317 College Ave.
Mary Macy Petty Building

UNCG

Department of
Mathematics & Statistics
Annual Report
2012-2013

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1. Summary

Ratnasingham Shivaji,
H. Barton Excellence Professor & Department Head

It has been an honor to lead a dynamic department consisting of four full professors, nine associate professors, nine assistant professors, five lecturers, four staff members, 14 doctoral students, 11 master's degree students, 110 undergraduate math majors, and 23 undergraduates with math as a second major. Over the year, we graduated 19 undergraduates and four master's students. Our Ph.D. program is in its fourth year, and we expect to have our first set of graduates in the summer of 2014.

Our faculty made significant contributions in research. This includes 39 peer-reviewed journal articles (published or in press) and two refereed conference proceeding papers, creating a rate of 2.15 articles per tenured/tenure-track faculty member. Our faculty also published one book and two book chapters and gave an impressive total of 67 research presentations. Kindly note that the information in this paragraph reflects data from the 2012 calendar year.

We submitted 27 external grant proposals of various sizes, out of which 16 were funded, including prestigious research grants from the National Science Foundation (NSF), the National Security Agency (NSA), and the Simons Foundation. We also had continuations on several of our existing externally-funded projects.

The department had a banner year in terms of research speakers. We continued two lecture series, the Helen Barton Lecture Series in Computational Mathematics and the Helen Barton Lecture Series in Mathematical Sciences. The Lecture Series in Computational Mathematics featured 10 external speakers and the Lecture Series in Mathematical Sciences featured 2 external speakers. These lecture series continues to feature world-renowned experts from areas of specialty represented in the department. The department also hosted 8 colloquia, 6 external seminar speakers, and 33 UNCG seminars given by 20 UNCG speakers, and 17 external research visitors from all over the world whose stays ranged from two to 24 days. For the last eight years, the department has hosted a student research conference. This year's conference was the largest, featuring 164 delegates representing 36 schools. The students made 56 presentations. Additionally, we hosted the International Conference on Advances in Interdisciplinary Statistics and Combinatorics, which featured 180 presentations including 42 by students. This year, we also hosted a successful UNCG Summer School in Computational Number theory for 26 participants.

In terms of courses, we offered a total of 216 sections including 47 online sections. Continuing with our endeavor to increase the effectiveness of our course offerings, we maintained the limits we imposed in 2012-2013 of a maximum of fifty students in MAT 112−MAT 151 lecture courses and one hundred students in MAT 112−MAT 151 WTX courses. We continued our maximum enrollment limit of thirty five students in MAT 191−MAT 293 and twenty five students in the MAT 300 level and above. Our

recruitment and retention plan for students seeking a BA in Mathematics with Teaching Licensure was fully implemented with plans to extend those efforts to all mathematics majors in 2013-2014. As part of this plan, particularly to advertise our program, in August the department hosted a breakfast buffet for Guilford County high school mathematics teachers. In June, the department hosted a lunch for mathematics department heads in each Guilford County high school. We also continued the undergraduate research scholarship program (via Barton Excellence Funds) to help our brightest undergraduate students obtain research experience. The department continues to host the final round of the State Mathematics Contest, which included 60 student participants this year.

We continued enhancements to our Computational Mathematics PhD program including opening new specialty tracks. New tuition waivers for graduate students were added. This year, we awarded a total of eighteen in-state tuition waivers and 6 out-of-state tuition waivers. We recruited four excellent new graduate students (3 PhD/1 MA). During the academic year 2013–14, we will have a total of sixteen PhD students and 8 MA students in our program.

The department has recently undergone successful expansion, which includes additional departmental spaces used for various individuals and activities. We now have a new Math Emporium located in Graham 303, which will be fully functional in the Fall of 2013. The Math Help Center in Curry 210 continues to provide tutoring services to undergraduate students. A new undergraduate lounge in Petty 206 will be added in Fall 2013. The department was also successful in obtaining funds from the College of Arts and Sciences to construct a conference room. The department decided to name the conference room, *The Jerry & Theresa Vaughan Conference Room*, in honor of Jerry and Theresa Vaughan's dedication and contribution to the department and UNCG as a whole. We also obtained two additional office spaces for graduate assistants in the Brown building, in addition to the 6 office spaces that were added in 2011. The graduate students also continue to use the space in Petty 101, which accommodates 8 students. For our research visitors, the department now features two visitors offices located in Petty 124 and Petty 138.

To better aid undergraduates in our mathematics courses, our new Math Help Center (MHC) opened in Curry 210, and provides students with a large, welcoming space to seek assistance with their mathematical questions. Additionally, we have continued enhanced offerings in the Math Help Center. In particular, help for higher level classes was a successful addition. Math Help Center offerings continued to serve as the lifeline for underprepared students in lower level math/stats courses. The Center recorded a staggering 4,002 individual student visits during the 2012–2013 academic year. The Center also offers review sessions for courses covered in MHC upon the request of the instructors, and are usually conducted by Graduate Teaching Assistants (GTAs). The Statistics Consulting Center also continued its excellent service to the UNCG community recording more than 100 consulting sessions.

The department continues to be a member of IMA (Institute of Mathematics and its Applications). The department has already benefited from this alliance. The IMA awarded Dr. Greg Bell a New Directions Professorship for Fall 2013. This year, many of our graduate students also attended important workshops including the Mathematical Modeling in Industry Summer Workshop– XVI, IMA Career

Options for Women in Mathematical Sciences, and the 2013 PI Summer Graduate Program: Flow, Geometric Motion, Deformation, and Mass Transport in Physiological Processes.

The Math Club has continued to be successful. The club aims to create a community for undergraduate and graduate math enthusiasts. The club met every other Wednesday beginning the second week of each semester. Turnout was excellent, and the club has maintained a core group of members. Most meetings centered on talks given by our very talented faculty and graduate students.

This year, two individuals, Patricia Cranford Yegge '76 and one person who would like to remain anonymous, have provided for scholarship endowments for UNCG math and statistics majors in their estate plans. Donations were also provided by Mrs. Jean Fleming Roosa, Ms. Lillian Boney, Ms. Nancy Taylor, Mrs. Christine Posey, Mrs. Linda Downs Philips, Ms. Gloria Edwards Thornton, Mrs. Dorothy Taylor Howell and Mr. William E. Howell, and Mrs. Frankie Hubbard. Our sincere gratitude goes to all of our donors.

The department had a successful year of recruitment, which resulted in four new faculty members to meet demands in teaching within the Ph.D. program and an Academic Professional position to help with recruitment and retention efforts. In the 2013–2014 academic year, Dr. Xiaoli Gao (Associate Professor), Dr. Thomas Lewis (Assistant Professor), Dr. Jonathan Rowell (Assistant Professor), Dr. Haimeng Zhang (Associate Professor with tenure), and Dr. Tracey Howell (Academic Professional) will join the department.

This year, two faculty members received promotion and/or tenure. Sebastian Pauli and Filip Saidak were tenured and promoted to the Associate Professor rank starting Fall 2012. Maya Chhetri, Richard Fabiano, and Walker Weigel successfully completed application procedures during the 2012–2013 academic year, and will take up their new positions starting Fall 2013. Maya Chhetri and Richard Fabiano will be promoted to Full Professor and Walker Weigel will be promoted to Senior Lecturer.

In closing, let me say that the success of our department is the result of our faculty and students, and we had several leaders in this area who have brought extra recognition to the department. Our undergraduate and graduate students were involved in various research publications and conference presentations. Undergraduate students in the department were involved in 6 research publications and gave a total of 32 conference presentations. Graduate students in the department published 4 research publications and gave 7 conference presentations at major conferences, as well as local presentations and presentations for the UNCG Math Club. Additionally, 4 graduate students presented posters at UNCG highlighting their research.

Dr. Rychtář was selected for the UNCG 2012–2013 Junior Research Excellence Award. Additionally, he received an excellent review in *Science*, from Martin A. Nowak, Professor of Mathematics and Biology at Harvard University, for his book, "Game-Theoretical Models in Biology," published March 2013. Dr. Clifford Smyth was awarded a three year National Security Agency (NSA) award (2012–2015). The funding will support his *Correlation Inequalities* project. Additionally, Dr. Smyth was awarded a Bernard-Glickman Dean's Professorship for 2013–2014. This professorship recognizes the accomplishments and potential of outstanding junior faculty in the College of Arts and Sciences. Dr. Talia Fernós was awarded

a three year (2013–2016) National Science Foundation (NSF) research grant. Grant work will focus on rigidity of isometric Hilbert space actions using the tool of low dimensional cohomology. Drs. Rychtář, Smyth, and Fernós are also recipients of Simons Foundation Grants. These are awarded only to individuals who currently have a record of active research and publication in high quality journals. However, Dr. Fernós and Dr. Smyth could not accept this award since they currently hold NSF and NSA awards. Dr. Carol Seaman received an award from the 2012 Annual Conference on Research in Undergraduate Mathematics Education for her paper, "Sociomathematical norms and mathematical sophistication: a qualitative case study of inquiry-based mathematics course for preservice elementary teachers." The department continues to be home to the prestigious international journals, *The Journal of Statistical Theory and Practice*, a Taylor and Francis Publication, and *Topology and its Applications*, an Elsevier Publication.

2. Faculty and Staff

2.1 Faculty

Doyel Barman, Lecturer

Dr. Barman earned her Ph.D. in 2011 from the University of North Carolina at Charlotte and joined the UNCG faculty in 2011. Her research interests include general topology and applications of set theory in topology.

Greg Bell, Associate Professor
Director of Graduate Studies

Dr. Bell earned his Ph.D. in 2005 from the University of Florida and joined the UNCG faculty in 2005. His research focus is on geometric group theory, geometric topology, and asymptotic invariants of groups.

Mariana Bujac-Leisz, Lecturer

Dr. Bujac-Leisz received a Ph.D. in 2005 from the State University of Moldova and joined the UNCG faculty in 2012. Her research interests include algebraic topology, algebraic geometry and their interactions, combinatory, optimization, graph theory, discreet mathematics, numerical analysis, and algorithm theory.

Dagny Grillis Butler, Lecturer

Ms. Butler earned her M.S. in 2009 from Mississippi State University and joined the UNCG faculty in 2011. She is currently working towards her Ph.D. in Mathematical Sciences from Mississippi State University. Her research interests include reaction diffusion equations on exterior domains with nonlinear boundary conditions.

Maya Chhetri, Associate Professor
Director of the Math Help Center & Coordinator of the Math Emporium

Dr. Chhetri earned a Ph.D. in 1999 from Mississippi State University and joined the UNCG faculty in 1999. Her research focus is on nonlinear elliptic boundary value problems.

Kumer Pial Das, Visiting Associate Professor

Dr. Das earned a Ph.D. in 2005 from Auburn University and joined the UNCG faculty in 2012. His research areas include probability theory, statistics, and actuarial mathematics.

Roland Deutsch, Assistant Professor

Dr. Deutsch earned a Ph.D. in 2007 from the University of South Carolina and joined UNCG faculty in 2007. His main research focus is on environmetrics non-parametric dose-response models.
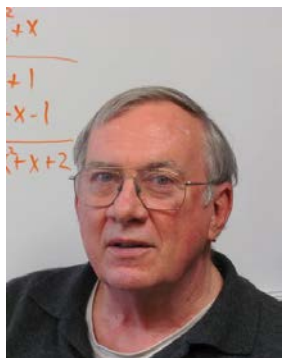
Paul Duvall, Professor

Dr. Duvall earned a Ph.D. in 1967 from the University of Georgia and joined the UNCG faculty in 1986. His research focus is on number theory, cryptography and combinatorics.

Igor Erovenko, Associate Professor
Director of Undergraduate Studies

Dr. Erovenko earned a Ph.D. in 2002 from the University of Virginia and joined the UNCG faculty in 2002. His research focus is on combinatorial properties of linear groups and bounded generation of S-arithmetic groups.

Richard Fabiano, Associate Professor

Dr. Fabiano earned a Ph.D. in 1996 from Virginia Tech and joined the UNCG faculty in 1996. His research focus is on applied mathematics, differential equations, and control theory.

Talia Fernós, Assistant Professor

Dr. Fernós earned a Ph.D. in 2006 from the University of Illinois at Chicago and joined the UNCG faculty in 2010. Her research focus is on infinite groups from both geometric and analytical perspectives.

Sat Gupta, Professor
Associate Head

Dr. Gupta earned a Ph.D. in Mathematics from the University of Delhi (1977) and a Ph.D. in Statistics from Colorado State University (1987). He joined the UNCG faculty in 2004. His research focus is on sampling designs, time series forecasting, and biostatistics.

Tracey Howell, Lecturer

Dr. Howell returned to the department in 2012−2013 as a lecturer. She received her Ph.D. in Teacher Education and Higher Education from UNCG in 2013 Her research focuses on instructional practices that support students' mathematical argumentation, instruction in highly-impacted schools, and teacher learning of students' mathematical thinking.

Sebastian Pauli, Associate Professor

Dr. Pauli received his Ph.D. from Concordia University in Montreal in 2001. He joined UNCG in 2006. His research focus is on computational number theory, computational class field theory and the distribution of the zeros of the derivatives of the Riemann Zeta function.

Scott Richter, Associate Professor
Director of the Statistical Consulting Center

Dr. Richter earned a Ph.D. in 1997 from Oklahoma State University and joined the UNCG faculty in 2001. His research focus is on nonparametric methods and multiple comparisons.

Jonathan Rowell, Lecturer

Dr. Rowell earned a Ph.D. in 2003 from Cornell University, and he joined the UNCG faculty in 2012. His primary research studies the application of game theory and differential equations to biological problems ranging from the cellular level to the population level.

Dohyoung Ryang, Assistant Professor

Dr. Ryang earned a Ph.D. in 2005 and an Ed.D. in 2010 from the University of Alabama, Tuscaloosa. He joined the UNCG faculty in 2010. His research focus is on mathematics education and geometric group theory.

Jan Rychtář, Associate Professor

Dr. Rychtář earned a Ph.D. in 2004 from the University of Alberta and joined the UNCG faculty in 2004. His research focus is on mathematical biology, game theory and functional analysis.

Filip Saidak, Associate Professor

Dr. Saidak received a Ph.D. in 2001 from Queen's University in Ontario, Canada and joined the UNCG faculty in 2005. His research focus is on classical questions concerning prime numbers and their distribution, and the location of zeros of the Riemann zeta function and its derivatives.

Carol Seaman, Associate Professor
Program Coordinator for Secondary Licensure in Mathematics

Dr. Seaman earned a Ph.D. in 2000 from Central Michigan University and joined the faculty at UNCG in 2008. Her research focus is on undergraduate mathematics education.

Insuk Shim, Lecturer

Ms. Shim earned a M.A. in 2006 from the University of Alabama, Tuscaloosa and joined the UNCG faculty in 2011. Her research interests include the "Multivariate Markovian arrival process" in Statistics.

Ratnasingham Shivaji, H. Barton Excellence Professor

Department Head, W.L. Giles Distinguished Professor Emeritus of Mathematics (Mississippi State University)

Dr. Shivaji earned a Ph.D. in 1981 from Heriot-Watt University in Edinburgh, Scotland and joined UNCG in 2011. His research focus is on partial differential equations, in particular, nonlinear elliptic boundary value problems.

Clifford Smyth, Assistant Professor

Dr. Smyth earned a Ph.D. in 2001 from Rutgers University and joined the UNCG faculty in 2008. His research focus is on combinatorial probability, computational complexity, and discrete geometry.

Brett Tangedal, Associate Professor

Dr. Tangedal earned a Ph.D. from the University of California at San Diego in 1994 and joined the faculty at UNCG in 2007. His research focus is on algebraic number theory with a particular emphasis on explicit class field theory.

Jerry Vaughan, Professor

Dr. Vaughan earned a Ph.D. in 1965 from Duke University and joined the UNCG faculty in 1973. His research focus is on general topology, set theory and logic, functional analysis, and set-theoretic topology.

Walker Weigel, Lecturer

Ms. Weigel earned a M.A. in 1967 from UNC-Chapel Hill and joined the UNCG faculty in 1985. Her research interests include new approaches and improvements to teaching through the use of online components, iclickers, and other pedagogical tools.
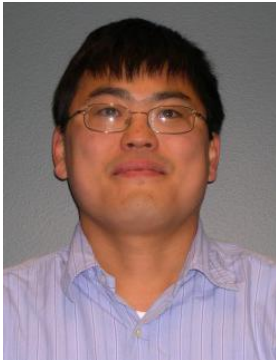
Dan Yasaki, Assistant Professor

Dr. Yasaki earned a Ph.D. in 2005 from Duke University and joined the UNCG faculty in 2008. His research focus is on modular forms, particularly the connection between explicit reduction theory of quadratic forms and the computation of Hecke data for automorphic forms.

2.2. Staff

Richard Cheek
Systems Administrator

Mr. Cheek graduated from UNCG with his M.S. degree in Computer Science in 1998 and has been the Systems Administrator for the Department since 1999.

Haley Childers
Business Services Coordinator (Office Manager)

Ms. Childers received her B.A. in Art History from UNCG in 2009 and her M.S. Degree in Library and Information Studies from UNCG in 2012. She joined the Department in 2005.

