# News@Math&Stat

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## *Welcome* by Department Chair Nagaraj K. Neerchal

Welcome to the Fall 2012 Mathematics and Statistics Department Newsletter. Here you will find updates on the goings-on in our department from the summer and fall semester. We had a number of successful promotion and tenure decisions, 3rd year contract renewals, and 1st reviews. Congratulations to these faculty members and thanks to the department's P&T committee members and chairs of various subcommittees. I want to particularly mention the staff, **Mrs. Deneen Blair** and **Mrs. Janet Burgee**, for providing excellent administrative support for the entire process.

Our long term colleagues Drs. Sue Minkoff and John Zweck have moved to University of Texas, Dallas. Their contributions to the department will be missed. We wish them well.

We've had an exciting semester so far, which included welcoming a new faculty member to our team, hosting our annual REU Site program, and celebrating the holidays with family and friends. Thank you to everyone who made this a successful semester.

## *Please Welcome our New Faculty Member: Dr. Brian Dean*



This fall, a new lecturer joined our department: Dr. Brian Dean.

**Dr. Brian Dean** comes to UMBC from Salisbury University. He grew up in Finksburg and attended Westminster High School. He received a B.S. in Mathematics from the University of Notre Dame in 1999 and is a member of Phi Beta Kappa. He earned an M.A. and Ph.D. in Mathematics from Johns Hopkins University, finishing his doctoral dissertation in the field of minimal surfaces in 2004 under the guidance of Dr. William Minicozzi. After a two-year postdoctoral position at the University of Rochester, he spent six years as a Lecturer and Assistant Professor at Salisbury University, prior to joining our department this fall.

## *News from the Graduate Program*

Congratulations to **Michelle Danaher** and **Zhong Gao** for completing their Ph.D. studies in Statistics in December Good luck to you both!

We also want to congratulate the following students who have completed their Master of Science degrees in Applied Mathematics or Statistics in August and December 2012! Students who graduated in August include: **John Burghardt** (Math), **Joshua Betz** (Stat), **Brandon Fleming** (Stat), and **Jia-Ern Pai** (Stat). Students who graduated in December include: **James Beam** (Math), **Xuan Huang\*** (Math), **Karendeep Kaur** (Stat), **Peter Linton\*** (Stat), **Elizabeth Murrin** (Stat), **Pavan Potharaju** (Stat), and **Navy Sushon** (Stat). The students with asterisks beside their names will be continuing their studies in their respective Ph.D. program.

And to all of our incoming graduate students, congratulations on acceptance and welcome to our program! We look forward to meeting you in the spring.

### *News from the Undergraduate Program* by Undergrad Program Director, Dr. Matthias Gobbert

The undergraduate programs in Mathematics and in Statistics continue to grow in the wide range of upper-division courses offered. In August and December 2012, we had six and ten graduates, respectively. Of our six graduates in August, two graduated with a B.A. in mathematics and four graduated with a math B.S. degree. In December, we had four math B.A. and six math B.S. degrees awarded. **Andrew Coates** (B.S), **Steven Deutsch** (B.A), and **Aleksander Kaplan** (B.S) were awarded Magna Cum Laude honors in the December graduation.

Also to note, in Spring 2012, we had four students complete the Math 497 Senior Thesis to graduate with departmental honors. These students were **Kimberly Daniels** (mentored by **Dr. Kathleen Hoffman**), **Ecaterina Coman**, **Robert Forder**, and **Randal McKissack** (all mentored by **Dr. Matthias K. Gobbert**).

### *CIRC Activities:  Fall 2012*

The Center for Interdisciplinary Research and Consulting (CIRC) is the primary consulting organization within the Department of Mathematics and Statistics at UMBC. CIRC is dedicated to supporting interdisciplinary research for both the UMBC campus community and the general public, and provides access to students and faculty for mathematics and statistics consulting projects. Beyond aiding our clients, CIRC offers mathematics and statistics students with valuable consulting experience that makes them attractive candidates for industry and academia jobs. CIRC is directed by **Drs. Nagaraj Neerchal** and **Matthias Gobbert**, with executive director **Dr. Liz Stanwyck**, research assistants **Jonathan McHenry** and **Brittney Henegar**, and affiliated students **Xuan Huang** and **Andrew Raim**.

This fall, CIRC continued its series of free software workshops including SAS, SPSS, MS Excel, MS Access, MATLAB. These workshops are in cooperation with the UMBC Division of Information Technology, and were led by Mathematics and Statistics graduate students **Brittney Henegar**, **Xuan Huang**, **Jonathan McHenry**, and **Nur Shahir**. CIRC also organized a COMSOL Multiphysics workshop delivered by staff from COMSOL.

