News@Math&Stat

Department of Mathematics and Statistics
University of Maryland, Baltimore County

1000 Hilltop Circle, Baltimore, MD 21250, 410-455-2412, www.math.umbc.edu
Fall 2011, Volume 6, Issue 2, Editor: Angela McNulty (amcnulty@umbc.edu)

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

It is a pleasure to bring to you the Fall 2011 issue of the department newsletter. This semester, the Mathematics and Statistics Department said hello to several new faces of both faculty members and graduate students, congratulated both undergraduate and graduates students on a job well done as they completed their studies and graduated in December, saw some of our students' achievements recognized, donated food and time to a good cause, and celebrated the holidays at our annual Holiday Party. It was nice to hear back from several alumni and it is exciting to know that our alumni are reading this newsletter. Thank you to everyone who made it a successful semester!

New Additions to the Department

This semester, we welcomed three new faces to the Mathematics and Statistics Department, and welcomed back a fourth. Three new faculty members started this fall: two new assistant professors and one new lecturer. A short introductory bio can be found below for each. We also welcomed our first post-doc research associate who completed her Ph.D. from UMBC in 2008.

Dr. Yaakov Malinovsky received his Ph.D. in statistics from the Hebrew University of Jerusalem in 2009. Between 2009 and 2011, he was a visiting fellow in NICHD. Research interests include design theory, stochastic ordering, sampling, group testing, and nonparametric methods.

Dr. Kofi Adragni completed a Ph.D. in Statistics at the University of Minnesota in 2009 under the mentorship of Prof. R. Dennis Cook. He was a Visiting Assistant Professor in the Department of Statistics and Actuarial Science of the University of Iowa before joining the Department of Mathematics and Statistics at UMBC in Fall 2011. His research interests include reduction of dimensionality, multivariate analysis, regression modeling and diagnostics, and computational statistics.

Dr. Kalman Nanes completed his B.S. in mathematics at the University of Michigan in 2003, and went on to a Ph.D. at Northwestern University in 2009. His research is in Dynamical Systems, focusing on partial hyperbolicity and smooth ergodicity. He is excited to have joined our department as a Lecturer, focusing on Calculus and Linear Algebra classes. He is also interested in the development of active learning and computer-aided teaching techniques for these courses, and is currently leading the department initiative to bring active learning into the Calculus classroom.

In addition, the department also hired its first Post-Doctoral Research Associate, **Dr. Ana Maria Soane**. Dr. Soane joined our department in October 2011. Before joining UMBC, Dr. Soane was a postdoctoral fellow in the Laboratory for Modeling and Scientific Computing at the Milan Polytechnic in Italy, after earning her Ph.D. in applied mathematics from UMBC in 2008. Dr. Soane is currently working with Dr. Andrei Draganescu on multigrid methods for optimal control problems constrained by fluid flows. Her research is funded by the Department of Energy.

News from the Undergraduate Program

Congratulations to the students who graduated this fall semester! One Stat B.S. major, four Math minors, twelve Math B.S. majors, and seven Math B.A. majors were awarded degrees in December. Congratulations to the seniors who have graduated with university honors: **John Seymour** graduated Cum Laude; and **Jordan Cater** and **Kristen Steinman** graduated Magna Cum Laude.

News from the Graduate Program *by Program Directors Kathleen Hoffman and Junyong Park*

It has been a greatly successful year in recruiting. We had 14 new students (11 full-time and 3 part-time) in applied mathematics program and nine new students (8 full-time and 1 part-time) in the statistics program in the fall. We congratulate our December graduates: in applied math, **Sergey Erenburg** (MS), **Mona S. Hajghassem** (MS), **Nicole Sara Massarelli** (MS), **Sai Subhash Paruchuru** (MS), **David Stephen Stanley** (MS), and **Mattie Katharine Branine Whitmore** (MS); and in statistics, **Xiaoyu Dong** (Ph.D.), **Elizabeth Anne Murrin** (MS), **Ginto Jacob Pottackal** (MS), **Andrew Martin Raim** (MS), **Faraz Ahmad Shaikh** (MS), **Yang Yang** (MS) and **Shuyan Zhai** (MS).