Nina Williamson
Administrative Support Associate

Ms. Williamson received her B.A. in English and Languages from East Tennessee State University in 2006 and joined the Department in 2011. She resigned in April of 2013 to work towards her goal of becoming a teacher.

Michelle Miller
Administrative Support Associate

Ms. Miller received her Bachelor of Music from Wheaton College in 2008 and her Master of Music from UNCG in 2012. She joined the Department in June 2013.

2.3. Recruitment of New Faculty Starting from Fall 2013

Xiaoli Gao, Associate Professor

Dr. Xiaoli Gao received her Ph.D. in Statistics from the University of Iowa in 2008 and joined UNCG in 2013. Her research interests include High-dimensional Data analysis, Shrinkage analysis, Statistical Genetics, Change point and Survival Analysis.

Tracey Howell, Academic Professional

Dr. Howell received her Ph.D. in Teacher Education and Higher Education from UNCG in 2013. Her research focuses on instructional practices that support students' mathematical argumentation, instruction in highly-impacted schools, and teacher learning of students' mathematical thinking.

### Thomas Lewis, Assistant Professor

Dr. Lewis earned a Ph.D. in 2013 from the University of Tennessee in Knoxville, and he joined the faculty at UNCG the same year. His research focuses on numerical PDEs and applied mathematics.

Jonathan Rowell, Assistant Professor

Dr. Rowell earned a Ph.D. in 2003 from Cornell University, and he joined the UNCG faculty in 2012. His primary research studies the application of game theory and differential equations to biological problems ranging from the cellular level to the population level.
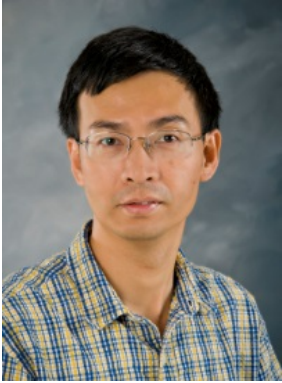
Haimeng Zhang, Associate Professor

Dr. Haimeng Zhang received his Ph.D. in applied mathematics with a concentration in statistics from the University of Southern California in 1998. He joined UNCG in 2013. His research interests include spatial statistics, survival analysis, and applied probability.

3. Tenure & Promotions, Awards & Honors

Tenure & Promotions

Dr. Sebastian Pauli was tenured and promoted to the Associate Professor rank starting Fall 2012.

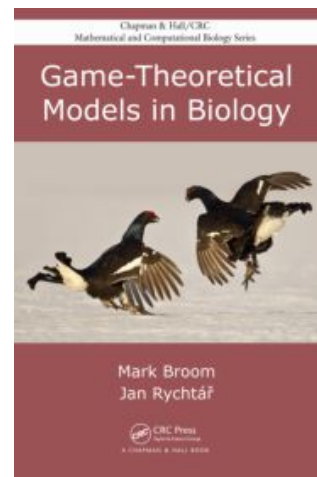Dr. Filip Saidak was tenured and promoted to the Associate Professor rank starting Fall 2012.

Awards & Honors

Dr. Jan Rychtář was selected for the UNCG 2012-13 Junior Research Excellence Award. Dr. Jan Rychtář's book, "Game-Theoretical Models in Biology," was published in March of 2013, and recently received an excellent review from Martin A. Nowak, Professor of Mathematics and Biology at Harvard University. The review was published in the August 2013 volume of the prestigious journal, *Science*. Covering the major topics of evolutionary game theory, "Game-Theoretical Models in Biology" presents both abstract and practical mathematical models of real biological situations. It discusses the static aspects of game theory in a mathematically rigorous way that is appealing to mathematicians. In addition, the authors explore many applications of game theory to biology, making the text useful to biologists as well. Dr. Rychtář received a three year grant award from the National Science Foundation for The Annual UNCG Regional Mathematics and Statistics Conference. He also received a grant from the Simons Foundation for his project, "Game-theoretical models in biology." Dr. Rychtář also received an Award from the Mathematical Association of America (under the program National Research Experience for Undergraduates, funded by NSA and NSF). The grant is titled, "Game Theory and Applications."

Dr. Clifford Smyth was awarded a three year Department of Defense National Security Agency (NSA) award (2012–2015). The funding will support his *Correlation Inequalities* project. These have to do with quantifying how certain random events influence each other. Although correlation inequalities belong to probability, they also have been of use in solving problems that, surprisingly, seem to have nothing to do with probability. They have had important impacts in a number of mathematical fields such as combinatorics, number theory, and computer science. Dr. Smyth received a grant award from the Simons Foundation, but was unable to accept it, as he could not hold the Simons grant and the NSA grant simultaneously. Additionally, Dr. Clifford Smyth has been awarded a Bernard-Glickman Dean's Professorship for 2013-14. This professorship recognizes the accomplishments and potential of outstanding junior faculty in the College of Arts and Sciences.

Dr. Talia Fernós was awarded a three year (2013–2016) National Science Foundation (NSF) research grant by the Division of Mathematical Sciences (Topology and Geometric Analysis Program). Grant work will focus on rigidity of isometric Hilbert space actions using the tool of low dimensional cohomology. She also received a grant from the Simons Foundation, but was unable to accept it, as she could not hold the Simons grant and the NSF grant simultaneously. Dr. Talia Fernós received a 2013 New Faculty Grant and a 2013 Summer Excellence Research Award from UNCG.

Dr. Carol Seaman received an award from the 2012 Annual Conference on Research in Undergraduate Mathematics Education for her paper, "Sociomathematical norms and mathematical sophistication: a qualitative case study of an inquiry-based mathematics course for preservice elementary teachers."

4. Faculty Research Profile
4.1 Research Groups

🞇 Applied Mathematics

The logistic growth curve
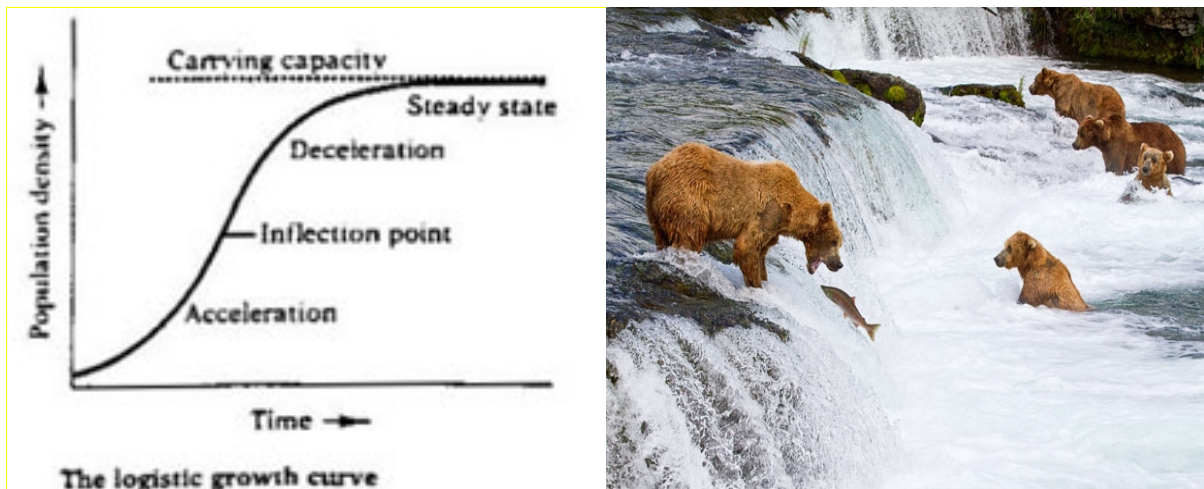
Applied mathematics is a discipline that develops mathematical techniques and concepts which can be used in understanding the natural and social sciences. Researchers at UNCG carry out research in differential equations, control theory, game theory, stochastic processes, graph theory, combinatorial probability and mathematical biology. Areas of application include modeling of reaction-diffusion processes, flexible structure, stealing behaviors, vector/ host affinity's effect on disease spread and the behavior of random networks. Faculty are actively involved in organizing conferences in specified research areas as well as annual conferences targeted only for students. Most faculty in this group have also worked with undergraduate students which resulted in journal publications as well as numerous conference presentations. Faculty involved in this research group is Maya Chhetri, Richard Fabiano, Jonathan Rowell, Jan Rychtar, Ratnasingham Shivaji and Clifford Smyth. Current Ph.D. Students in these areas: Abraham Abebe, Quinn Morris, Catherine Payne, James Rudzinski, Byungjae Son, and Dagny Butler (Mississippi State University).

⬇ Combinatorics, Group Theory and Topology
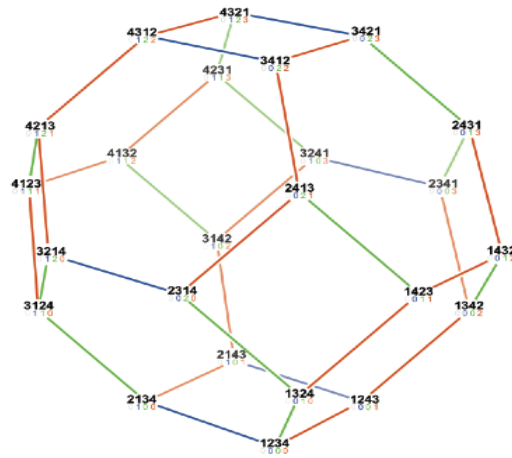
Combinatorics, Group Theory and Topology are three active areas of research in pure mathematics at UNCG. The Combinatorics Group works with combinatorial probability, computational complexity, and discrete geometry. Group Theory research areas include geometric group theory, representation theory, and arithmetic groups. UNCG's topologists work with general and set- theoretic topology, geometric topology, and asymptotic topology. Faculty involved in this research group: Greg Bell, Paul Duvall, Igor Erovenko, Talia Fernós, Clifford Smyth and Jerry Vaughan. Current PhD students in these areas: Danielle Moran, Michael Palmer, and James Rudzinski.

⬇ Mathematical Biology

Modeling disease transmission in mosquitos, understanding the behavior of dung beetles, tracking of mice and bats, understanding the mating of honey bees or knowing how much fish to harvest all have one thing in common—mathematics. The Department of Mathematics and Statistics is proud to be a part of this truly interdisciplinary research. The faculty offer expertise to assist UNCG faculty and graduate students with their research in biology and beyond. Faculty involved in this research group are Maya Chhetri, Roland Deutsch, Sat Gupta, Sebastian Pauli, Jonathan Rowell, Jan Rychtar, Ratnasingham Shivaji and Clifford Smyth.
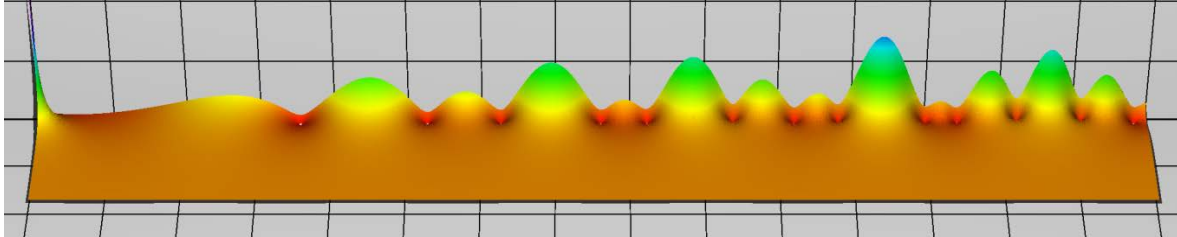
Number Theory

Figure: ζ(σ+it) for 0≤σ≤8 and 0.1≤t≤60

Number theory is one of the oldest research areas in pure mathematics. It is concerned with the study of integers (in particular prime numbers) and generalizations thereof. In the last 30 years number theory has found many applications, especially in cryptography. The members of the number theory group at UNCG work in several areas of number theory, including algebraic, analytic, and computational number theory and modular forms. The members of this research group are Sebastian Pauli, Filip Saidak, Brett Tangedal, and Dan Yasaki. Current Ph.D. students in this area: Ricky Farr, Paula Hamby, Jonathan Milstead, and Brian Sinclair.

For more details about the activities and research of the number theory group, visit:
http://www.uncg.edu/math/numbertheory/summerschool/2013.html

Applied Statistics
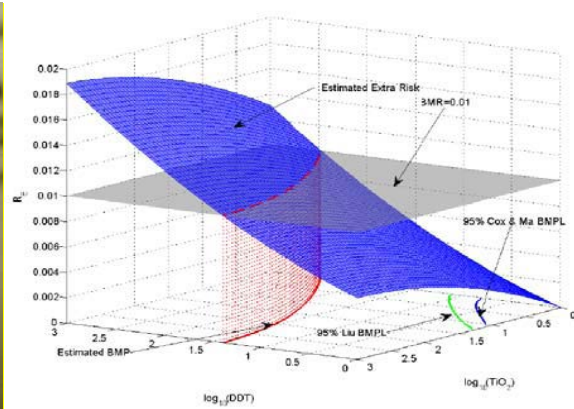
The stats group in the department consists of three full time faculty (Dr. Sat Gupta, Professor; Dr. Scott Richter, Associate Professor; and Dr. Roland Deutsch, Assistant professor). While Dr. Deutsch left at the end of 201l-2012 academic year, we added two new faculty in Dr. Haimeng Zhang and Dr. Xiaoli Gao, both Associate Professors. The focus of Dr. Gupta's research is in the area of sample surveys. Dr. Richter specializes in non-parametric methods and multiple comparisons. Dr. Zhang specializes in survival analysis, spatial statistics and applied probability, and Dr. Gao specializes in high dimensional data analysis and statistical genetics. Collectively the stats group is engaged in both disciplinary research in their respective areas of speciality as well as interdisciplinary research in collaboration with other UNCG faculty. In this role, they serve as co-investigators or key personnel on externally funded projects as well as undergraduate research through the NSF funded Math/Bio and REU projects. The Statistics faculty also provides support through the Statistical Consulting Center to researchers across many disciplines at all stages of research, including assistance with articulating research questions and designing data collection, often for grant proposals, and subsequent data analysis and interpretation, and manuscript preparation. These collaborations often lead to peer- reviewed journal articles. Current Ph.D. students in this area: Wei Chen, Jeong Sep Sihm, Chris Vanlangenberg, and Tanja Zatezalo.

4.2 2012 Publications

Refereed Articles

Greg Bell

Bell, G.C. and Nagórko, A. A new construction for universal spaces for asymptotic dimension. *Topology and its Applications*. (In Press).

Raushan Bouziakova

Bouziakova, R. Z. Combinations Not Tolerated by Normal Topological Groups. *Topology and its Applications, 159 (1)*, 158-161.

Bouziakova, R. Z. & Chigogidze, A. Fixed and Periodic Points of Multivalued Maps on Euclidean Spaces. *Houston Journal of Mathematics*.   (In press).

Maya Chhetri

Chhetri, M., Raynor, S., & Robinson, S. B. On the existence of multiple positive solutions to some superlinear systems. *Proceedings of the Royal Society A, 142(A)*, 39-59.

Roland Deutsch

Deutsch, R. C. & Piegorsch, W. Benchmark Dose Profiles for Joint-Action Quantal Data in Quantitative Risk Assessment. *Biometrics, 68*, 1313-1322.

Ignatova, I. I., Deutsch, R. C., & Edwards, D. Closed Sequential and Multistage Inference on Binary Responses With or Without Replacement. *American Statistician*. (In press).

Ruepell, O., Meier, S., & Deutsch, R. C. Multiple Mating but not Recombination Causes Quantitative Increase in Offspring Genetic Diversity for Varying Genetic Architectures. *PlosOne*.   (In press).

Richard Fabiano

Fabiano, R. H. A semidiscrete approximation scheme for neutral delay-differential equations. *International Journal of Numerical Analysis and Modeling*. (In press).

Talia Fernós

Chatterji, I., Fernos, T., & Iozzi, A. The Median Class and Superrigidity of Actions on CAT(0) Cube Complexes. *Journal of Topology*. (In press).

Sat Gupta

Mehta, S., Dass, B. K., Shabbir, j., & Gupta, S. N. A Three-Stage Optional randomized Response Model. *Journal of Statistical Theory and Practice, 6 (3)*, 417-427.

Gupta, S. N., Shabbir, J., Sousa, R., & Corte-Real, P. Regression Estimation of the Mean of a Sensitive Variable in the Presence of Auxiliary Information. *Communications in Statistics-Theory and Methods, 41*, 2394-2404.

Letvak, S., Ruhm, C., & Gupta, S. The Effects of Nurse Presenteeism on Self Reported Quality of Care and Patient Safety. *American Journal of Nursing, 112 (2)*, 30-38.

Kazi, H., Kazi, R., Gupta, S. N., Shaik, S., & Leh, D. Time for Change: Dyslipidemia Management by Internal Medicine Residents. *Cardiovascular Endocrinology, 1 (4)*, 83-85.

Koyuncu, N., Gupta, S. N., & Sousa, R. Exponential Type Estimators of the Mean of a Sensitive Variable in the Presence of Non-Sensitive Auxiliary Information. *Communications in Statistics-Simulation and Computation*. (In press).