CIRC was actively engaged in consulting projects with other departments including Psychology (analyzing levels of depression and stigma toward counseling services), Information Systems, Mechanical Engineering, Chemistry, and outside organizations including NASA. CIRC continued to host weekly social hours, in which graduate students and faculty have the opportunity to network with guest speakers at the Mathematics and Statistics colloquia.

### *April Albertine: First NSF Fellowship Graduate Student in Department*

Third year statistics graduate student **April Albertine** was awarded the National Science Foundation's Graduate Research Fellowship this year. This fellowship provides three years of full stipend and tuition support to the awardee to attend any graduate school in the U.S. Her dissertation advisor, **Dr. Bimal Sinha**, is "proud and excited that Ms. Albertine is the first graduate student ever in our department to be awarded this most prestigious fellowship." Her Ph.D. thesis topic *A Bayesian Approach to Modeling Publication Bias in Meta-Analysis* will explore new ways of modeling and analyzing publication bias, which is a significant component in any meta-analysis project. April credits her experience mentoring UMBC's REU students as an important part of helping her win the fellowship, as it gave her tangible research experience to strengthen her application.  April hopes to work in an international statistical capacity after the completion of her Ph.D.

## *News from the SIAM Student Chapter* by President Jonathan McHenry

At the beginning of the fall semester, UMBC's math and statistics students who attended the SIAM Student Chapter's first meeting elected new officers. This year's officers include: **Joshua Austin** (Secretary), **Peter Linton** (Treasurer), **Zois Boukouvalas** (Vice President), and **Jonathan McHenry** (President). We also would like to welcome our new chapter faculty advisor, **Dr. Andrei Draganescu**, and thank our longstanding Webmaster **Zana Coulibaly**.

In October, the UMBC SIAM Student Chapter hosted a panel talk over catered lunch on how to gracefully transition from graduate school to a career. The panelists were **Drs. Bradford Peercy** and **Kofi Adragni** of UMBC's Department of Mathematics and Statistics, and **Diane Crump-Fogle**, a career specialist from UMBC's Career Center. Jonathan McHenry was the moderator. The faculty gave advice from their personal experiences, while Ms. Fogle provided advice on the services the Career Center provides. We were pleased to read in the October 2012 edition of the national SIAM newsletter a mention of our chapter's event from last spring in which we had the NSA and the UMBC Career Center send speakers for a professional development workshop. One student called the event "the most useful [workshop] ever."

Dr. Tammy Kolda, of Sandia National Labs, visited our department in December to give an applied math talk. We organized a pre-talk discussion with the distinguished Dr. Kolda over coffee in order to give students the opportunity to meet her and learn from her experience.

*Dr. Peercy shares his experiences with attending graduate students while Dr. Adragni, Ms. Fogle (top right,) and Dr. Draganescu (left) observe. Graduate students John Zylstra, Jonathan McHenry, and Nur Shahir are pictured in the foreground, left to right.*

About our organization:
SIAM is the Society for Industrial and Applied Mathematics, a national organization. The SIAM Student Chapter at UMBC is group of SIAM members who are dedicated to serving the graduate math and stat students here. To increase grad students' awareness of the outside professional world, we host semiannual professional development workshop series, contribute to the departmental distinguished speaker series, and provide information on deadlines and conferences.

## *News from the Council of Majors and Pi Mu Epsilon* by Dr. Kalman Nanes

Our departmental undergraduate student groups - the Council of Majors; Pi Mu Epsilon, the mathematics honors society; and Mu Sigma Rho, the statistics honors society - have been hard at work this fall providing our undergraduates with informative panels for advice on various aspects of both school and career.

This fall, we hosted a panel on internships with help from the Shriver Center. The panel discussed all of the basic information on internships, including why they are important, and what students need to be prepared for when applying. We also hosted a new event we called the Freshman Fifteen, a panel in which older, established majors helped our incoming freshmen and transfers in math and statistics by providing some tips and tricks for getting through their first season of finals.

We are planning many more activities for the spring, including two more informational panels on careers and graduate school, and also the launch of a new Buddy System in which incoming students will be paired with older students for peer advising as they go through their math and stat majors. Our officers have been working tirelessly to turn our student groups into the basis of a social support structure for our department's majors. I would like to recognize our officers for 2012 - 2013: **Sean Leavy**, President; **Ann Marie Weideman**, Vice President; **Sandya Lakkur**, Secretary; **Andrew Keegan**, Treasurer; and **Rachel Sandlain**, Webmaster.

We would also like to proudly announce the induction of 11 new members into Pi Mu Epsilon over the summer. We will be reviewing further applications in January.

