can be solved by a little fun math... so a place to play intellectually and learn ways to apply your knowledge AND get to know many professors in a low key situation. Attendance and participation are the

key factors. For more information contact Anne Walter or Kay Smith.

Mathematics Education in Budapest!

Budapest Semesters in Mathematics Education (BSME) is a semester-long program in Budapest, Hungary, designed for those interested in teaching middle or high school mathematics. BSME is specifically intended for students who are not only passionate about mathematics, but also the *teaching* of mathematics.

You do *not* need to be enrolled in a teaching program (like our Math Education Program) to apply to BSME. Come enjoy a shared experience with other passionate future teachers, forming a rich support network and professional community that will extend beyond your time in Budapest.

For more details, see bsmeducation.com or contact Ryota Matsuura (matsuura@stolaf.edu). **Act now, since the application deadline for semester/ year off-campus study in 2016-17 is Monday, February 29.**

Konhauser Problemfest

Calling all problem-solvers! The chance to bring the coveted Pizza Theorem Trophy back to St. Olaf is upon us. This year's Konhauser Problemfest will take place Saturday, February 27, 9:00-12:00 at Macalaster College. Teams from St. Olaf will compete with teams from Carleton, Macalaster, and St. Thomas in this fun problem-solving contest. Lunch will be provided immediately after the contest and it provides is a great opportunity to meet math majors from nearby colleges. If you are interested in this contest, please let Prof. Diveris or Prof. Wright by Monday, 15 February.

Math REU Opportunity

Are you interested in either algebraic geometry or probability theory? Would you like to

research this summer? Then consider the Purdue Research Research in Mathematics Experience (PRiME), a new summer research program for undergraduate students to be held at Purdue University. Applications are being accepted now through March 11.

For more information, see:

<http://tinyurl.com/prime-reu>. Many other Research Experiences for Undergraduates (REUs) are now accepting applications for summer 2016, though application deadlines are quickly approaching! To discover REUs that might interest you, see the following sites: <http://www.ams.org/programs/students/emp-reu> http://www.nsf.gov/crssprgm/reu/list_result.jsp?unitid=5044 <https://sites.google.com/site/mathreuprograms/>

MSCS T-Shirt Design Contest 2015-16

Do you want to own an MSCS memorabilia from this academic year?

Do you want the bragging rights to the design of said memorabilia?

Then look no further!

PME is looking for YOUR designs for this year's official MSCS t-shirt.

Submit a t-shirt design that incorporates an MSCS theme to pmehs@stolaf.edu or to khan@stolaf.edu by FEBRUARY 19, and you might just be the one whose design is immortalized on the official MSCS t-shirt for this academic year!

From the Editor

A team at the University of Central Missouri has found the newest prime number: $2^{74,207,281} - 1$. It has over 22 million digits. The new record has broken the old record by approximately 5 million digits.

Read more at: <http://phys.org/news/2016-01-largest-prime.html#jCp>

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