Gupta, S. N., Mehta, S., Shabbir, J., & Dass, B.K. Generalized Scrambling in Quantitative Optional Randomized Response Models. *Communications in Statistics-Theory and Methods, 31 (1-2)*, 1-12.

Gupta, S. N., Tuck, A., Gill, T. S., & Crowe, M. Optional Unrelated-Question Randomized Response Models. *Involve*. (In press).

Shabbir, J. & Gupta, S. N. An improved generalized difference-cum-ratio type estimator for the population variance in two phase sampling using two auxiliary variables. *Communications in Statistics-Simulation and Computation*. (In press).

Sebastian Pauli

Greve, C. & Pauli, S. Ramification Polygons, Splitting Fields, and Galois Groups of Eisenstein Polynomials. *International Journal of Number Theory*. (In press).

Guardia, J., Nart, E., & Pauli, S. Single Factor Lifting and Facgtorization of Polynomials over Local Fields. *Journal of Symbolic Computation*. (In press).

Boseman, A. & Pauli, S. On the zeros of zeta(s)-c. *Involve*. (In press).

Scott Richter

Lacey, E. L., Lovin, M. P., & Richter, S. J. Fitness Effects of Thermoregulation in a Thermally Changing Environment. *American Naturalist, 180 (3)*, 342-353.

Richter, S. J. & McCann, M. H. Using the Tukey-Kramer omnibus test in the Hayter-Fisher Procedure. *British Journal of Mathematical and Statistical Psychology, 65*, 499-510.

Dohyoung Ryang

Ryang, D. Exploratory analysis of Korean elementary preservice teachers' mathematics teaching efficacy beliefs. *International Electronic Journal of Mathematics Education*.   (in press).

Ryang, D. Groups acting on median graphs and median complexes. *Pure and Applied Mathematics*.   (In press).

Ryang, D. & Thompson, T. Sums of positive integer powers. *Mathematics Teacher*.   (In press).

Ryang, D. The viability of the MTEBI for Korean secondary preservice teachers. *International Congress of Mathematics Education*. (In press).

Jan Rychtář

Barker, H., Broom, M., & Rychtar, J. A game theoretic model of parasitism with strategic arrivals and departures of beetles at dung pats. *Journal of Theoretical Biology, 300*, 292-298.

Broom, M. & Rychtar, J. A general framework for analysing multiplayer games in networks using territorial interactions as a case study. *Journal of Theoretical Biology, 302*, 70-80.

Gove, R., Chen, W., Zweber, N., Erwin, R., Rychtar, J., David Remington. Effects of causal networks on the structure and stability of resource allocation trait correlations. *Journal of Theoretical Biology, 293*, 1-14.

Broom, M., Bruni, M., & Rychtar, J. Analysing territorial models on graphs. *Involve*.   (In press).

Carol Seaman

Seaman, C. E. & Szydlik, J. E. Sociomathematical norms and mathematical sophisticatoin: A qualitative case study of an inquiry-based mathematics course for preservice elementary teachers. *15th Conference on Research in Undergraduate Mathematics Education*.

Seaman, C. E. & Szydlik, J. E. Prospective Elementary Teachers' Evolving Meanings for Generalizing, Doing Mathematics, and Justifying. *15th Conference on Research in Undergraduate Mathematics Education*.

Ratnasingham Shivaji

Lee, E., Sasi, S., & Shivaji, R. An ecological model with a Sigma shaped bifurcation curve. *Nonlinear Analysis: Real World Applications, 13 (2)*, 634-642.

Butler, D., Sasi, S., & Shivaji, R. Existence of alternate steady states in a phosphorous cycling model. *ISRN Mathematical Analysis, Vol. 2012*, *Article ID 869147*, 12 pages.

Hai, D.D., Sankar, L., & Shivaji, R. Infinite semipositone problems with asymptotically linear growth forcing terms. *Differential and Integral Equations, 25 (11-12)*, 1175-1188.

Manouni, S. E., Perera, K., & Shivaji, R. On singular quasimonotone (p, q)- Laplacian systems. *Proceedings of the Royal Society of Edinburgh, Section: A Mathematics, 142 (3)*, 585-594.

Castro, A., Sankar, L., & Shivaji, R. Uniqueness of nonnegative solutions for semipositone problems on exterior domains. *Journal of Mathematical Analysis and Applications, 394 (1)*, 432-437.

Castro, A., Ko, E., & Shivaji, R. A uniqueness result for a singular nonlinear eigenvalue problem. *Proceedings of the Royal Society of Edinburgh, Section: A Mathematics*. (In press).

Clifford Smyth

Smyth, C. D. & Howard, D. Revolutionaries and spies. *Discrete Mathematics*, Volume 312 (22), 3384-3391.

Cranston, D. W., Smyth, C. D., & West, D. B. Revolutionaries and spies on trees and unicyclic graphs. *Journal of Combinatorics*, Volume 3 (2), 195-206.

Jerry Vaughan

Dow, A. & Vaughan, J. Ordinal remainders of classical ψ-spaces. *Fundamenta Mathematicae, 217*, 83-93.

Dan Yasaki

Yasaki, D. Computing Modular Forms for GL_2 over Certain Number Fields. *Computations with Modular Forms 2011, Mathematics Center Heidelberg*. (In press).

4.3   2012 Book Chapters, Books and Monographs

Szydlik, J. E. & Seaman, C. E. *Big Ideas in Mathematics for Future Elementary Teachers: Big Ideas in Data Analysis and* Probability, McGraw Hill.

Seaman, C. E. & Szydlik, J. E. *Big Ideas in Mathematics for Future Elementary Teachers: Big Ideas in Geometry*, McGraw Hill.

4.4   2012 Research Presentations

Greg Bell

Tucker's lemma and a problem from geometric group theory.   UNCG AC/NT Seminar, Greensboro, North Carolina.

Dimension Theory II - Large Scale.   UNCG Topology Seminar, Greensboro, North Carolina.

Maya Chhetri

Existence and Nonexistence of Positive Solutions For a Special Class of.   AIMS American Institute of Mathematical Sciences, Orlando, Florida.

Existence of positive solutions for a class of p-Laplacian superlinear semipositone problems.   MSU-UAB Conference on Differential Equations and Computational Simulations, Starkville, Mississippi.

Existence of Positive Solutions For a Class of Semipositone Systems with Exponential Growth in R^2.   Joint Mathematics Meeting, Boston, Massachusetts.

Existence of positive solutions for a class of p-Laplacian superlinear semipositone problems.   Southeastern-Atlantic Regional Conference on Differential Equations, Winston Salem, North Carolina.

Roland Deutsch

Benchmark Profiles for Joint-Action Quantal Data in Quantitative Risk Assessment.   International Conference on Advances in Interdisciplinary Statistics and Combinatorics, UNCG, Greensboro, North Carolina.

Looking Back at South Africa: Analyzing and Reviewing the 2010 FIFA World Cup. Joint Statistical Meetings, San Diego, California.

Benchmark Profiles for Joint-Action Quantal Data in Quantitative Risk Assessment.   UNCG Statistics Seminar, Greensboro, North Carolina.

Richard Fabiano

Semidiscrete approximation for LQR control of delay systems. SAMSI Workshop on nonlocal continuum models, Research Triangle Park, North Carolina.

Introduction to delay differential equations (continued). UNCG Applied Math Seminar, Greensboro, North Carolina.

Introduction to delay differential equations. UNCG Applied Math Seminar, Greensboro, North Carolina.

Semidiscrete approximation for LQR control of delay differential equations. SEARCDE, Winston-Salem, North Carolina.

Talia Fernós

What is... Amenability. The 23nd Annual PCMI Summer Session: Geometric Group Theory, Park City, Utah.

Rigidity of actions on CAT(0) cube complexes. Geometry, Topology, and Dynamics Seminar, Chicago, Illinois.

Rigidity of actions on CAT(0) cube complexes. Algebra, Number Theory, and Combinatorics Seminar, Greensboro, North Carolina.

Rigidity of actions on CAT(0) cube complexes. Geometry-Topology Seminar, College Park, Maryland.

Images of real representations of $SL_n(Z_p)$. Algebra Seminar at the University of Virginia, Charlottesville, Virginia.

Property (T), its friends, and its adversaries. Geometry Seminar at University of WI, Madison, Madison, Wisconsin.

Sat Gupta

Optimal Two-Stage Randomized Response Models. Invited talk at Banasthali University, Jaipur, India.

Optimal Two-Stage Randomized Response Models. Distinguished Lecture at the International Conference on Statistics and Informatics in Agricultural Research, New Delhi, India.

Data Analysis and InterpretationSome Case Studies.   Invited talk at the Agricultural College & Research Institute, Madurai, India.

Randomized Response Models and Some Optimality Issues.   Invited talk at the Statistics for the 21st Century conference held at Kerala University, Trivandrum, India.

On Multi-Stage Optional Randomized Response Models.   Invited talk at Cochin University of Science and Technology, Cochin, India.

Two-Stage Optional RRT Models.   Invited talk at UAE University, Al Ain, Al Ain, United Arab Emirates.

Randomized Response Models.   UNCG Math Dept Colloquium, Greensboro, North Carolina.

Data Analysis Selecting the Right Statistical Tool and Making the Right Inference.   Invited talk at University of Houston- Clear Lake, Houston, Texas.

Randomized Response Models and Some Optimality Issues.   Invited talk at James Madison University, Harrisonburg, United States of America.

New Advances in Randomized Response Models.   Invited talk at the International Conference on Mathematics and Statistics, University of Memphis, Memphis, Tennessee.

Recent Developments in RRT Models.   Invited talk at the LSU Health Sciences Center, New Orleans, New Orleans, Louisiana.

Analysis of the Space Shuttle Challenger Disaster Data.   Invited talk at the University of New England, Biddeford, Maine.

Multi-Stage RRT Models.   Invited talk at Appalachian State University, Boone, North Carolina.

Sebastian Pauli

Polynomial Factorization and Single Factor Lifting.   Sage Days 36, San Diego, California.

Welcome and outline of the problem.   PHP and Web Design Workshop, Greensboro, North Carolina.

p-adic Fields, Algorithms and Constructions I and II.   UNCG AC/NT Seminar, Greensboro, North Carolina.

Evaluating the Riemann Zeta Function. UNCG Summer School in Computational Number Theory, Greensboro, North Carolina.

Zeros of Derivatives of the Riemann Zeta Function. UNCG Summer School in Computational Number Theory, Greensboro, North Carolina.

Scott Richter

Using the Tukey-Kramer Omnibus Test in the Hayter-Fisher Procedure. Joint Statistical Meetings, San Diego, California.

Simultaneous Confidence Intervals for Location Using Medians and Permutation Tests. AISC, Greensboro, North Carolina.

Dohyoung Ryang

Usability of the MTEBI for Korean teachers. ICME, Seoul, Korea.

Developing the MTEBI for middle grade preservice teachers. Annual Conference of Research Council of Mathematics Education, Charlotte, North Carolina.

Is there a general formula for the sum of t-cubes of first n consecutive positive integers? NCCTM Conference, Greensboro, North Carolina.

Jan Rychtář

Games with Information Asymmetry. International Conference on Advances in Interdisciplinary Statistics and Combinatorics, UNCG, Greensboro, North Carolina.

Does knowing more hurt? A surprising effect of information asymmetry. MAA-SE conference, Atlanta, Georgia.

Carol Seaman

Prospective Elementary Teachers' Evolving Meanings for Generalizing, Doing Mathematics, and Justifying. 15th Conference on Research in Undergraduate Mathematics Education, Portland, Oregon.

Exploring the Common Core Standards through Learning Trajectories. Association of Mathematics Teacher Educators, Forth Worth, Texas.

Ratnasingham Shivaji

Colloquium. Oxford University, Oxford, United Kingdom.

Special session paper. 9th International Conference on Dynamical Systems, Differential Equations, and Applications, Orlando, Florida.

Colloquium. University of Ulsan, Ulsan, Korea.

Colloquium. Pusan National University, Busan, Korea.

Colloquium. Wake Forest University, Winston-Salem, North Carolina.

Invited Talk. Conference on Variational and Topological Methods, Flagstaff, Arizona.

Colloquium. Auburn University at Montgomery, Montgomery, Alabama.

Colloquium. Auburn University, Auburn, Alabama.

Plenary lecture. 32nd Annual Southeastern-Atlantic Regional Conference on Differential Equations, Winston-Salem, North Carolina.

Clifford Smyth

Means and row-column correlation. Combinatorics Seminar, Baton Rogue, Louisiana.

Some open problems in combinatorics. UNCG math seminar, Greensboro, North Carolina.

The BKR inequality on finite distributive lattices. UNCG math seminar, Greensboro, North Carolina.

Brett Tangedal

Explicit Computation of Gross-Stark Units over Real Quadratic Fields. AMS Sectional Meeting, Special Session on Algebraic Number Theory, Diophantine Equations and Related Topics, University of Hawaii, Honolulu, Hawaii.

Sine-like Functions and their Applications to Geometry, Algebra, and Algebraic Number Theory.   Mathematics Seminar, High Point University, High Point, North Carolina.

Jerry Vaughan

Equivalent conditions to Mrowka's construction of a unique z-ultrafilter on ψ-spaces.   VI Workshop on Coverings, Selections, and Games in Topology, Caserta, Italy.

Several presentations on my current research.   Carolina Topology Seminar, Charlotte, Pembroke, North Carolina.

Dan Yasaki

Applications of Koecher complexes to number theory.   UNCG AC/NT Seminar, Greensboro, North Carolina.

Some explicit delta = 1,2 computations.   PANTS XVIII, Winston Salem, North Carolina.

Perfect unary forms over real quadratic fields.   Number Theory Seminar at the University of South Carolina, Columbia, South Carolina.

Some explicit delta = 1, 2 computations.   BIRS workshop: Torsion in the homology of arithmetic groups: geometry, arithmetic, and computation, Banff, Canada.

Computations with explicit reduction theories (SQuaRE−Structured Quartet Research Ensemble), American Institute of Mathematics, Palo Alto, California.

4.5 Department Journals
Journal of Statistical Theory and Practice
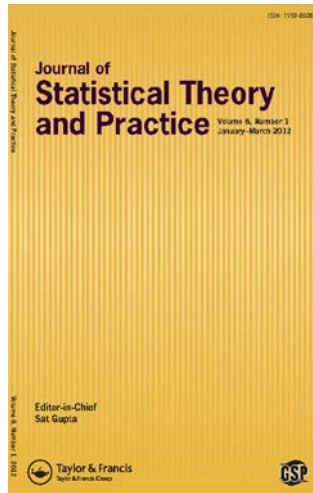
The Journal of Statistical Theory and Practice (http://www.tandfonline.com/loi/UJSP20) was conceived and started in 2007 by Professor Sat Gupta, Department of Mathematics and Statistics at the University of North Carolina at Greensboro. Its editorial board boasts of some of the most eminent academics in the field of statistics such as C. R. Rao (Penn State), Joe Gani (Australian National University), Alan Gelfand (Duke University), Sergio Verdu (Princeton University), Dan Zelterman (Yale University), and Pranab Sen (UNC Chapel Hill).

The main goal of JSTP is to publish expeditiously original research papers covering theory and applications of statistics. Each paper is refereed by two anonymous referees in addition to one of the Associate Editors. The usual turnaround time for the first review is 90 days. From time to time, the journal also publishes biographies of eminent statisticians in its Life and Work sequence. Some of the eminent statisticians/mathematicians who have been featured include R. A Fisher, S. N. Roy, Leonhard Euler, Jack Kiefer, C. R. Rao, and Charles Heyde.

Effective March 2012, the journal is published by Taylor and Francis. The journal publishes four issues every year, with more than 50 papers appearing in Vol. 6, 2012. Author affiliations included Hungarian Academy of Sciences, U C Berkeley, University of Technology, Sydney, Australia, ISI, UC Davis, Texas A & M, Penn State, Sheffield University, McMaster University, and many other major research centers.

Sat Gupta serves as Editor-in-chief for the journal.

Topology and its Applications

Professor Jerry Vaughan, along with his colleague Jan van Mill (Vrije Universiteit, Amsterdam) are Editors-in-Chief of the research journal *Topology and its Applications* (http://www.journals.elsevier.com/topology-and-its-applications) published by Elsevier Science B.V.   They and four managing editors will handle submissions. The journal is primarily devoted to publishing original research papers in most areas of topology such as algebraic, general, geometric, and set-theoretic topology, as well as papers that concern interaction between and applications of topology to other mathematical disciplines, e.g., topological algebra, topological dynamics, functional analysis, category theory, theoretical computer science, etc. The journal, which began in 1971, continues to grow. The number of submissions has more than doubled during the past ten years. The journal will publish 27 issues in 2013; an issue contains about 110 pages.