## *News from the MSGSA* *by President Karen Kaur*

Holidays are a time for compassion, joy, and sharing the warmth of happiness by getting together with near and dear friends and family. The Math & Stat department hosted its annual holiday party on Friday December 7th to gather together faculty, staff, graduate students, and family for an evening of fun and food. The holiday party this year was put together with a lot of effort from the MSGSA committee as well as much help from the faculty and students of the department itself. This year the event was held in the Math & Stat lounge, and featured games such as Student vs. Faculty Charades which saw participation from many guests. A table of arts and crafts was arranged for the kids, who created some beautiful work by the end of the evening. A live jazz medley was provided during dinner by our own graduate student **Joshua Austin**, on bass, and his brother Marcus, who played guitar. The dinner included a variety of dishes from different cuisines such as kabobs, pepper steak stir fry, Singapore noodles, tzaziki, dinner rolls, hummus, potato salad, and many more. The colorful and bright desserts put a smile on everyone's face. The holiday party ended with a few party drinks and warm goodbyes! The MSGSA committee thanks the department staff for helping us organize this event, and all guests for making it a success!

## *Student Kudos*

- **Ms. Kimberly Daniels** completed her senior thesis `Modeling the Deactivation of the Menalopsin Phototransduction Cascade' and graduated with honors in the mathematics major. Ms. Daniels pursued this research as part of the NSF funded UBM@UMBC undergraduate training grant. She is currently pursuing a Master's degree in epidemiology at Harvard University.

- UBM@UMBC students **Drew Thatcher** and **Kevin Herold** presented their research at the Undergraduate Research Conference at the Interface of Mathematics and Biology, hosted by NIMBioS in Knoxville TN November 17-18.

## *Kudos*

- During the Graduate School Ceremony to recognize UMBC's doctoral candidates in early November, it was announced that **Dr. Anindya Roy** topped the list of being the mentor of a maximum number of doctoral candidates (four) all across the UMBC campus with five statistics doctoral candidates!

- **Dr. Manil Suri** and **Dr. Michele Osherow** from the English department have composed a series of three essays about the humanities and mathematics course they co-taught in the spring. These articles have been published in the *Chronicle of Higher Education*.

- **Drs. Bimal Sinha** and **Dr. Nagaraj Neerchal** received NSA funding for our 8th Annual Probability and Statistics Day at UMBC in 2014.

- **Drs. Matthias K. Gobbert** and **Nagaraj K. Neerchal** were awarded a $450,000 grant by the National Science Foundation and National Security Agency for three years of support for our REU Site: Interdisciplinary Program in High Performance Computing. This grant fully funds 12 participants in the 8-week program in summers 2012, 2013, and 2014. For more information, please see www.umbc.edu/hpcreu.

- **Dr. Matthias K. Gobbert** was awarded a $428,571 grant by the National Science Foundation in September 2012. This grant funds *MRI: Acquisition of hybrid CPU/GPU nodes for the Interdisciplinary UMBC High Performance Computing Facility*. Dr. Gobbert is the lead-PI for this institutional proposal with 30 investigators from 10 departments and research centers across campus. For more information, please see www.umbc.edu/hpcf.

Image Credits: A. McNulty, J. McHenry, M. Gobbert

## *REU Site: Interdisciplinary Program in High Performance Computing – Summer 2012*



Research Experiences for Undergraduates (REU) Sites are one of the main ways in which the National Science Foundation (NSF) encourages undergraduate students to pursue graduate studies and research careers. This REU Site is a unique eight week long summer program at UMBC in which students engage in an extremely intensive 3-credit course on scientific, statistical, and parallel computing that culminates in a team-based capstone project. Teams of four students select projects from a set of real-world problems presented by clients from industry, government, and other academic departments. Students have access to tara, a state-of-the-art computing cluster located in the UMBC High Performance Computing Facility (HPCF). They complete professional development workshops, a GRE prep course, and take field trips to nearby labs. Each team's research culminates in a technical report, website, and a poster presentation at the CNMS Summer Undergraduate Research Fest.

This year, the REU Site received joint funding from the NSF and the National Security Agency (NSA) for 12 participants selected from over 120 applicants. The program is directed by **Drs. Matthias Gobbert** and **Nagaraj Neerchal**, and supported by UMBC graduate students **Teresa Lebair** (a 2010 participant and current graduate student), **Jonathan McHenry**, **Andrew Raim**, **Sai Popuri**, and **Bob Forder**, and undergraduate assistant **Matthew Brewster**.



The summer 2012 program began with an extremely intensive three-credit course, MATH 447, which was essentially taught in only two-and-a-half weeks. All-day work consisted of lectures and computer labs, which allowed the teams to quickly get to know their team members before research began. Each of the three teams selected a project from among seven potential options presented by clients from industry and academia. To facilitate rapid progress in the short time available, each team is supported on a daily basis by both graduate assistants and faculty mentors.