Student Kudos

Sandya Lakkur, an undergraduate statistics B.S. major had an opportunity this fall to answer some questions for the CEO of Career Paths. She was asked to write down some advice she had for STEM students, as well as her struggles and successes she has experienced in the course of her major. A website was made with her responses, and the responses of other students pursuing STEM research goals. Please see the following link to view her article:
http://stemcp.com/profiles/rising-stem-stars/sandya-lakkur/

Michelle Danaher (Ph.D. Statistics) has been selected to receive one of the International Biometric Society's Distinguished Student Paper Awards for the 2012 Spring Meetings in Washington D.C. The award letter mentions that "the quality of manuscripts submitted was high and the competition was keen. In addition, we had a record number of submissions this year. It was difficult for the committee to choose among so many deserving papers." Michelle will receive her award at the beginning of the President's Invited Address session. She will also receive a travel award, free registration for the conference, one year free membership for the society, and access to their flagship journal BIOMETRICS. She will present her paper during the meetings.

UMBC Graduate Stories

Coy Herrin has been a student at UMBC since 1991 and has taken at least one class per year for all but 7 of those 20 years. He started at UMBC at about the same time many of his fellow graduates were born. For much of this time, Coy has been a manager at a distribution warehouse for a grocery store chain and so has had to juggle his coursework with his full time job and family life. His perseverance is remarkable, particularly because math courses rely so heavily on having material from prior courses at one's fingertips. Coy graduated with a B.A in Mathematics and a minor in Physics December 2011.

News from the Council of Majors and Pi Mu Epsilon *by President Lauren Won*

Internship Panel Event: Get In Before You Get Out
On Friday, December 2nd, four current undergraduate and graduate math and statistic students served as panelists to talk to about strategies to obtain an internship, the internship experience, and more to other undergraduate students. The panelists were **Sandya Lakkur** (Stat), **Jamahl Stokes** (Math), **Rebecca Goldstein** (Math), and **Joshua Austin** (Math, MS). After the Q&A session, **Casey Miller** from the Shriver Center spoke about services in the Shriver Center and other tips. The students enjoyed light refreshments while getting the chance to network at the end of the event.

News from the SIAM Student Chapter *by President Jyoti Saraswat and Dr. Jinglai Shen*

At the beginning of the semester, the new officers for the 2011-2012 academic year were chosen. SIAM's 2011-2012 officers are President, **Jyoti Saraswat**, Vice President, **David Trott**, Treasurer, **Zois Boukouvalas**, Secretary, **Jonathan McHenry**, and Webmaster, **Zana Coulibaly**.

On October 19, 2011, SIAM hosted a presentation by former Chapter President and current post-doc at Johns Hopkins University, **Dr. Alen Alexanderian.** Dr. Alexanderian put together a talk where he discussed responsible conducts and ethics in research. The presentation was also based on a SIAM published article **Professional Ethics: Taking the High Road.** The article, which will soon be available online through the SIAM website, can be found in *SIAM News*, Volume 44, Number 8 of October 2011. Prior to talk, our former faculty advisor **Dr. Susan Minkoff** introduced **Dr. Jinglai Shen**, who has graciously agreed to take over as faculty advisor of the chapter. Dr. Minkoff's advising, expertise, and enthusiasm helped found the UMBC SIAM student chapter in 2008, and with her guidance, multiple successful professional development events have been held.

News from the MSGSA *by President Paula Borrego*

Last fall semester, the MSGSA organized a community service activity at Moveable Feast (http://www.mfeast.org/). It was a nice opportunity to help others by cooking for people with AIDS and other diseases that prevent them from preparing food for themselves.

We held monthly meetings, where we had lunch together and talked about our concerns and future events. We had elections in November and the 2012 committee was elected. We had a wonderful Holiday party in the game room where the Mama's Boys sang for us, we had lots of food, contests and a great time! We were pleased to have so many students attend with their families. And finally we ordered new department t-shirts.