5. Grant Proposals and Awards

Academic Year 2012–13 Submitted Grant Proposals					
PI Name	**Co-PIs**	**Project Name**	**Sponsor**	**Funded/ Pending/ Not Funded**	**Amount Funded**
Gregory Bell	NONE	Scientific and Engineering Applications of Algebraic Topology	University of Minnesota Institute for Mathematics and its Applications	Funded	$20,000 09/03/2013–12/15/2013
Maya Chhetri	NONE	Nonlinear boundary value problems with semipositone structure	Simons Foundation	Not Funded	
Talia Fernos	NONE	Low Dimensional Cohomology and the Geometry of Hilbert Space	National Science Foundation (NSF)	Funded	$228,065.42 09/01/2013–08/31/2018
Talia Fernos	NONE	Low Dimensional Cohomology and the Geometry of Hilbert Space	Simons Foundation	Funded*	$35,000 09/01/2013–08/31/2018
Talia Fernos	NONE	The Poisson Boundary for Median Spaces	Association for Women in Mathematics (AWM)	Not Funded	
Sat Gupta	**Jan Rychtar, Ratnasingham Shivaji**	International Conference on Advances in Interdisciplinary Statistics and Combinatorics	Institute of Mathematics and its Applications (IMA)	Funded	$2,000 01/01/2012–06/30/2013
Sat Gupta	Rebecca Crews, **Scott Richter, Jan Rychtar**	International Conference on Advances in Interdisciplinary Statistics and Combinatorics	National Science Foundation (NSF)	Funded	$20,000 09/01/2012–08/31/2014

*Did not accept since she was also awarded an NSF Grant

Sat Gupta	Rebecca Crews	International Conference on Advances in Interdisciplinary Statistics and Combinatorics	North Carolina Chapter of the American Statistical Association (NCASA)	Funded	$3,500 10/05/2012–06/30/2013
Jan Rychtar	NONE	Game-theoretical models in biology	Simons Foundation	Funded	$35,000 09/01/2012–08/31/2017
Jan Rychtar	**Maya Chhetri, Sat Gupta, Ratnasingham Shivaji**	The Eighth Annual UNCG Regional Mathematics & Statistics Conference	Mathematical Association of America (MAA)	Funded	$2,600 09/01/2012–12/31/2012
Jan Rychtar	**Maya Chhetri, Sat Gupta, Ratnasingham Shivaji**	The 8th Annual UNCG Regional Mathematics and Statistics Conference	National Science Foundation (NSF)	Funded	$10,000 09/01/2012–12/31/2012
Jan Rychtar	Tsvetlanka Sendova (Bennett College), Hyunju Oh (Bennett College)	Game Theory and Applications	Mathematical Association of America (MAA)	Funded	$26,360 05/01/2013–12/31/2013
Jan Rychtar	**Maya Chhetri, Sat Gupta, Ratnasingham Shivaji**	The Annual UNCG Regional Mathematics & Statistics Conference	National Science Foundation (NSF)	Funded	$42,000 09/01/2013–08/31/2016
Jan Rychtar	NONE	REU Site: Mathematical Biology at UNCG	National Science Foundation (NSF)	Not Funded	
Jan Rychtar	NONE	Mathematical models of territorial interactions	National Science Foundation (NSF)	Not Funded	
Jan Rychtar	**Maya Chhetri, Sat Gupta, Ratnasingham Shivaji**	The 9th UNCG RMSC conference	Institute of Mathematics and its Applications (IMA)	Not Funded	
Olav Rueppell (Biology)	**Jan Rychtar**	REU Site Biological Networks Studies at UNCG	National Science Foundation (NSF)	Not Funded	
Department representative: **Carol Seaman**	**Dohyoung Rhang**	AToMS: STEM Living Learn Community	UNCG	Funded	$69,000 07/01/2012–06/30/2013

P.H. Wilson	**Carol Seaman**, K. Hewitt, H.A. Downs	NC Quest Core Math II	Department of Education (DE)	Funded	$299,929 04/01/2013–03/31/2015
Carol Seaman	Jeffery Patton, Lynn Sametz, Malcolm Schug, Jerome Walsh, Dianne Welsh	STEM Inspiration through Involvement, Investigation, and Innovation	National Science Foundation (NSF)	Not Funded	
Ian Beatty (Physics and Astronomy)	Lynn Sametz, **Carol Seaman**, Malcolm Schug	PBL Realized Across the Curriculum to Transform the Introductory STEM Experience (PRACTISE)	National Science Foundation (NSF)	Pending	
Ratnasingham Shivaji	NONE	P-3 Funds to work with Jerome Goddard II (Auburn University Montgomery) on NSF proposal	College of Arts and Sciences (UNCG)	Funded	$3,000 08/01/2012–06/30/2013
Ratnasingham Shivaji	NONE	P-3 Funds to work with Jerome Goddard II (University of Alabama Montgomery) on NSF proposal	College of Arts and Sciences (UNCG)	Funded	$3,000 06/04/2013–06/30/2014
Ratnasingham Shivaji	NONE	Positive Solutions to Classes of singular Nonlinear Eigenvalue Problems	Simons Foundation	Not Funded	
Ratnasingham Shivaji	**Maya Chhetri**	Population Dynamics with Diffusion, Harvesting and Grazing	BYU Center for Undergraduate Research in Mathematics (CURM)	Not Funded	
Ratnasingham Shivaji	J. Goddard (Auburn University of Montgomery)	Population dynamics with diffusion, harvesting, grazing, and negative density dependent emigration on the boundary	National Science Foundation (NSF)	Not Funded	

Clifford Smyth	NONE	Collaborations in Combinatorics	Simons Foundation	Funded*	$35,000 09/01/2012–08/30/2017
Clifford Smyth	NONE	Correlation inequalities	National Security Agency (NSA)	Funded	$28,514 01/01/2013–01/01/2015
Dan Yasaki	NONE	P-3 Funds for Modular Forms over Complex Cubic Fields	College of Arts and Sciences (UNCG)	Funded	$2,300 09/15/2012–06/30/2013
Dan Yasaki	**Sebastian Pauli, Brett Tangedal**	UNCG Summer School in Computational Number Theory	National Security Agency (NSA)	Funded	$14,600 04/01/2013–03/31/2014
Dan Yasaki	**Sebastian Pauli, Filip Saidak, Brett Tangedal**	UNCG Summer School in Computational Number Theory	National Science Foundation (NSF)	Funded	$53,748 04/01/2013–03/31/2016
Active Funded Projects (starting date prior to 07/01/2012)					
S. Danford	Gerrace, Tate, Lepri, Cannon, Nile, **Clifford Smyth**	STAMPS (Science, Technology, and Math Preparation Scholarships)	National Science foundation (NSF)		$598,000 09/01/2010–08/31/2014
Tracey Howell	A. Edward Uprichard	The Cumulative Effect: UNC System/Guilford County Schools Mathematics Project	Cemala, Joseph M. Bryan, and Weaver Foundations		$1,153,333 07/01/2009–06/30/2013
Tracey Howell	A. Edward Uprichard	The Cumulative Effect: UNC System/Guilford County Schools Mathematics Project	Cemala, Joseph M. Bryan, and Weaver Foundations		$2,050,000 09/01/2006-07/31/2012
Susan Phillips	Vincent Henrich, Sandra Mace, **Scott Richter**	Noise Induced Hearing Loss: Threshold, Exposure and Genetic Susceptibility	National Institute on Deafness and Other Communication Disorders		$378,619 05/28/2010–04/30/2013
Jan Rychtar	NONE	REU Site: Interdisciplinary Quantitative Science REU at	National Science Foundation (NSF)		$182,766 05/01/2009–04/30/2013

*Did not accept since he was also awarded an NSA Grant

		UNCG			
Jan Rychtar	**Maya Chhetri**, Mary Crowe, David Remington, Olav Rueppell	UNCG Group Undergraduate Training in Mathematics	National Science Foundation (NSF)		$233,820 09/01/2009–07/31/2013
Debra Wallace	Robert Aronson, Tracy Bartlett, Susan Calkins, Vincent Francisco, **Sat Gupta**, Erik Hines, Jie Hu, Julia Jackson-Newsom, **Scott Richter**, Terry Shelton	TRIAD-2 Center for Health Disparities Research	National Institutes of Health (NIH)		$4,792,825 06/01/2012–04/30/2016
Peter Wilson	**Carol Seaman**	Core-Math: Supporting the Implementation of the Common Core State Standards Using Learn Trajectories	NC Quest		$299,922 03/04/2011–09/30/2012

6. Undergraduate Program

Effective Fall 2012, we reorganized the undergraduate program to offer the following undergraduate programs:

-BA in Mathematics
-BA in Mathematics with teaching licensure
-BS in Mathematics with concentration in mathematics
-BS in Mathematics with concentration in Statistics

However, the students enrolled in our program before Fall 2012 continue their course of study in the various degree programs and concentrations outlined in the chart below.

Igor Erovenko, Director of Undergraduate

Undergraduate Degree Program with concentrations	2012–2013 Student Enrollment
BA in Mathematics with teaching licensure	26
BA in Mathematics with concentration in mathematics	23
BS in Mathematics with concentration in mathematics	11
BS in Mathematics with concentration in statistics	24
BS in Mathematics with concentration in computer Science	2
BS in Mathematics with concentration in computer science with teaching licensure	1
BS in Mathematics with concentration in applied mathematics	9
BS in Mathematics with concentration in interdisciplinary mathematics	3
BS in Mathematics with concentration in pure mathematics	10
BS in Mathematics with concentration in pure mathematics with teaching licensure	1
OVERVIEW: Undergraduate Degree Program	**2012–2013 Student Enrollment**
BA in Mathematics	49
BS in Mathematics	61

The Department of Mathematics and Statistics conducted its first formal GMT Assessment in the fall 2012 semester, and its second formal GMT assessment in the spring 2013 semester. The assessment was embedded in the final exams of all GMT marked courses. Most of the questions on the exams were allocated to verify achievement of one or several GMT student learning outcomes. The data we

gathered as a result of this exercise leads us to believe that students who achieve at least an average mastery of a GMT course material in the context of the actual subject taught in the class (which we view as getting a final grade of C or better) demonstrate successful achievement of all five GMT SLOs.

We offered an experimental MAT 190 (Precalculus) course in the fall 2012 semester as part of our commitment to look into restructuring the current two-semester precalculus sequence. The experimental class faced certain challenges, and we went back to the drawing board to redesign it. In particular, we plan to require students to take a special placement test to qualify to enroll in this fast-track precalculus class. We also plan to use a different textbook.

We will continue to conduct formal GMT assessment in the 2013—2014 academic year. In the fall 2013 semester we are offering a redesigned version of the experimental MAT 190 course. We will come back to discuss the possibility of restructuring our precalculus offerings once we have data from the second iteration of the experimental MAT 190 course.

As part of our commitment for high quality instruction in the classroom, we continued to keep the sizes of all lecture sections in all mathematics and statistics classes at 50, while most of the classes at the level above remedial have a limit of 35 seats and all classes at 300 level or above are limited to 25 students per section.

During the 2012–2013 academic year, the following students completed their degrees: James Byrd, James Davis, Adam Eury, Lance Everhart, Corinne Finamore, William Kager, Steven Kaufmann, Sijia Liang, Yang Lu, Evans Mack, Joshua Martin, Yusuke Matsuzaki, Diana Phelps, Abhishek Pratap, Desmond Reaves, Kristina Rhodes, Robert Stoesen, Anna Tuck, and Shiyuan Wang.

More Pictures from the May 2013 Departmental Graduation Ceremony

7. Undergraduate Research Program

Background and history

The major push for undergraduate research in the Department started in 2005 with the establishment of a math/biology research group by Drs. Rychtar, Chhetri and Gupta from the Department of Mathematics and Statistics, Drs. Rueppell and Remington from the Department of Biology, and Dr. Crowe from the Office of Undergraduate Research. The group has been funded by two major NSF grants; 0634182 (2006-2010) and 0926288 (2009-2013). Over the years, this research has involved 16 faculty and over 45 undergraduate students. The students and faculty received 33 awards and recognitions, gave over 250 presentations, and published over 40 research articles in major international journals.

Research projects in 2011-2012

Each year, students and faculty work in interdisciplinary teams of 4–6 people, consisting typically of 2–3 undergraduate students (at least one from math and one from biology) and 2–3 faculty members (at least one from math and one from biology). The following were research projects in 2012–2013.

Stealing behavior and the effect of the information

Stealing is a relatively prevalent behavior in nature. On the surface, it seems logical that in order to steal, one needs access to detailed information and the more information the better. However, mathematical models developed by a group led by Dr. Rychtar suggest that very often, not knowing too much is better than knowing a lot.

Evolution of Cooperation

The evolution of cooperation and altruism has intrigued scientists for more than a century. It seems to have individuals act against the Darwinian paradigm of individual fitness maximization. The group led by Drs. Rueppell and Rychtar studies the evolution of cooperation in social insect and other animal groups with complex life histories.

Ecology of Infectious Diseases

A mosquito bite is bad on its own but things can get really ugly when the mosquito carries a disease. The group led by Wasserberg and Smyth modeled complex systems of vector born diseases such as the La-Crosse encephalitis which is relatively common in Western-Carolina.

Automated video processing

How do people know so many things about nocturnal animals such as mice and bats? It is simple. Use thermal cameras, record videos for many nights, and then *personally* watch the videos. Very soon, this process will become increasingly simplified as the group, led by Kalcounis-Rueppell and Pauli, works on computer programs for automated processing of such recordings.

Detecting and Modeling Natural Selection

Thanks to Darwin, many have no doubts about the existence of evolution and natural selection. However, very few really saw it in action. The group led by Schug, Remington and Deutsch builds computer models and studies the wild population of *Drosophila Ananassae* in order to see evolution of eye genes of certain this species

Thermoregulation in plants

The group led by Lacey and Richter is addressing questions about the evolution of thermal acclimation in plants and its potential impact on species survival in different thermal environments and in the face of global warming. The experimental organism *Plantago lanceolata*, is a temperate perennial weed introduced into North America from its native Eurasia. It can partially thermoregulate its reproduction by altering floral color and reflectance in the visible and near-infrared regions in response to external temperature at the time of flowering.

Resource allocation

Plants such as Arabidopsis lyrata provide an excellent model organism for resource allocation. The group led by Remington and Rychtar studied this plant in order to better understand the mechanisms behind optimal division of limited (and unpredictable) resources and their allocation for reproduction or survival.

Randomized response techniques

Do you want to know how many students take illegal drugs or engage in illegal or dangerous behavior? Direct and personal questioning usually works best, but in this case, chances of getting truthful answers are slim. A group led by Dr. Gupta uses statistics to develop a survey method that allows anonymous individual responses, yet provides very good estimates on the aggregate level.

NSF funded REU Program at UNCG

Faculty members Jan Rychtar, Sat Gupta, and Sebastian Pauli were involved in the REU program. Jan Rychtar is PI on the NSF grant 0850465 REU Site: Interdisciplinary Quantitative Science REU at UNCG. The grant provides support for interdisciplinary teams of UNCG faculty to conduct research with UNCG as well as non-UNCG students.

The primary focus of this program was the undergraduate student training and education related to research within STEM fields. In total, 28 student participants worked in research labs of faculty mentors, and developed and completed their own research projects. The projects were often interdisciplinary, spanning areas of mathematics, statistics, biology, chemistry and physics. The students were trained in all aspects of the research, and were provided with a research experience that begins with creating testable hypotheses and literature search, through project specific research techniques, and concludes with a public presentation (written and oral) of the new knowledge gained.

The students' work resulted in 10 manuscripts in the following journals: *Biochemistry*, *Journal of Theoretical Biology*, *PloS One* (two manuscripts), *Experimental Gerontology, and Springer Proceedings in Mathematics and Statistics* (5 manuscripts). The work also resulted in 47 conference presentations, including 11 presentations at international conferences. Also, our students won 5 awards for their presentations (at MathFest 2009, Entomological Society of America meeting 2009, NC Academy of Science meeting 2010 and 2011, International Conference on Advances of Interdisciplinary Statistics and Combinatorics, 2012).

We exposed students to career options in academics, industry, and government and increased their awareness of graduate school opportunities and the preparation needed for graduate school. Out of 15 student that graduated, 6 are in the grad school and 4 did not get to the school of their choice and will reapply again (they currently work as research associates/interns at research institutes/scientific consulting firms), 5 decided not to go into grad school for now.

The REU helped to create a truly interdisciplinary culture within UNCG. Thanks to this project, a group of faculty from Biology, Mathematics and Statistics, Chemistry and Physics department regularly work together on interdisciplinary projects.

Student Awards

• Tracy Spears Gill won first place for the Best Oral Presentation during BigSURs, 2013

• Thomas Parrish won third place for the Best Student Presentation during 8th annual UNCG RMSC, 2012

• Anna Tuck, Tracy Spears, Caitlin Ross received the Best Paper Award for Undergraduate Presenters at the AICS 2012 conference

• Anna Tuck, Tracy Spears, Caitlin Ross, David Sykes and Thomas Parrish received the NSF Young Researcher Awards to present at the AICS 2012 conference.

Student Papers (Undergraduate students in bold)

Dagny Butler, R. Shivaji, and **Anna Tuck** (2013): S-shaped bifurcation curves for logistic growth and weak Allee effect growth models with grazing on an interior patch, accepted for publication, Electronic Journal of Differential Equations (Conf. Series)

Broom, M., Rychtar, J., & **Sykes, D.** (2013) "The effect of information on payoffs in kleptoparasitic interactions," To appear in *Springer Proceedings in Mathematics & Statistics*.