Throughout the eight weeks, research work was complemented by professional development activities. These included presentations on: applying to graduate school by Senior Graduate Dean **Dr. Janet Rutledge**; career choices by **Dr. Ken Baron**, Director of Academic Advising; and presentation techniques by **Kathy Sutphin**, Assistant Dean of the CNMS. Participants also profited from visits by VIPs including UMBC President **Dr. Freeman Hrabowski**, UMBC Provost **Dr. Philip Rous** (photo above), Dean of the CNMS **Dr. William LaCourse**, Graduate Program Director **Dr. Muruhan Rathinam**, and NSF Fellowship recipient **April Albertine**. As an appropriate conclusion to the professional development presentations, editor of *UMBC Review: Journal of Undergraduate Research* **Ms.**



**Gagan Singh** explained the process of submitting undergraduate research for publication.

Augmenting research and professional development talks were a number of scientific field trips. First, we traveled to the SIAM Section Summer Meeting located at the University of Maryland, College Park. Participants attended scientific talks and networked with scientists and researchers. The second trip was to Advanced Computing Systems (ACS), located in the UMBC Research

Park, where David Mountain, Technical Director of the ACS Research Program for the DoD, spoke about the research conducted there and then sent the participants to meet researchers and tour their labs. Third, students visited the NSA at Fort Meade where mathematician Dr. Mel Currie gave a talk on Bayesian statistics. The fourth trip was a tour by **Randy Philipp** of the main computer room of the UMBC DoIT (photo above) where students got a first-hand view of tara, the supercomputer that they used in their coursework. The last scientific field trip was to visit BCT LLC, a HPC contractor for the intelligence community. CEO Stephen Tate spoke about the current high demand for people with HPC skills; and **Kyle Stern**, former REU Site RA and UMBC graduate, also spoke. In addition to the scientific trips, students had a social field trip to the Independence Day fireworks on the National Mall in Washington D.C.

## *REU Site Team Capstone Projects*

### <u>Team 1</u>: Graph 500 Performance on a Distributed-Memory Cluster

*Team Members*: Jordan B. Angel (East Tennessee State U.), Amy M. Flores (Grinnell), Justine S. Heritage (Dickinson), and Nathan C. Wardrip (Saint Cloud State U.).
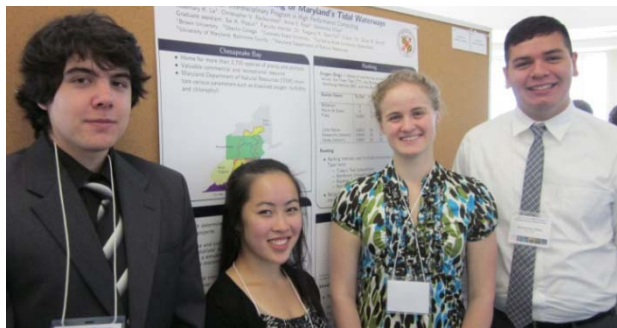*Graduate Assistant*: Andrew M. Raim
*Clients*: Richard C. Murphy (Sandia National Laboratories), David J. Mountain (Advanced Computing Systems Research Program)



This team executed the Graph 500 benchmark on the distributed-memory cluster tara in UMBC's HPCF. Based on the best result, tara was officially ranked at 98 on Graph 500 in Nov. 2012, out of 123 entries. Three undergraduate student team members, Jordan Angel, Nathan Wardrip, and Amy Flores, were able to travel to the conference at which the ranking was announced and met with faculty mentor Dr. Matthias Gobbert and client David Mountain.

### <u>Team 2</u>: Water Quality Monitoring of Maryland's Tidal Waterways



*Team Members*: Rosemary K. Le (Brown), Christopher V. Rackauckas (Oberlin), Anne S. Ross (Colorado State U.), and Nehemias Ulloa (California State U., Bakersfield)
*Graduate Assistant*: Sai K. Popuri
*Client*: Dr. Brian R. Smith (Maryland Department of Natural Resources)

To rank Maryland Department of Natural Resources (DNR) monitoring stations and to assess the health of the Chesapeake Bay and its associated tributaries, Team 2 used multiple comparison tests including Tukey's Test, Bonferroni, Benjamini-Hochberg, and Bayesian tests; and developed a GUI for visualizing DNR data.

### <u>Team 3</u>: Simulation of a University as a Dynamical System

*Team Members*: Annie Castner (Notre Dame), Jenny Louthan (Lewis & Clark), Edwardo Rivera (U. of Puerto Rico, Rio Piedras Campus), and Christian Weigandt (High Point U.)
*Graduate Assistant*: Jonathan S. McHenry
*Client*: Dr. Michael Dillon (UMBC OIR)



Team 2 created a simulation of a university as a dynamical system, and included GUI controls and visualizations that can be used by OIR to quickly run "what-if" scenarios. Statistical models for student enrollment and advancement were informed by publicly available data from OIR and the Integrated-Post Secondary Educational Data System.