

# MSCS MESS

Department of Mathematics, Statistics, and Computer Science

St. Olaf College, Northfield, MN 55057

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## Monday's Colloquium

Title: Bayesian Models for Analysis of Airborne Chemical Exposures During the Deepwater Horizon Oil Spill Response and Clean-up Efforts  
Speaker: Caroline P Groth '12  
Time: Monday, April 24, 3:30pm  
Place: RNS 310

**About the talk:** In April 2010, the Deepwater Horizon oil rig caught fire and sank, sending approximately 5 million barrels of oil into the Gulf of Mexico over the ensuing 3 months. Thousands of workers were involved in the response and clean-up efforts. Many harmful chemicals were released into the air from crude oil, including total hydrocarbons (THC), benzene, toluene, ethylbenzene, xylene, hexane (BTEXH), and volatile organic compounds (VOCs). NIEHS's GuLF STUDY investigators are estimating the exposures the workers experienced related to the event and evaluating associations between the exposures and detrimental health outcomes.

My research focuses on developing statistical methods to quantify airborne chemical exposure in response to this event and other settings in environmental health. Factors complicating the exposure estimation include analytical method and data collection limitations. All analytical methods used to measure chemical concentrations have a limit of detection (LOD), or a threshold below which exposure cannot be detected with the analytical method

(measurements below LOD are called censored measurements). However, even these small exposures must be assessed to provide the most accurate estimates of exposure. Similarly, due to the scope of this event, it was not possible to take measurements in all scenarios where workers were involved in the response.

In this talk, I describe a Bayesian model used to quantify exposures under possible LOD censoring in both the chemical response and chemical predictor. Then, I briefly describe how we used a database of over 26 million direct-reading VOC area measurements to supplement our exposure information for THC. Finally, I conclude with possible avenues for future research in environmental health and exposure assessment.

**About the speaker:** Carrie, a Ph.D Candidate at the University of Minnesota's Division of Biostatistics, graduated from St. Olaf in 2012, where she was a psychology major and Center for Interdisciplinary Research (CIR) Fellow. Carrie will be defending her dissertation this summer before starting a 2-year postdoctoral research fellowship at Northwestern University.

## Thursday's Research Seminar

Title: Evolutionary Dynamics of Cancer  
Speaker: Jasmine Foo  
Time: Friday, April 27, 7:00pm  
Place: RNS 410

**About the talk:** Cancer initiation, progres-

sion and treatment can be described as a complex evolutionary process occurring at the level of cells in the body. Mathematical models of this process can yield useful insights into the mechanisms causing cancer and also suggest possible treatment strategies. In this talk I will introduce some basic mathematical models of cancer evolution, and describe some applications to the design of treatment strategies.

### Friday's Research Seminar

Title: A Universal Taylor Series  
Speaker Joe Benson  
Time: Friday, April 28, 3:40pm  
Place: RNS 204

**About the talk:** Built on a set of five axioms, Euclidean geometry as presented in Euclid's Elements laid the foundation for how mathematics and geometry were to be studied and understood for the next 2000 years. However in the 19th century, new geometries appeared, consistent under their own sets of axioms, and totally independent of Euclidean geometry. This led to dramatic new ways of thinking about geometry and the physical world, exemplified by the works and ideas of Bernhard Riemann, Felix Klein, and Sophus Lie. This talk will

provide an accelerated history of these geometric developments, and then touch on the roles these ideas play in modern mathematics and my research in particular.

**About the speaker:** Joes mathematical interests lie in Lie groups, mathematical physics, geometric flows, and integrable equations. When he is not teaching, prepping, grading, exercising or spending time with his family, he likes to dabble in these research interests.

### MSCS Recital

This year's MSCS Recital is scheduled for 7:00pm on Wednesday, April 26<sup>th</sup> in Ytterboe Lounge, and we are looking for students and faculty to contribute acts. Contact Ellen Haberoth (habero1@stolaf.edu) if you are interested. Spectators are more than welcome, too!

### Senior Salute questionnaire

Seniors, please make sure to respond to the Senior Salute questionnaire sent out by Ellen Haberoth this week—the questions are very short, and we would like to use the information to recognize your hard work and exciting futures!

*To submit an article or event for publication in the Mess, email brooke@stolaf.edu; to receive the Mess digitally each Friday, email freking@stolaf.edu; visit <http://wp.stolaf.edu/mscs/mscs-mess/> for a digital archive of previous MSCS Mess issues.*

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