The new MSGSA 2012 committee is:

President: **Andreas Papadopoulos**
Vice President: **Maria Barouti**
Treasurer: **Joshua D. Austin**
Secretary: **Brittney Henegar**
GSA Senator: **Paula Borrego**
Webmaster: **Andrew Raim**

This semester, we will keep holding monthly meetings, and many other activities. Please stay tuned for news of our events! And students: join our Facebook group! Looking forward to a wonderful semester!

MSGSA Hosts Annual Holiday Party *by Andrew Raim*

The department hosted its annual holiday party on Dec 3rd in the Commons Game Room. Students, faculty, staff, and family gathered to enjoy an evening of delicious food and great company. This year's party featured a special appearance by the UMBC Mama's Boys (www.umbcmamasboys.org) who helped to set the holiday mood with an acapella performance. First prize in the Best Dish Competition went

to **Paula Borrego** for her Mexican tostadas. The winner of the billiards tournament was **Jonas Schaefer** (visiting graduate student from Germany), and **Sanatan Saraf** was champion of the table tennis tournament. Thanks to the 2011 MSGSA officers and the department staff for helping to arrange the party.

2011 MSGSA Officers (pictured above, right): Nicole Massarelli, Paula Borrego, Elande Baro, April Albertine, and Amanda Peterson. Current graduate students (pictured left): Maria Barouti, Zois Boukouvalas, and Andreas Papadopoulos.

Update on CIRC Activities: Fall 2011

The Center for Interdisciplinary Research and Consulting (CIRC), housed within the Department of Mathematics and Statistics at UMBC, provides mathematical and statistical consulting services for both on- and off-campus clients. CIRC is dedicated to supporting interdisciplinary research for both the UMBC campus community and the general public. In addition, CIRC provides Mathematics and Statistics students with vital consulting experience needed for industry and academia jobs.

During the fall of 2011, CIRC, in cooperation with the UMBC Division of Information Technology, continued its series of free software workshops including SAS, SPSS, MS Excel, MS Access, and MATLAB. A special MATLAB session, led by **Jonathan McHenry** and facilitated by **Xuan Huang** and **Zana Coulibaly**, and funded by the UMBC Graduate School, provided advanced MATLAB programming and numerical techniques for science and engineering graduate students; attendees offered very positive feedback.

In addition to offering software workshops, CIRC was actively engaged in consulting projects. One project featured the analysis of the donation patterns of UMBC alumni for the Office of Institutional Advancement; another developed an analysis of the associations between pain and stigma in patients with Sickle Cell Anemia for Dr. Bediako of the Department of Psychology at UMBC. Both were conducted by **Merve Gurlu** and **Brittney Henegar**, under the direction of Executive Director **Dr. Liz Stanwyck**. A confidential project for the Maryland Attorney General's Office was overseen by CIRC's director, **Dr. Nagaraj Neerchal**. **Dr. Bimal Sinha**, a senior Statistics faculty member in the department, made significant contributions to this project through his expertise in meta-analysis and Bayesian methodology.

Through HPCF RA **Andrew Raim**, CIRC continued its close collaboration with the UMBC High Performance Computing Facility (www.umbc.edu/hpcf). **Dr. Matthias Gobbert**, chair of the HPCF user committee and co-director of CIRC began his academic-year sabbatical at the University of Kassel in Germany, where he is expanding his research in parallel computing and fostering new collaborations.