Caitlin Ross and Olav Rueppell and Jan Rychtar (2013): A spatially organized population model to study the evolution of cooperation in species with discrete life-history stages. To appear in *Springer Proceedings in Mathematics & Statistics*.

Tracy Spears Gill, Anna Tuck, Sat Gupta, Mary Crowe, and **Jennifer Figueroa** (2013): A Field Test of Optional Unrelated Question Randomized Response Models: Estimates of Risky Sexual Behaviors. To appear in *Springer Proceedings in Mathematics & Statistics*.

Matina Kalcounis-Rueppell, **Thomas Parrish**, and Sebastian Pauli (2013): Application of Object Tracking in Video Recordings to the Observation of Mice in the Wild To appear in *Springer Proceedings in Mathematics & Statistics*.

Sat Gupta, **Anna Tuck**, **Tracy Spears Gill** and Mary Crowe: Optional unrelated-question randomized response models, to appear in Involve

Major student conference presentations

Student: **Frederick Beck**

Mentor: Clifford Smyth

Presentation: The Lonely Runner Conjecture, 7th Annual Carolyn & Norwood Thomas, Undergraduate Research Expo, UNCG, 2013

Student: **Anna Tuck**

Mentor: Ratnasingham Shivaji

Presentation: Population Dynamics Model with Logistic Growth, Weak Allee Effect, and Grazing on an Interior Patch, Mathematical Association of America MD-DC-VA Section Meeting , Salisbury University - Salisbury, MD, 2013

Student: **Anna Tuck**

Mentor: Sat Gupta

Presentation: Estimating Sexual Behaviors among College Students Using Optional Unrelated Question RRT Models, 7th Annual Carolyn & Norwood Thomas Undergraduate Research Expo*,* 2013

Presentation: Optional Unrelated-question Randomized response model, International Conference on Statistics and Informatics in Agricultural Research, New Delhi, India, 2012

Presentation: Parameter Estimation for Quantitative and Binary Optional Unrelated-Question Randomized Response Model, National Conference on Statistics for Twenty-First Century-2012, Kerala University, India, 2012

Presentation: Estimating parameters for optional unrelated-question randomized response models, Undergraduate Research Conference at the Interface of Biology and Mathematics, NIMBioS, Knoxville, TN, 2012

Presentation: Optional Unrelated-Question Randomized Response Models 8th Annual University of North Carolina Greensboro Regional Undergraduate Mathematics and Statistics Conference, University of North Carolina at Greensboro, Greensboro, NC, 2012

Student **David Sykes**

Mentor: Jan Rychtar

Presentation: Resource holding potential and parasitism, National Conference of Undergraduate Research, University of Wisconsin – Madison, 2013

Presentation: Individualized Resource Valuation in Kleptoparasitic Interactions, 7th Annual Carolyn & Norwood Thomas Undergraduate Research Expo, 2013

Presentation: Cost-Benefit Analysis of Kleptoparasitic Interactions , 2013 Joint Mathematics Meeting, San Diego, California.

Presentation: Optimal Strategies in Kleptoparasitic Interactions, International Conference on Statistics and Informatics in Agricultural Research, New Delhi, India, 2012

Presentation: The effect of Information on Kleptoparasitic Interactions, SNCURCS 2012, Durham, North Carolina

Presentation: Kleptoparasitic Interactions and Internal States, UNCG RMSC, Greensboro, NC, 2012

Presentation: The Effect of Internal States on Kleptoparasitic Interactions, International Conference on Advances in Interdisciplinary Statistics and Combinatorics, Greensboro, NC, 2012

Student: **Caitlin Ross**

Mentors: Jan Rychtar and Olav Rueppell

Presentation: The effect of varying life stages on the evolution of altruism, National Conference of Undergraduate Research, University of Wisconsin – Madison, 2013

Presentation: The Effect of Life History Structures on the Evolution of Altruism, 7th Annual Carolyn & Norwood Thomas Undergraduate Research Expo, 2013

Presentation: How the Evolution of Altruism is Affected by Various Aging Structures, International Conference on Statistics and Informatics in Agricultural Research, New Delhi, India, 2012

Presentation: The impact of life history structures on the evolution of altruism, Undergraduate Research Conference at the Interface of Biology and Mathematics, Knoxville, Tennessee, 2012

Presentation: The Effect of Aging Structures on the Evolution of Cooperation.   UNCG RMSC, Greensboro, North Carolina, 2012

Presentation: The Influences of Life Stages on the Evolution of Altruism, International Conference on Advances in Interdisciplinary Statistics and Combinatorics, Greensboro, NC, 2012

Student: **Tracy Spears**

Mentor: Jan Rychtar

Presentation: Application of Game-Theoretical Models to Influenza Vaccination Decisions, BigSURs, High Point, 2013

Presentation: Influenza Vaccination: Game-Theoretical Models, 7th Annual Carolyn & Norwood Thomas Undergraduate Research Expo, 2013

Student: **Tracy Spears**

Mentor: Sat Gupta

Presentation: Applying Optional Unrelated-Question Randomized, International Conference on Statistics and Informatics in Agricultural Research, New Delhi, India, 2012

Presentation: Estimating risky sexual behaviors among college students using optional unrelated question RRT models, Undergraduate Research Conference at the Interface of Biology and Mathematics, NIMBioS, Knoxville, TN, 2012

Presentation: An Application of Optional Unrelated-Question Randomized Response Technique 8th Annual University of North Carolina Greensboro Regional Undergraduate Mathematics and Statistics Conference, University of North Carolina at Greensboro, Greensboro, NC, 2012

Presentation: A Quantitative Optional Unrelated-Question Randomized Response Model, International Conference on Advances of Interdisciplinary Statistics and Combinatorics, UNCG, 2012

Presentation: A Quantitative Optional Unrelated Question Randomized Response Model, National Conference on Health Statistics, Washington DC, 2012

Student: **Thomas Parrish**

Mentors: Sebastian Pauli and Matina Kalcounis-Rueppell

Presentation: Behavioral Studies of P. californicus and P. boylii Through Automated Video Processing, International Conference on Statistics and Informatics in Agricultural Research, New Delhi, India, 2012

Presentation: Determinants of free-ranging mouse activity based on remote thermal video analyses, Undergraduate Research Conference at the Interface of Biology and Mathematics, NIMBioS, Knoxville, TN, 2012

Presentation: Automated Tracking of Small Objects in Video Recordings 8th Annual University of North Carolina Greensboro Regional Undergraduate Mathematics and Statistics Conference, University of North Carolina at Greensboro, Greensboro, NC, 2012

Presentation: Behavioral Studies of P. californicus and P. boylii Through Automated Video Processing, International Conference on Advances of Interdisciplinary Statistics and Combinatorics, UNCG, 2012

Student: **Benjamin Manifold**

Mentors: Sebastian Pauli and Matina Kalcounis-Rueppell

Presentation: A Computer-Vision Approach for the Automated Analysis of Peromyscus californicus Behavior, 7th Annual Carolyn & Norwood Thomas Undergraduate Research Expo, 2013

Some of our undergraduate research students.

UNCG Undergraduate Researchers visiting Taj Mahal and enjoying a camel safari at Jaisalmer during their visit to the International Conference on Statistics and Informatics in Agricultural Research during December 18–20, 2012.

8. Graduate Programs

Year in Review

In 2012-13 the graduate program admitted five new PhD students and four new MA students for a total of 14 students in the PhD program and 11 students in the MA program. In May 2013, the following students completed their MA degrees: Paula Hamby, John Hardee, Jeong Sep Sihm, and Michael Watts. PhD student pass rates on qualifying exams were the highest the program has ever seen and three PhD students were admitted to doctoral candidacy.

Greg Bell, Director of Graduate Studies

Ten of our PhD students led some 25 sections of 100-level mathematics lectures; our PhD and MA students tutored over 140 TA hours per week in the Math Help Center and around 35 hours in the Math Emporium. Graduate students submitted several papers, delivered over a dozen national level conference talks on their research, delivered many local talks on their research, attended conferences and colloquia, and attended many workshops and summer schools.

This year the department put together a proposal for a joint MA-PhD program. The hope is that this will serve to attract strong PhD students directly from the baccalaureate degree as well as encourage current MA students to continue to the PhD program.

Graduate Student Accomplishments

This year we introduced three new qualifying exam topics: Linear Algebra, Differential Equations, and Mathematical Statistics. Students performed better than ever on these exams. In the spring semester, roughly 85% of all attempts at the PhD exams were awarded a PhD pass.

PhD students Abraham Abebe, Danielle Moran, and Brian Sinclair all successfully defended their

dissertation topic defenses and were admitted to candidacy. All that remains for these three students to earn their PhD is to complete their dissertations.

Abraham Abebe published "A moment-based approach for DVH-guided radiotherapy treatment plan optimization" in Physics in Medicine and Biology, Vol 58, no. 6 (2013).

Rick Farr (joint with Sebastian Pauli) had a paper accepted for publication in Proceedings of the RMSC conference. The paper is "More zeros of the derivatives of the Riemann zeta function on the left half-plane."

Jeong Sep Sihm's paper "A two-stage binary optional randomized response model" was accepted for publication in Communications in Statistics – Simulation and Computation.

The paper "Uniqueness of positive solutions for a singular nonlinear eigenvalue problem when a parameter is large" by **Byungjae Son** (joint with E.K. Lee, E. Ko, and R. Shivaji) was accepted for publication in Bulletin of Belgium Mathematical Society.

The annual Regional Mathematics and Statistics Conference at UNCG was very popular among our graduate students. Among the participants this year were **Abraham Abebe**, **Rick Farr**, **Lauren Farr**, **Byungjae Son**, and **Jonathan Milstead**. **Abebe** and **R. Farr** also presented their research at this conference. **R. Farr**, **Tanja Zatezalo**,

Ricky Farr, Ph.D. student

and **Jeong Sep Sihm** also attended the Conference on Advances in Interdisciplinary Statistics and Combinatorics, where **Sihm** presented his research.

Abraham Abebe, **Quinn Morris**, and **Byungjae Son** attended the Conference on Differential Equations and Computational Simulation at Mississippi State University, where **Abebe** presented his research. Both **Rick Farr** and **Quinn Morris** presented research at the regional MAA conference in Rock

Paula Hamby, Ph.D. student

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Hill, SC. Many other students attended and participated in the conference.

Several students participated in the Graduate School's Graduate Research and Creativity Expo this year. **Abraham Abebe**, **Rick Farr**, **Lauren Farr**, and **Paula Hamby** presented research posters highlighting some of their work.

Abraham Abebe, **Rick Farr**, **Paula Hamby**, and **Brian Sinclair** were among several students who participated in the 2013 Summer School in Computational Number Theory. **Abraham Abebe**, **Paula Hamby**, **Catherine Payne**, and **Byungjae Son** attended several IMA events throughout the year.

Additionally, many students gave local presentations in seminars and at the Math Club. Also, **Catherine Payne** presented her research in the Carolina Topology Seminar.

Finally, **Paula Hamby** and **Quinn Morris** applied for and were accepted into the Graduate School's new "Preparing Future Faculty" program. This program prepares students for a career in academia with workshops in grant writing, faculty service expectation, student mentoring, and other common new faculty concerns.

Future Plans

In 2013-14, the department will propose a joint MA/PhD program in Computational Mathematics. This 75-hour program would admit students directly from the baccalaureate degree and would allow them to obtain an MA in mathematics en route to a PhD in computational mathematics. If approved by the college and the graduate school, this program would begin admitting students in Fall 2014. It would also retroactively apply to current MA students and provide means for an easy transition to the PhD program.

9. Funding Opportunities for Students

Scholarships

Our department offers numerous scholarships, each of which has different requirements and restrictions. These include:

- Helen Barton Scholarship;
- Ione Holt Grogan Scholarship;
- Vicky Langley Math Scholarship;
- Judith J. Mendenhall Scholarship;
- Mary D. Murray Scholarship in Mathematics;
- Eldon E. and Christine J. Posey Mathematics Scholarship;
- Cornelia Strong Scholarship;
- Dr. Theresa Phillips Vaughan Math Scholarship;
- Bertha Barnwell Vielhauer Endowed Scholarship.

2012–2013 Scholarship Recipients

- **Helen Barton Scholarship**:
  Abraham Abebe, Lauren Farr
- **Vicky Martin Langley Math Scholarship**:
  Kayla Jackson
- **Judith L. Mendenhall Scholarship**:
  Thomas Parrish
- **Mary D. Murray Scholarship in Mathematics**:
  Ricky Farr, Catherine Payne
- **Eldon E. and Christine J. Posey Scholarship**:
  Cassandra Brownell, Lance Everhart, Anna Tuck
- **Cornelia Strong Scholarship**:
  Corrine Finamore
- **Dr. Theresa Phillips Vaughan Math Scholarship**:
  Paula Hamby, Tanja Zatezalo
- **Bertha Barnwell Vielhauer Endowed Scholarship**:
  Joshua Martin, Thomas Parrish

Undergraduate Research Scholarships

- Helen Barton Undergraduate Research Awards in Mathematics and Statistics
- Undergraduate Research Assistantships in Mathematics and Statistics

2012–2013 Research Scholarship Recipients

- **Helen Barton Undergraduate Research Awards in Mathematics and Statistics:**
  Anna Tuck, a UNCG Math Major, received a Helen Barton Undergraduate Research Award in Mathematics and Statistics in Fall 2012 and Spring 2013 for her work on the project titled, "A population dynamics model with logistics growth and grazing in an interior patch," under the supervision of Ratnasingham Shivaji.

- **Undergraduate Research Assistantships in Mathematics and Statistics:**
  Frederick Beck, a UNCG Math Major, received a UNCG Undergraduate Research Assistantship, covering Fall 2012 and Spring 2013 as a Research Assistant under the supervision of Clifford Smyth.

There are also numerous other opportunities to financially support mathematics education at UNCG:

1. STAMPS (Science, Technology and Math Preparation Scholarships) awards up to $6750 per year in scholarship support to students who major in Biology, Chemistry & Biochemistry, Computer Science, Geographic Information Science & Earth Science, Mathematics & Statistics, or Physics & Astronomy.

2. The NSF Math-Bio Undergraduate Fellowship awards a stipend of up to $4500 per year and offers exciting research opportunities with various math-biology research projects.

3. Project ENRICH is a program in the UNCG School of Education that partners local teachers with students interested in becoming science or math teachers in K-12 education through a teacher residency program. In the five years of the Project Enrich grant, UNCG will recruit and train teachers, including about 20 resident teachers per year who will earn master's degrees and get hands-on training working with experienced teachers in the school system. Residents will be selected to mirror the diversity of the student population, must have an undergraduate degree in a content area and no teaching credential.

4. The College of Arts & Sciences UNCG Scholarships has several different scholarships for general arts and sciences. Many of these scholarships are available to undergraduate full-time students majoring in mathematics.

5. The Department of Mathematics and Statistics offers grader positions to senior qualified undergraduate students.

Graduate Assistantships

Our Graduate students are usually funded via graduate assistantships. Their duties include one or a combination of the following: teaching lower level Mathematics or Statistics courses, tutoring in the Math Help Center, or monitoring the Math Emporium Lab.

Graduate Assistantship levels:

- **$10,800+tuition waivers** for the M.A. in Mathematics (Mathematics/Applied Statistics Concentration)
- **$18,000+tuition waivers** for the Ph.D. Program in Computational Mathematics

For the 2012−13 academic year, we had fifteen Ph.D. Students and five Masters students that were funded through Graduate Assistantships.

Graduate Teaching Assistants in 2012−2013

Ph.D.	Ph.D.	M.A.
Abraham Abebe	James Rudzinski	David Barron
Kashonda Bynum	Jeong Sep Sihm	Adam Eury
Ricky Farr	Lauren Sher	Robert Stoeson
Paula Hamby	Brian Sinclair	Zane Styron
Jonathan Milstead	Byungjae Son	Mike Watts
Danielle Moran	Tanja Zatezalo	
Quinn Morris		
Michael Palmer		
Catherine Payne		

10. Mathematics Education Program

The program is coordinated by the math education faculty consisting of Dr. Carol E. Seaman, Associate Professor of Mathematics and Program Coordinator for Secondary Licensure in Mathematics, Dr. Dohyoung Ryang, Assistant Professor of Mathematics, and Dr. Tracey Howell, Academic Professional in Mathematics Education. We are responsible for teaching all courses that are specifically designated for undergraduate students seeking teaching licensure in mathematics, namely, MAT 303 (Topics in Mathematics), MAT 304 (Introduction to the Foundations of Geometry), MAT 330 (Axiomatic Foundations of Geometry), MAT 405 (Foundations of Mathematics for Teaching I), and MAT 406 (Foundations of Mathematics for Teaching II). In addition, we teach the following 500-level courses for School of Education master's students in Mathematics Education: MAT 503 (Problem-Solving in Mathematics, MAT 513 (Historical Development of Mathematics), and MAT 520 (Non-Euclidean Geometries).