Kudos

- **Dr. Bimal Sinha** and **Dr. Nagaraj Neerchal** received the NSA 2013 Probability and Statistics Day conference grant.
- A paper published in Fall 2011 and based on consulting work completed in Fall 2007 was listed as number 4 under the 25 most downloaded articles of the journal *Nonlinear Analysis: Real World Applications*! The CIRC RA that assisted in this consulting job was **Alen Alexanderian**. The full citation of the paper and direct link to the article is as follows:

  Alen Alexanderian, **Matthias K. Gobbert**, K. Renee Fister, Holly Gaff, Suzanne Lenhart, and Elsa Schaefer. "An Age-Structured Model for the Spread of Epidemic Cholera: Analysis and Simulation." *Nonlinear Analysis: Real World Applications*, vol. 12, no. 6, pp. 3483-3498, 2011. http://www.sciencedirect.com/science/article/pii/S1468121811001453
- **Dr. Nagaraj Neerchal** was appointed to be an Entrepreneurship Fellow for 2012 by the Alex. Brown Center for Entrepreneurship, along with Dr. Amy Froide (History) and Dr. George Karabatis (Information Systems). Entrepreneurship Fellows raise the profile of entrepreneurship on campus, for which Dr. Neerchal is a clear prototype with his engagement in CIRC. For more information please see http://www.umbc.edu/entrepreneurship/pdf/ENTRE2012-002_Newsletter_vF.pdf

---

Image Credits: P. Borrego, A. Raim, M. Gobbert

REU Site: Interdisciplinary Program in High Performance Computing -- Summer 2011

This REU Site is an eight week summer program that combines a broad introduction to scientific, statistical, and parallel computing with project work on an application problem provided by a client from industry, government, or another academic department. 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. Led by directors **Dr. Nagaraj K. Neerchal** and **Dr. Matthias K. Gobbert** for the program's second year, the program received funding from NSF to cover eight participants. Five additional participants were chosen, three of which were funded by a grant from the National Security Agency (NSA) through the UMBC Meyerhoff Program. The 13 participants were selected from over 110 applicants from across the nation and performed research in four teams. New this year, the program offered the assistance of peer mentor **Michael Curtis**, a participant himself in the previous year, and undergraduate assistant **Matthew Brewster**, who was also working on research himself throughout the program.

The program started with an extremely intensive three-credit course, Math 447 Introduction to Parallel Computing, which was essentially taught in only two-and-a-half weeks. The all-day work during lecture and in the computer lab allows the teams to gel rapidly and provide insight for team members on each other's strengths. Each team selected a project from among seven potential options. This approach implements the model of consulting work, where the application scientist poses the problem as the client, but the teams proceed to work on their own then. For this exciting approach to work successfully in the short time available, each team is supported on a daily basis by both graduate assistants and faculty mentors. Each team's research culminated in a poster presentation at the CNMS Summer Undergraduate Research Fest (see group photo), a technical report, and a webpage.

Throughout the eight weeks, the research work was complemented by professional development activities including 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 in the Dean's Office. The students also profited from a GRE prep course and visits from VIPs including UMBC President **Dr. Freeman Hrabowski**, then-Dean of the CNMS (and now Provost) **Dr. Philip Rous** (photo), Assistant Provost **Dr. Yvette Mozie-Ross**, Assistant Vice President for Research **Dr. Don Engel** and Graduate Program Director, **Dr. Kathleen Hoffman**. As a special conclusion to the program, the editors of the UMBC Review, math major **Esther Gross,** and **Melanie Dell** presented on publishing undergraduate research. Scientific field trips included those to NASA Greenbelt and to the NSA (thanks to **Dr. Mel Currie**), as well as a visit to the DoIT machine room to see the HPCF cluster (thanks to Systems Administrator, **Aaron Knister**, for his explanations!). Social field trips included a trip to the Independence Day fireworks on the National Mall in Washington D.C.

We are very happy to acknowledge the tireless help of department staff **Deneen Blair**, **Bobbie Butler**, **Angela McNulty**, **Boris Alemi**, and program coordinator **Kristel Ehrhardt**, without whom the program would not be possible. Other helpers included teaching assistants **David Trott** and **Zana Coulibaly**, in addition to the graduate assistants involved with the projects. The REU Site is also proud to partner with the Center for Interdisciplinary Research and Consulting (CIRC) and the UMBC High Performance Computing Facility (HPCF). Special thanks go to the NSF, NSA, UMBC, CIRC, and HPCF for financial support.