Chair of Mathematics Education Committee

Students in the BA-HS major in mathematics (those seeking licensure in secondary mathematics) must complete all requirements for a BA in mathematics, including all general education and College of Arts and Sciences requirements, as well as completing MAT 330, MAT 405, MAT 406, 15 hours of professional education coursework, 100 hours of internship in local high schools, and a final semester of student teaching. The last page of this report presents the details of the program of study. Students must maintain a 2.5 GPA in mathematics to qualify for student teaching. At the end of their program of study, students also complete an electronic portfolio of licensure evidences (as specified by the state of North Carolina) as part of their application to the state for a teaching license.

As well as teaching mathematics courses for preservice and in-service teachers, we advise all undergraduate students in the BA-HS in mathematics major, participate in the Council of Program Coordinators (a School of Education initiative that administers all the professional requirements of the teacher preparation programs at UNCG), write and administer grants related to mathematics education, lead department efforts to recruit and retain mathematics majors, present professional development opportunities for teachers in local school districts, and engage in scholarly research in undergraduate mathematics education.

In addition to these activities within the department Dr. Seaman, Dr. Ryang, and Dr. Howell participate in the RISE (Research and Instruction in STEM Education) Network on campus for which Dr. Seaman serves as faculty facilitator. In this capacity Dr. Seaman attended PKAL Academic Renewal Conference on "Next Generation STEM Learning: Investigate, Innovate, Inspire" in November 2012 and, along with four other RISE members, the AAC&U 2012 Institute on Integrative Learning and the Departments in July 2012. Dr. Seaman also presented the work of the UNC system's initiative on a program of study leading to an Add-on License in Elementary Mathematics at the Joint Meetings of the Mathematics Association of America (MAA) and the American Mathematical Society (AMS) in January 2013.
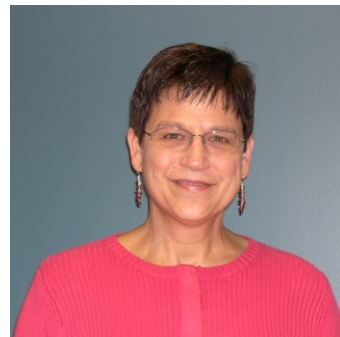
As a part of the department's service to the community, Dr. Seaman and Dr. Howell attend the Department Head Meetings and the Teaching and Learning Seminars presented by Guilford County Schools Secondary Mathematics Curriculum specialists to offer support for colleagues in high school mathematics classrooms. Each August the department welcomes high school mathematics teachers in Guilford County "back to school" with a breakfast buffet at their annual district professional development day and each June we thank the mathematics department heads in each high school for their work during the school year with a lunch in their honor at a local restaurant.

We also participate in national, state, and regional conferences that have a focus on mathematics education such as the National Council of Teachers of Mathematics (NTCM), Southeast Region of the MAA (MAA-SE), and the North Carolina Council of Teachers of Mathematics (NCCTM). Dr. Ryang presented papers at conferences of both organizations: "Does gender affect the mathematics teaching efficacy?" at MAA-SE in March 2013 and "Is there a general formula for the sum of t-cubes of first n consecutive positive integers?" and "Fractions, ratios, and rational numbers" at NCCTM in October 2012. The "Fractions, ratios, and rational numbers" talk was co-presented by an undergraduate student majoring in middle grades mathematics education. Dr. Howell presented her work on classroom discourse and mathematical argumentation in high school Algebra I classrooms at the meeting of the Association of Mathematics Teacher Educators (AMTE) in January, 2013 and at the Research Pre-session of NCTM in April, 2013.

Dr. Seaman and Dr. Ryang both participated in the implementation of the first year of the STEM living and learning community entitled Achieving Together in Mathematics and Science (AToMS). The goal of AToMS is to attract students into STEM fields (including STEM teaching) and retain them. Students in AToMS have the choice to live together while enrolling in common integrated courses or may live off campus or anywhere on campus while still enrolling in these same common integrated courses and participating in co-curricular experiences. These experiences in AToMS strengthen students' scientific and/or mathematical knowledge through the use of student-oriented teaching methods and improve the students' communication skills to enable them to convey concepts in science and mathematics to each other and to those in the outside community.

In the 2012-2013 year, Dr. Seaman partnered with Dr. Holt Wilson of the department of Teacher Education and Higher Education and with Dr. Kimberly Hewitt of the department of Educational Leadership and Cultural Foundations to write a grant proposal entitled *Core-Math II: Assisting Teachers' Implementation of the Common Core State Standards for Mathematics With Learning Trajectories, Reform-Oriented Pedagogy, and Leadership for Supporting and Sustaining Instructional Change*, which was funded through the NC Quest state grant program. Dr. Seaman and Dr. Howell will deliver a 96-hour professional development experience for 15 elementary (K-5) teachers in Rockingham County during the 2012-13 school year as part of this grant.

11. Lecture Series, Colloquia, Seminars and Research Visitors

11.1 Helen Barton Lecture Series in Computational Mathematics and Mathematical Sciences

Computational Mathematics:

The Lecture Series in Computational Mathematics at UNCG has been organized by the Department of Mathematics and Statistics since Fall 2011. The target audience is graduate students and upper level undergraduate students, as well as faculty members. Experts in their fields will cover a variety of topics in computational mathematics and computational statistics, as well as their applications in other disciplines. A particular aim of the lecture series is to spark interest among students in the newer trends in computational mathematics and its applications. The organizing committee of the lecture series consists of Sat Gupta, Sebastian Pauli, Jan Rychtář, and Clifford Smyth.

Mathematical Sciences:

The Lecture Series in Mathematical Sciences at UNCG has been organized by the Department of Mathematics and Statistics since Spring 2012. The target audience is graduate students and upper level undergraduate students, as well as faculty members. This lecture series features a very distinguished mathematician who gives a series of three lectures on a topic in the mathematical sciences. A particular aim of the lecture series is to spark interest among students in the newer trends in the mathematical sciences and its applications. The organizer for the lecture series is Maya Chhetri.

UNCG HELEN BARTON LECTURE SERIES IN COMPUTATIONAL MATHEMATICS

FALL 2012

Sponsored by:
The Department of Mathematics and Statistics

Speakers

Nalini Ravishanker (University of Connecticut)
Dynamic Bayesian modeling for discrete valued time series (marketing, highway safety, ecology applications)
October 8 at 3pm in Stone 204, Refreshments at 2:30 in Petty 116

Paul Gunnells (University of Massachusetts)
Expander graphs
October 23 at 4pm in Petty 150, Refreshments at 3:30 in Petty 116

Chris Cosner (University of Miami)
Modeling the evolution of dispersal with reaction-advection-diffusion equations and their discrete and nonlocal analogues
November 5 at 4pm in Petty 150, Refreshments at 3:30 in Petty 116

Mike Mesterton-Gibbons (Florida State University)
Strategic behavior among animals: insights from game-theoretic models
November 14 at 4pm in Petty 223, Refreshments at 3:30 in Petty 116

Organizing Committee: Talia Fernos, Sat Gupta, Sebastian Pauli (Chair), Jan Rychtar, Shan Suthaharan (Computer Science)

For abstracts and further information see http://www.uncg.edu/math/talks.

HELEN BARTON LECTURE SERIES IN COMPUTATIONAL MATHEMATICS

Spring 2013

Sponsored by the Department of Mathematics and Statistics at UNCG

Speakers

John Harer (Duke University)
Topology, Geometry and Statistics: Merging methods for data analysis
Wednesday, February 13th at 4pm in Petty 313, Refreshments at 3:30 in Petty 116

Ken Bollen (The University of North Carolina at Chapel Hill)
New tests of the dimensions of measures using instrumental variables
Monday, February 25th at 4pm in Petty 213, Refreshments at 3:30 in Petty 116

Erich Kaltofen (North Carolina State University)
Approximation of data points by sparse polynomial models
Wednesday, March 27th at 4pm in Petty 313, Refreshments at 3:30 in Petty 116

Yuliang Zheng (The University of North Carolina at Charlotte)
Public Key Encryption for Cloud Storage
Wednesday, April 10th at 4pm in Petty 313, Refreshments at 3:30 in Petty 116
(Co-sponsored by the Department of Computer Science at UNCG.)

Mikhail Ershov (University of Virginia)
Product replacement algorithm and Kazhdan's property (T)
Friday, April 19th at 4pm in Petty 150, Refreshments at 3:30 in Petty 116

Mark Broom (City University London, U.K.)
A general framework for analysing multiplayer games in networks
Wednesday, May 22nd at 4pm in Petty 313, Refreshments at 3:30 in Petty 116

Organizing Committee: Talia Fernos, Shan Suthaharan (Computer Science), Sat Gupta, Sebastian Pauli (chair), Jan Rychtar

For more information see http://www.uncg.edu/math/talks/lecture-series.html

THE UNIVERSITY of NORTH CAROLINA
GREENSBORO
Department of Mathematics & Statistics

Helen Barton Lecture Series in Mathematical Sciences

Dr. Alfonso Castro

Professor of Mathematics
Harvey Mudd College

Solvability of semilinear boundary value problems with discrete spectrum

Abstract

Semilinear equations with discrete spectrum are present in multiple scientific problems. Problems, methods, and open questions will be presented. First we will consider two point boundary value problems for ordinary differential equations such as those arising in the study of a simple pendulum. Then we will analyze higher dimensional equations with symmetries leading to singular one-dimensional problems. Finally we will see how the presence or absence of compactness impacts the existence of solutions to such equations.

Dr. Alfonso Castro is a Professor of Mathematics at Harvey Mudd College, CA. He received his B.S. and M.S. degrees from Colombia, Bogota and PhD from University of Cincinnati, OH in 1977.

Professor Castro is a world renowned expert in the area of Partial Differential Equations. In particular his interest lies in variational methods, inverse problems and water waves (solitons). He has more than 80 articles in reputed journals and supervised 13 PhD students at various institutions. His research, for example, involves understanding the temperature distribution in a star which requires balancing heat diffusion, generation and radiation. In recent years, he has fully classified the radial solutions to this problem. The fundamental nature of his research allows him to involve mathematics majors interested in differential equations in his research program.

He served as the program director of National Science Foundation from 1989 to 1991. He is in the editorial board of many journals. Most notably, he is the Co-founder and Managing Editor of the open access journal *Electronic Journal of Differential Equations*.

Lecture 1

Monday, August 27th 2012
Reception: Lounge, Petty 120, 3:30-4:00 PM
Lecture: Petty 150, 4:00 PM

This lecture will introduce audience to boundary value problems to energy preserving ordinary differential equations. The role of the asymptotic behavior of the potential energy will be emphasized.

Lecture 2

Wednesday, August 29th 2012
Reception: Lounge, Petty 120, 3:30-4:00 PM
Lecture: Petty 150, 4:00 PM

This lecture will discuss the solvability of boundary value problems for ordinary differential equations where energy is not preserved. Applications to radial solutions to semilinear elliptic boundary value problems will be presented.

Lecture 3

Friday, August 31st, 2012
Reception: Lounge, Petty 120, 3:30-4:00 PM
Lecture: Petty 150, 4:00 PM

The final lecture will be devoted to the effect of compactness, or lack of it, on the existence of solutions boundary value problems.

For more information, please see: http://www.uncg.edu/math/talks/index.html or contact Dr. Maya Chhetri at maya@uncg.edu.

THE UNIVERSITY of NORTH CAROLINA
GREENSBORO
Department of Mathematics & Statistics

Helen Barton Lecture Series in Mathematical Sciences

Dr. Klaus Schmitt

Professor Emeritus of Mathematics
University of Utah

An Overview of Variational Inequalities -Applications to Obstacle, Contact, and Unilateral Problems- Elliptic Problems Subject to Constraints

Abstract

The lectures will provide an introduction to the theory of variational inequalities, its history, and also its applications to problems in mechanics, such as obstacle, contact and unilateral problems. Applications, of a more theoretical nature are also given to PDE problems of elliptic type. The basic motivating principle for studying variational inequalities emanates from classical calculus ideas connected with the process of minimizing (or maximizing) functionals of several variables on given closed convex sets (the constraint sets). Such problems give rise to inequalities, whose solutions are, for certain classes of functionals, solutions of the given extremum problem. This, in a very natural way leads to the development of an existence (often also uniqueness) theory for more general inequalities. The great utility of the theory becomes apparent through the realization that many of the finite dimensional considerations may be extended to infinite dimensional spaces and thus allow for the treatment of certain obstacle problems associated with elliptic partial differential equations (e.g. the defection of a beam constrained by obstacles or, more generally, the defection of membranes subject to constraints, flux problems, etc.).

Professor Schmitt is a professor emeritus at the University of Utah. He received his B.S. from St. Olaf College in Minnesota, a M.S. and a Ph.D. from the University of Nebraska. He served as Department Chair and as Director of the University of Utah VIGRE Program.

His research research interests are in nonlinear analysis and the theory of partial differential equations focusing on nonlinear equations and variational inequalities, obstacle and unilateral problems, bifurcation theory and pattern formation, Hamiltonian systems, elliptic and parabolic equations, systems of reaction diffusion equations and nonlinear evolution equations. Together with his 57 collaborators he had been engaged in developing tools for the qualitative analysis, solution structure and solution geometry of such equations. He has twice been the recipient of the Alexander von Humboldt Senior U.S. Scientist Award (1978-79 and 1996-97).

He has published around 150 articles in reputed journals with 57 collaborators. He has had 17 Ph.D. students, 11 Masters students, 6 REU students, and has 6 mathematical grandchildren (to date). He held visiting positions at universities in Asia, Australia, Europe and South America.

Lecture 1

Friday, April 12, 2013
Reception: Lounge, Petty 120, 3:30-4:00 PM
Lecture: Petty 150, 4:00 PM

Lecture 2

Monday, April 15, 2013
Reception: Lounge, Petty 120, 3:30-4:00 PM
Lecture: Petty 213, 4:00 PM

Lecture 3

Tuesday, April 16, 2013
Reception: Lounge, Petty 120, 3:30-4:00 PM
Lecture: Petty 150, 4:00 PM

For more information, please see: http://www.uncg.edu/math/talks/index.html
or contact Dr. Maya Chhetri at maya@uncg.edu.

11.2 Colloquia

Suzanne Lenhart	University of Tennessee, Knoxville	11/12/2012	Exploring the effects of order of events in population models with discrete time
Michael Pearson	Executive Director, MAA	11/13/2012	Stirling's Formula: A Monthly Habit
Hyeona Lim	Mississippi State University	12/10/2012	Speckle Image Denoising Methods based on Total Variation Minimization
David Galvin	University of Notre Dame	1/10/2013	Taxi walks and the hard-core distribution on Z^2
Xiaoli Gao	Oakland University	2/20/2013	Signal Detection and Variable Selection for High-dimensional Structured Sparse Models
Haimeng Zhang	Mississippi State University	2/22/2013	Estimation Efficiency in Cox's Model and Spatial Modeling in the Sphere
Thomas Lewis	University of Tennessee at Knoxville	3/1/2013	Finite Difference Methods for Fully Nonlinear Second Order PDEs and Applications
Jonathan Rowell	University of North Carolina at Greensboro	4/17/2013	Adaptive movement dynamics: concepts and consequences of ideal motivation within populations.