For all information including details of the projects, information on the special event schedule, and photo album, please visit www.umbc.edu/hpcreu. There, you will also find our YouTube video about the 2010 REU Site, with introductory remarks by **Dr. Hrabowski** and testimonials by participants, graciously produced by the DoIT New Media studio!

Team 1:
Assessment of Simple and Alternative Bayesian Ranking Methods Utilizing Parallel Computing

Team Members: Samantha Allen (High Point University), Dorothy Kirlew (Hood College), Neil Obetz (Millersville University), and Derek Wade (Boise State)
Graduate Assistant: **April Albertine**
Faculty Mentor: **Nagaraj K. Neerchal**
Client: **Martin Klein**, U.S. Census Bureau

The U.S. Census Bureau uses an algorithm based on sample estimates to rank the states according to certain criteria. The team compared algorithms based on non-informative Bayesian techniques to the current method and demonstrated speedup of a parallel implementation.

Team 2:
Sampling Within k-Means Algorithm to Cluster Large Datasets

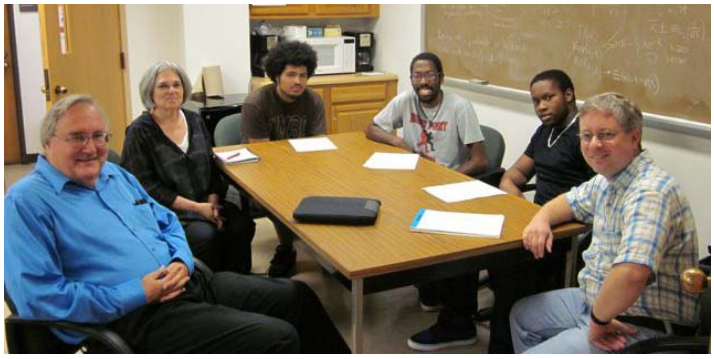
Team Members: Jeremy Bejarano (BYU), Koushiki Bose (Brown), Tyler Brannan (NC State), and Anita Thomas (Illinois Inst. of Tech.)
Faculty Mentors: **Kofi Adragni** and **Nagaraj K. Neerchal**
Client: George Ostrouchov, Oak Ridge National Laboratory

Due to advances in data collection technology, huge data sets are gathered very rapidly (for instance several terabytes per day by one NASA satellite). The team's research focused on improving Lloyd's k-means clustering algorithm to handle extremely large datasets by a sampler algorithm that used approximately 0.5% of the data only but made highly accurate predictions.

Team 3:
Optimization of Computations Used in Information Theory Applied to Base Pair Analysis

Team Members: **Andrew Coates** (UMBC) and Alexey Ilchenko (Case Western Reserve)
Faculty Mentors: **Matthias K. Gobbert** and **Nagaraj K. Neerchal**
Clients: **Patrick O'Neill** and **Ivan Erill**, Biological Sciences, UMBC

Biologists use Information Theory as a method of predicting where proteins will bind to DNA, which requires extensive calculations for varying sample sizes. The team developed python, Matlab, and C code that enables calculations across the full range of desired sample sizes.



Team 4:
Intel Concurrent Collections as a Method for Parallel Programming

Team Members: **Richard Adjogah**, **Randal Mckissack**, and **Ekene Sibeudu** (all UMBC)
Graduate Assistant: **Andrew M. Raim**
Faculty Mentor: **Matthias K. Gobbert**
Client: Loring Craymer, DoD Center for Exceptional Computing, shown along with Kath Knobe, Intel Corp. lead-developer, meeting with the REU Site team.

Concurrent Collections (CnC) is a new parallel software paradigm proposed by Intel Corporation that makes programming in parallel easier, since the programmer merely identifies dependencies among code segments in the program, and the parallelization of these code segments is handled automatically by CnC at the runtime. Comparisons with MPI indicate a clear advantage of CnC over MPI in parallelization of parameter studies.