11.3 External Seminar Speakers

Tammy Muhs	University of Central Florida	9/7/2012	Math Emporium Talk: Consultant for WLL Courses.
Jeremy Rouse	Wake Forest University	10/3/2012	Quadratic forms representing all odd positive integers
Dr. Prajneshu	Indian Agricultural Statistics Research Institute	10/10/2012	Nonlinear Growth Models and Their Applications
Peter Takac	University of Rostock, Germany	10/10/2012	p-Laplacian with a convection term†
Mythily Ramaswamy	Tata Institute for Fundamental Research	10/11/2012	Introduction to Variational Methods
Pavel Drabek	University of West Bohemia, Czech Republic	10/23/2012	Estimates of the principal eigenvalue of the p-Laplacian

11.4 UNCG Seminar Speaker

Talia Fernos	UNCG	9/5/2012	Rigidity of actions on CAT(0) cube complexes
Dan Yasaki	UNCG	9/12/2012	Applications of Koecher complexes to number theory
Sebastian Pauli	UNCG	9/19/2012	p-adic Fields, Algorithms and Constructions
Ratnasingham Shivaji	UNCG	9/21/2012	A uniqueness result for a singular nonlinear eigenvalue problem
Sebastian Pauli	UNCG	9/26/2012	p-adic Fields, Algorithms and Constructions II
Roland Deutsch	UNCG	9/28/2012	Benchmark Dose Profiles for Joint-Action Data in Quantitative Risk Assessment
Greg Bell	UNCG	10/10/2012	Tucker's Lemma and a problem from dimension theory
Dani Moran	UNCG	10/24/2012	Complexes of Groups
Mikhail Balaev	UNCG	10/26/2012	Time-delayed Effects in the Models of Democracy
Richard Fabiano	UNCG	10/26/2012	An Introduction to Delay Differential Equations
Brian Sinclair	UNCG	11/7/2012	Okutsu Invariants in the OM Algorithm
Jerry Vaughan	UNCG	11/8/2012	Dimension Theory, Part 1: An introduction to dimension theory through its history
Richard Fabiano	UNCG	11/9/2012	An Introduction to Delay Differential Equations II
Greg Bell	UNCG	11/15/2012	Dimension Theory, Part 2: Asymptotic Dimension
Lauren Farr	UNCG	11/19/2012	Caley Graphs of Infinite Groups
John Hardee	UNCG	11/28/2012	Thesis defense
Paula Hamby	UNCG	11/28/2012	Thesis defense

Anna Tuck	UNCG	11/29/2012	Seminar 1: A population dynamics model with logistic growth, and grazing in an interior patch Seminar 2: Mathematical modeling of HIV and the immune system
Brian Sinclair	UNCG	12/5/2012	Oral examination (Thesis proposal)
Dani Moran	UNCG	1/23/2013	Ph.D. Topic Defense
Greg Bell, Talia Fernos, Sebastian Pauli, Cliff Smyth, Dan Yasaki	UNCG	1/23/2013	Research Overview Talks
Ratnasingham Shivaji	UNCG	2/4/2013	Subsolutions: A Journey from Positone to Infinite Semipositone Problems
Brian Sinclair	UNCG	2/6/2013	Constructing Polynomials with given Okutsu Invariants
Ratnasingham Shivaji	UNCG	2/11/2013	Rellich's & Pohzaev's Identities and a Non Existence Result
Jonathan Milstead	UNCG	2/27/2013	Determining Galois Groups using Resolvents
Filip Saidak	UNCG	4/3/2013	Pi: Covers some of the more interesting classical results in which pi plays a key role
Mike Watts	UNCG	4/15/2013	Thesis Defense
Rick Shepherd	UNCG	4/25/2013	Thesis Defense
Jonathan Milstead	UNCG	5/15/2013	Thesis Topic Defense

11.5 Research Visitors

Research Visitor	Institution	Dates Visited	Host
Alfonso Castro	Harvey Mudd College	8/19–9/1/2012	R. Shivaji
Lakshmi Kalappatil	Mississippi State University	8/22–8/28/2012; 11/2–11/4/2012	R. Shivaji
Tammy Muhs	University of Central Florida	9/6–9/7/2012	Maya Chhetri
Mythily Ramaswamy	Tata Institute for Fundamental Research	10/9–10/12/2012	R. Shivaji
Eunkyung Ko	Mississippi State University	10/12–10/15/2012	R. Shivaji
Pavel Drabek	University of West Bohemia, Czech Republic	10/14–10/21/2012; 4/5–4/19/2013	R. Shivaji, Maya Chhetri
Peter Takac	University of Rostock, Germany	10/7–10/13/2012	R. Shivaji, Maya Chhetri
Paul Gunnells	University of Massachusetts-Amherst	10/22–10/24/2012	Sebastian Pauli
Jerome Goddard II	Auburn University Montgomery	11/2–11/4/2012; 3/1–3/3/2013	R. Shivaji
Chris Cosner	University of Miami	11/3–11/6/2012	Jan Rychtar
Michael Pearson	Executive Director, MAA	11/12–11/13/2012	R. Shivaji Maya Chhetri
Suzanne Lenhart	University of Tennessee at Knoxville	11/12–11/13/2012	Maya Chhetri
Mike Mesterton-Gibbons	Florida State University	11/13–11/15/2012	Jan Rychtar
Hyeona Lim	Mississippi State University	12/9–12/11/2012	R. Shivaji
Eun Kyung Lee	Pusan National University, Korea	1/13–1/19/2013	R. Shivaji
Petr Girg	University of West Bohemia, Czech Republic	12/8–12/20/2012; 6/7–6/30/2013	Maya Chhetri
Klaus Schmitt	University of Utah	4/11–4/17/2013	R. Shivaji

Some research visitors from the 2012–2013 academic year

Mythily Ramaswamy, Tata Institute of
Fundamental Research (TIFR),
Bangalore, India

Chris Cosner, University of Miami

Prajneshu, Indian Agricultural Statistics
Research Institute (IASRI), India

Ken Bollen, University of North Carolina at Chapel Hill

Erich Kaltofen, North Carolina State University

Klaus Schmitt, University of Utah
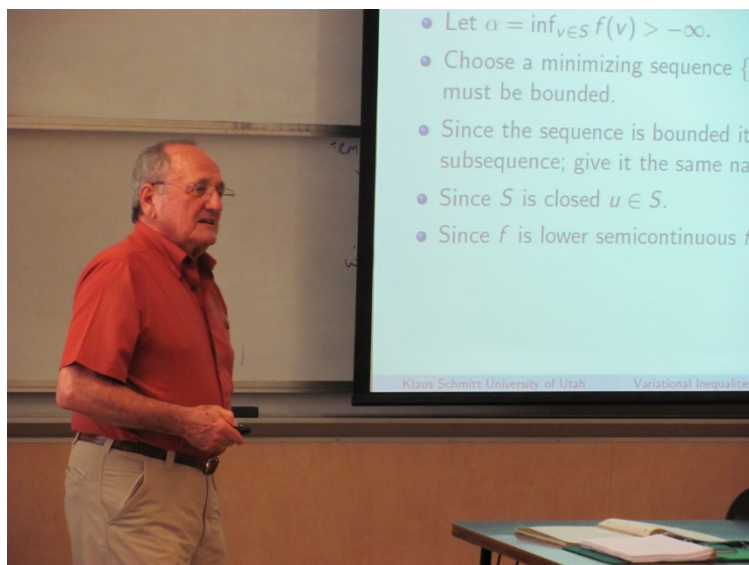
Michael Pearson, Executive Director, Mathematical Association of America (MAA)

Hyeona Lim, Mississippi State University

Peter Takac, University of Rostock, Germany

Tammy Muhs, University of Central Florida

John Harer, Duke University

Alfonso Castro, Harvey Mudd College

Suzanne Lenhart, University of Tennessee Knoxville

Pavel Drabek, University of West Bohemia

11.6 Carolina Topology Seminar

The Carolina Topology Seminar is a research seminar on topics in topology and its applications of interest to the participants. These topics currently include general topology, set-theoretic topology, set theory, and to a lesser extent, real analysis, complex Hilbert spaces and interactions between topology, logic and matroid theory. Presentations at the seminar incl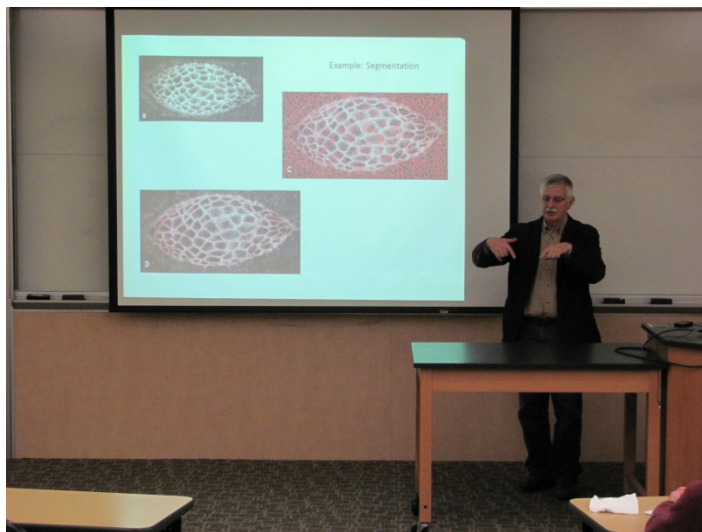ude talks by invited visitors, talks on research by the participants, presentation of papers of interest to the seminar, and presentation of student work, including topics from master's thesis and Ph.D. dissertations.

The seminar has proudly welcomed many distinguished guest speakers over the years. Speakers from the USA include Andreas Blass (Ann Arbor, MI) William Fleissner (Lawrence, KS), Paul Gartside (Pittsburgh, PA), Judy Roitman(Lawrence, KS), and Scott Williams (Buffalo, NY). International speakers include: A.V. Arhangelskii (Moscow), K.P. Hart (Delft), Istvan Juhasz, (Budapest), Jan van Mill (Amsterdam), Akihiro Okuyama (Kobe), Petr Simon (Prague), Paul Szeptycki (Toronto), Vladimir Tkachuk (Mexico City).

The origin of the seminar can be traced back to a series of mini-conferences that met once or twice a year mostly at UNC-Greensboro, but also other universities in the Carolinas and Virginia, beginning around 1974. In the 1990's the mini-conferences were replaced by a series special sessions at fall meetings of the Southeastern Section of the American Mathematical Society. In 2000 the seminar as currently constituted began meeting approximately every two weeks. Occasionally, photos of the seminar are posted at http://www.uncg.edu/~vaughanj/topseminar.html.

Topology Seminar Participants

12. Service Profile

The departmental faculty was very actively involved on various Department, College and University committees. Four major service programs provided by the department are: The Math Help Center, The Math Emporium, The Statistical Consulting Center, and the State Math Contest.

12.1 Math Help Center

Services:

- Free tutoring is available to all UNCG students enrolled in 100-level MAT and STA courses as well as STA 271/290. This is a walk-in service in Curry 210 and is open Monday, Wednesday 9am-3pm and 5pm-7pm, Tuesday, Thursday 9am-7pm and Friday 10am-1pm.

Director, Maya Chhetri

- We have expanded MHC service to include more upper level courses. Now we offer tutoring for the upper level MAT/STA courses which include MAT 253 (Discrete Mathematical Structure), 292 (Calculus II), 293 (Calculus III), 310 (Elementary Linear Algebra), 311 (Introduction to Abstract Algebra), 390 (Ordinary Differential Equations), 394 (Calculus IV) and STA 290. One Graduate Teaching Assistants is responsible for tutoring the one of these courses in MHC.
- We no longer use paper to keep track of students' sign-in and sign-out. Each student is asked to sign-in and sign-out using their UNCG user name and enter their class information from the drop-down menu. They are able to leave feedback/comments/suggestions when they sign-out including the experience they had with the tutor.
- In addition to this tutoring service, MHC also arranges **Review Sessions** for courses covered in MHC upon the request of instructors. Usually, Review sessions are requested a week prior to mid-term exams. These Review Sessions are conducted by Graduate Teaching Assistants (GTAs) who tutor in MHC.
- The Director of MHC also hires undergraduate mathematics majors with math GPA higher than 3.0 to help instructors in grading, managing on-line materials and proctoring exams for lower level courses.

Fall 2012 Activities

1. 12 Graduate Teaching Assistants tutored in Math Help Center and some of them conducted review sessions before mid-term exams.
2. 2092 student visits were recorded in MHC of which 381 visits were for the upper level MAT/STA courses which include MAT 253, 292, 293, 310, 311, 394 and STA 290
3. 11 undergraduate students helped 12 instructors in their classes.

Spring 2013 Activities

1. 12 GTAs tutored in Math Help Center and some of them conducted review sessions before mid-term exams.
2. 1910 student visits were recorded in MHC of which 484 visits were for the upper level MAT/STA courses which include MAT 253, 292, 293, 310, 311, 394 and STA 290
3. 12 undergraduate students helped 16 instructors in their classes.

12.2 Math Emporium

Description of Math Emporium (WLL marker) courses:

WLL courses are enhanced versions of online courses (WTX and WEB). Students enrolled in WLL courses will be required to attend a 1 hour class meeting every week and to spend a minimum of 3 hours per week in a Math Emporium Lab working on online learning assignments.

The goal of the weekly class meeting is to expand the students' understanding of selected course topics through problem solving, group work, and other pedagogical methods. The weekly meetings cannot cover all the material the students need to know, and, as with online courses each student is in charge of his or her own learning and must accept responsibility for spending time

Math Emporium Coordinator, Maya Chhetri

independently working on the course assignments, collaborating with classmates when appropriate, and seeking assistance when needed. In addition to the 1 hour class meeting spent specifically with the course instructor, the 3 hours students are required to spend in a Math Emporium Lab working on online mathematics assignments will be facilitated by teaching assistants specifically trained to assist students enrolled in WLL courses. Midterm exams took place during the evening hours and the final exam during the common final exam time for mathematics courses. In each of the Fall 2012 and Spring 2013 semesters, we offered one section of MAT 115 and MAT 150 as Math Emporium classes.

12.3   Statistical Consulting Center

The Statistical Consulting Center (SCC) offers consultation and advice to University researchers engaged
in:

- the design of studies and experiments (including proposal preparation)
- the statistical and graphical analysis of data
- the appropriate choice, application and presentation of statistical methods

Director of the Statistical Consulting Center, Scott Richter

Faculty that serve as consultants for the 2012–13 academic year are Scott Richter, Sat Gupta, and Roland Deutsch.

Using the Center

Faculty and staff: General consultation is provided to faculty and staff free of charge. However, researchers routinely list consultants as co-authors on journal publications or paper presentations, and as co-PIs on research grants, as recognition for their service. Researchers are encouraged to interact with a consultant as early as possible in a study, preferably at the planning stage. To obtain assistance, send a brief description of the scope and type of assistance anticipated to scc@uncg.edu.

Graduate students: Graduate students who wish to use the SCC must register for STA 667 during the semester in which they plan to use the Center. The student will then be entitled to one hour of consulting per week for that semester. STA 667 is designed to be a learning experience for both the consultants and their clients. The SCC points out problems, tries to correct errors, suggests possible solutions, and assists in the analysis of the results. Every attempt is made to increase the understanding of problems and possible solutions. Students must obtain permission to enroll in a STA 667 section. If the student has a consultant preference, they should contact the consultant directly to obtain permission to enroll in that consultant's section. If the student does not have a consultant preference, the student should send a brief description of the research topic, as well as the scope and type of assistance anticipated, to scc@uncg.edu, and the student will be referred to a consultant.

2012-13 Highlights

- 21 students enrolled in STA 667 and worked with faculty consultants to complete graduate research projects. One of these consultations led to a manuscript that was recently accepted by

the British Journal of Sports Medicine. (Taylor, J., Waxman, J., Richter, S. & Shultz, S. Evaluation of the effectiveness of anterior cruciate ligament injury prevention program training components: a systematic review and meta-analysis.)

- Faculty consultants assisted researchers from many disciplines across campus. Several of these collaborations resulted in submitted manuscripts and grant proposals, including 'Food Insecurity Among African American Women' (PIs J. Dharod, A. Ammerman, S. Richter), which was funded by a NC TraCS grant.

Goals for 2013-14

The Department added two new faculty consultants, beginning in Fall 2013: Dr. Xiaoli Gao, with research interests in statistical genetics and high dimensional data analysis, and Dr. Haimeng Zhang, with research interests in spatial statistics, survival analysis and applied probability. We are excited with the expanded expertise these new faculty will bring to the SCC, and anticipate increased consulting activity. We also plan bring together faculty with quantitative expertise from across campus to explore ways to increase awareness of available statistical resources and further enhance quantitative research capabilities at UNCG.

12.4 State Math Contest

The State Mathematics Contest is a problem-solving competition through which students interested in mathematics can become familiar with more sophisticated and advanced mathematical concepts and ideas that are not covered in traditional school curricula. The contest has been in existence for over 40 years in the state of North Carolina. During that time, there were more than 2,500 students who have participated in the state finals, and over 100,000 students who took part in the qualifying rounds of the contest. The importance of the contest for elevating the level of middle and high school mathematics education in North Carolina can hardly be overestimated.

Filip Saidak, Chair

Every year, the culmination of the contest is a final test that determines statewide winners. Currently, North Carolina is divided into 3 regions (West, Central and East), where the final round takes place simultaneously. This final round of the 2013 NC State Mathematics Contest for the Central Region was once again organized here at UNCG on April 25, 2013. There were about 60 students (ages 9–15) who came to Greensboro to participate in the 3 divisions: Algebra I, Geometry, and Algebra II. Each of the 3 tests consisted of 40 multiple choice questions that had to be answered in 80 minutes. In spite of the very high level of difficulty of the problems, the results of best performers in every division were quite impressive. Just like last year, the Central Region had the overall winner for the whole state of North Carolina in all 3 divisions (in the Top 5 we had 2, 5 and 3 students, respectively); and each of the overall winners managed to score at least 95%.

Following the award ceremony of the contest, the student and parent feedback was uniformly positive, largely due to the voluntary help of Professors Talia Fernós, Tracey Howell, and Dohyoung Ryang, who made the competition not only possible this year, but enjoyable for everyone as well.

13. Collaborations with IMA

Director of IMA, Dr. Fadil Santosa

Faculty and students during Dr. Santosa's talk

The Institute for Mathematics and its Applications (IMA)

UNCG is a participating institution member of the Institute for Mathematics and its Applications (IMA) at Minnesota.

To introduce some background, the Institute for Mathematics and its Applications connects scientists, engineers, and mathematicians in order to address scientific and technological challenges in a collaborative, engaging environment, developing transformative, new mathematics and exploring its applications, while training the next generation of researchers and educators. Founded in 1982, the Institute for Mathematics and its Applications (IMA) is an NSF-funded visitors' institute that has grown to become among the most influential math institutes in the world. Located on the University of Minnesota campus, it is one of eight NSF Mathematical Sciences Research Institutes. The IMA has no permanent faculty, but rather is a flux of visitors and postdoctoral researchers.

The IMA aims to achieve synergy between mathematics and its applications, develop transformative mathematical research through interdisciplinary exploration, strengthen and broaden the workforce that confronts pressing challenges facing science and society, and effectively communicate the role of mathematics in our world. The IMA utilizes many strategies and mechanisms to realize these goals, from its annual thematic program to hot topics workshops to seminars and public lectures.

When UNCG first became a participating member of the IMA, several meetings were held with Terri Shelton to discuss how the department can best support the university research enterprise, and in the process help itself by offering new avenues for our faculty and students resulted in the membership in IMA. We extend our deepest gratitude to the UNCG Office of Research and Economic Development for continuing to provide this valuable membership. The department secured IMA funding for its Statistics conference in October 2012, and many faculty members and students have since participated in various

IMA workshops. Below are descriptions of various faculty and students who have participated in IMA events **to date**.

Faculty

Greg Bell, Associate Professor, Department of Mathematics & Statistics

In June, Dr. Greg Bell attended the annual meeting of the IMA's Participating Institutions and Industrial Advisory Board. In this meeting the IMA member institutions and industrial partners review the IMA's activities over the past year and give input on the direction of upcoming annual thematic programs, new directions courses, and conferences.

The IMA awarded Greg Bell a New Directions Professorship for Fall 2013. Dr. Bell will spend September through December in residence at the IMA participating in the Annual Thematic Program on Applications of Algebraic Topology. From the IMA website, the New Directions Professorship enables mid-career mathematicians the opportunity "to branch into new directions and increase the impact of their research by spending an academic year immersed in the thematic program at the IMA, where they learn new mathematics and applications, connect their research with important problems, and establish new contacts and collaborations."
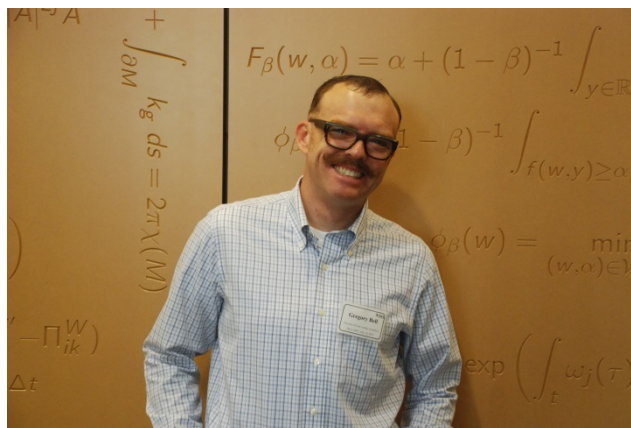
Greg Bell at IMA

Dagny Butler, Lecturer, Department of Mathematics & Statistics

Ms. Butler attended the IMA's *Career Choices for Women in Mathematical Sciences* workshop on March 3–5, 2013 at the University of Minnesota in Minneapolis. While there, she did a poster presentation on her research titled, "Existence of Alternate Steady States in a Phosphorus Cycling Model." She also attended several lectures and panel discussions which were given by women mathematicians who work in academia, government labs, the financial industry, engineering, insurance, and other fields. They shared the details of their careers, which was helpful because it showed a great variety in the mathematical world. They also gave advice on finding the right career, job hunting, negotiating, progressing in your career, work-life balance, and other helpful tips. Additionally, the workshop offered several lunches and dinners for networking, so she was able to meet several successful women mathematicians and get advice from them personally. Overall, this was a very well organized workshop with chances not only for research discussions but also for gaining genuinely helpful advice for choosing a career after graduation.

In June 2012, Ms. Butler attended the IMA's Mathematical Modeling in Industry workshop. It was held at the University of Calgary, and was a ten day workshop. She thoroughly enjoyed her time at this workshop. There were seven different research teams each comprised of a mentor from industry and six graduate students. Ms. Butler was put on a team with Dr. Effrosini Tsouchnika who works at Siemens in Germany; they were working on a research project titled, "Validation of Service Concepts for Oil Drilling by Simulation." Basically, in this project, they wanted to maximize the oil production and

minimize the service costs, while taking into account all of the same conditions and constraints that a normal oil company would have to consider. At the end of the project, they were required to present their findings to all the workshop mentors and attendees, as well as write a technical report.

Working on this project was very beneficial to Ms. Butler, because up to that point in her life, she had only worked in academia. She knew that she loved teaching, but had never had the opportunity to explore what it would be like to use her mathematical skills for a career in industry. She learned about many things during the workshop; some of which were working for management, having a strict deadline, using computer software for simulation, working with multiple other people in a group setting, being told exactly what they had to research, using mathematical techniques to optimize a problem, getting to use math for real-world applications, etc. It was interesting to see how different industry is from life at a university. She felt like she gained much from this exposure, and it will help her be better informed when she graduates with her doctorate and is applying for jobs.

Shan Suthaharan, Associate Professor, Department of Computer Science

Dr. Suthaharan attended a new direction workshop in Applied Statistics and Machine Learning on June 17–28, 2013 at the Institute for Mathematics and its Applications (IMA). His participation was fully funded by IMA. This workshop provided Dr. Suthaharan an opportunity to learn modern statistical techniques and apply them to Machine Learning (ML) problem in Big Data environment.

During this workshop he conducted a mini research project with Chris Vanlangenberg (who is a Ph.D. student in the UNCG Department of Mathematics and Statistics) and YunKyong Hyon to address network intrusion detection problem using ML techniques, and presented the results and findings at the end of the workshop. In addition to the excellent academic qualities and new knowledge, the course also provided Dr. Suthaharan with an excellent networking opportunity, which led to his current visiting scholar appointment at UC Berkeley. Dr. Suthaharan is currently working on Deep Learning (a modern ML technique) research project with Professor Bin Yu, who was one of the organizers of the new direction workshop at IMA.
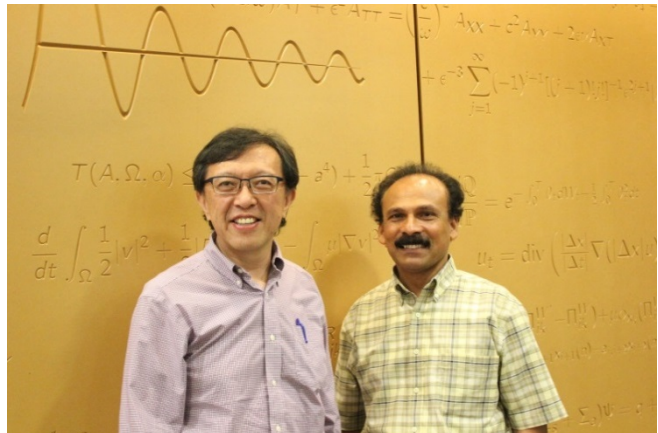
Dr. Fadil Santosa (Director of IMA) and Dr. Shan Suthaharan

Students

Abraham Abebe, PhD student, Department of Mathematics & Statistics

Araham participated in the *Mathematical Modeling in Industry Summer Workshop – XVI* in June 2012, which was held at the University of Calgary. In this workshop, Abraham was able to gain new mathematical skills and techniques and to meet experts in industry. He was able to work on real life problems with mathematicians and industry personnel to come up with a solution that is useful for real industry applications. He explored many applied mathematics applications in industry. Among these applications, he was also involved in an active research in cancer radiotherapy techniques and how to apply mathematical skills to improve and optimize cancer radiotherapy. During this ten day workshop, collaborations were formed with mathematics graduate students, professors, and medical experts. As a result of the collaboration and team work, they published a paper in the *Journal of Physics in Medicine and Biology*. The title of their research was, *A moment-based approach for DVH-guided radiotherapy treatment plan optimization*. This October 2013, he also participated (funded by the IMA) in the 51st meeting of the Society of Natural Philosophy, to be held November 14–16, 2013 at the University of Minnesota.

Adam Eury, Masters student, Department of Mathematics & Statistics

Adam Eury attended the 2013 PI Summer Graduate Program at the University of Minnesota, MN on July 15–August 2, 2013. The program was titled "Flow, Geometric Motion, Deformation, and Mass Transport in Physiological Processes." He learned about the fundamentals of mathematical and computational methods used in studying mechanisms that underlie physiological and material processes. The majority of the workshop consisted of lecturers presenting their research topics which included numerical analysis of nonlinear partial differential equations, kinetic theory, and solid and fluid mechanics and how they related to topics such as the motion of biomembranes, solid-fluid interaction, and morphogenesis of growing tissues. A few times participants broke into small groups to discuss the material that Mark Peletier presented. An experimental scientist at the University of Minnesota named Ronald Siegel gave a talk explaining how his experimental evidence in drug delivery studies related to the mathematical models. Attendees had the opportunity to see a demonstration in his lab. Overall, Adam had a great time attending the program. The exposure to how particular areas of applied mathematics were being used to study biological material science was very rewarding.

Paula Hamby, PhD student, Department of Mathematics & Statistics

Paula attended the *IMA Special Workshop: Career Options for Women in Mathematical Sciences* held March 3–5, 2013 at the University of Minnesota. The workshop consisted of presentations from successful women in both industry and academics about their roles as mathematicians, the differences between careers in industry and academics, and issues that pertained specifically to women. There were several discussion panels including, *Job Search and Career Development Skills in the Industry and Quantitative Finance Sector* and *The Challenges and Opportunities of New Paradigms in Research and Education.*

Catherine Payne, PhD student, Department of Mathematics & Statistics

Catherine attended the *IMA Special Workshop: Career Options for Women in Mathematical Sciences* on March 3–5, 2013. She heard many mathematicians speaking about a wide variety of careers in mathematics, both in academia and industry. It was a great opportunity for her to think about which of the various types of jobs appeals to her the most, and to see what kind of mathematics is used in different jobs. There were also many chances to meet other mathematicians and students from many different areas and talk with them about their research. She particularly enjoyed seeing other students present their posters about their research, since she had never seen a poster presentation before. It was particularly interesting to see all of the other areas people are studying and to see how they put it together into one poster to present. The most important part of the conference for Catherine was to see how many different jobs mathematicians hold and to hear what those jobs are like on a day-to-day basis.

Byungjae Son, PhD Student, Department of Mathematics & Statistics

Byungjae attended the *2013 PI Summer Graduate Program: Flow, Geometric Motion, Deformation, and Mass Transport in Physiological Processes*. This program consisted of lectures, tutorial sessions, and poster sessions. Each main lecturer provided fundamental concepts of gradient flows and differential geometric for 8 hours. Dr. Mark Peletier talked about Variational Modelling, which was of particular interest to Byungjae. In his lecture, he gave simple examples to show modelling procedure. Dr. Peletier explained a concept of entropy and, using this, showed expression of free energy, which is well-known in thermodynamics and statistical mechanics. Additionally, he introduced Wasserstein metric, gradient flows and dissipation. His lecture was very good, but not easy. However, using tutorial session, Byungjae could read Dr. Peletier's lecture notes, think about the exercise problem, and ask him questions. In the poster session, Byungjae could learn real problems which were ongoing.

For more information, see the website http://www.ima.umn.edu

14. Conferences
14.1 UNCG-RMSC: UNCG Regional Mathematics and Statistics Conference

The Department is home to a very prestigious NSF/MAA supported annual student research conference called UNCG-RMSC. The conference is expanding every year and attracts very bright student researchers.

Background and history

The UNCG Regional Mathematics and Statistics Conference started under the name UNCG – RUMC (The University of North Carolina at Greensboro–Regional Undergraduate Mathematics Conference). The first edition of the conference took place in 2005 and we have run the conference each year since.

The emphasis of the conference used to be on interdisciplinary mathematics with particular focus on mathematical biology. However, the topics of conference presentation by students were always open to all areas of research in mathematical sciences since the opportunity to listen to a wide variety of talks gives undergraduate students a better foundation for their choice of a more focused study program.

In 2008 one former undergraduate presenter returned to the conference as a graduate student and in 2009 we already had 3 presentations by returning graduate students (6 presentations by graduate students in total). In 2010, out of 26 student presentations, 11

Conference in numbers				
Year	Student presenters	Student attendees	Faculty	Schools Represented
2005	12	23	12	5
2006	12	30	13	9
2007	15	36	14	9
2008	11	28	12	10
2009	20	44	21	12
2010	26	64	22	16
2011	48	132	30	27
2012	56	120	44	36

were delivered by graduate students. The undergraduate students enjoyed the presentations of the more mathematically mature graduate students and the graduate students benefited as they tried to make their work accessible to an undergraduate audience.

The 8th UNCG RMSC 2012

UNCG-RMSC is an annual one day conference promoting student research in mathematics, statistics, and their applications in various fields. The 2012 conference was held on Saturday, November 3, 2012. Jan Rychtar served as conference chair and Sat Gupta, Maya Chhetri, and Ratnasingham Shivaji were co-organizers. The conference featured three plenary presentations by invited speakers:

- Katia Koelle, Duke University: The use of mathematical models to understand and control viral pathogens.
- Sujit Ghosh, NC State University: A Statistician's Journey Through the 'Bayesian' Path.
- Michael Dorff, Brigham Young University: Kidney transplants, the Iron Man suit, and Pixar's movie "the Incredibles".

Jan Rychtar,

Main Organizer

The conference was attended by 164 participants, of whom 73 were woman, 25 were Asian, 20 were African American, and 2 were Hispanic. There were 78 undergraduate students, 42 graduate students, and 44 faculty. Participants came from 36 different universities and colleges. The schools with the largest number of participants were UNCG (44), NC State University (15), Clemson University (12), Winthrop University (11), Bennett College (9) and Kennesaw State University (8).

The undergraduate students delivered a total of 30 presentation and the graduate students delivered 26 presentations. All presentations were evaluated by a group of faculty volunteers. The results of the best presentation competition are as follows:

Graduate student best paper awards
1st place: Virginia Burger, CMU-Pittsburgh University
2nd place: John Steenbergen, Duke University
3rd place: Andrew Snyder-Beattie, NC State University

Undergraduate student best paper awards
1st place: Alison Miller, Elon University
2nd place: Chris Miles, Lafayette College
3rd place: Thomas Parrish, UNCG

All UNCG RMSC presenters were invited to submit papers to the refereed issue, *Topics from the 8th Annual UNCG Regional Mathematics and Statistics Conference*, to be published by Springer as part of its Springer Proceedings in Mathematics and Statistics series.

Conference funding

14.2 2013 UNCG Summer School in Computational Number Theory: Computational Algebraic Number Theory

David Roberts, University of Minnesota-Morris

From May 20 to May 25, 2013, the University of North Carolina at Greensboro hosted a summer school workshop entitled Computational Algebraic Number Theory. There were 26 participants, including 6 from UNCG and 11 from external universities.

The summer school covered algorithms for number fields, such as methods for arithmetic and polynomial factorization, and algorithms for the computation of integral bases, unit groups, class groups, and Galois groups. These subjects are essential for further computations in number theory and algebraic geometry and complement what students learn in standard courses on these topics. The week culminated with a workshop on May 25, 2013.

The lectures in the summer school were given by:

1. David Ford (Concordia University, Montreal)
2. John Jones (Arizona State University)
3. Michael Pohst (TU Berlin)
4. David Roberts (University of Minnesota Morris)

The speakers at the workshop were:

1. Michael Bush (Washington and Lee University)
2. David Ford (Concordia University, Montreal)
3. David Roberts (University of Minnesota Morris)
4. Brian Sinclair (UNCG)
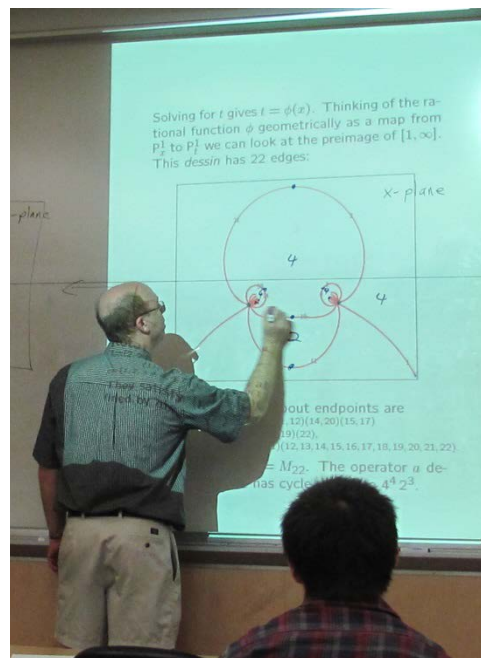
Additional information, including links, slides, and notes from some of the lectures, and problem sets can be found on the website at http://www.uncg.edu/math/numbertheory/summerschool/2013.html

Figure: Participants of the summer school; from left to right, top row: Dan Yasaki (UNCG), Avi Kulkarni (Simon Fraser), Michael Bush (Washington and Lee), Anna Haensch (Wesleyan), Jonah Leshin (Brown), Caroline Turnage-Butterbaugh (Mississippi), Rebecca Black (Maryland), Adam Lizzi (Maryland), Jonathan Milstead (UNCG), Jacob Hicks (Georgia), Michael Pohst (TU Berlin), Bobby Grizzard (Austin), bottom row: John Jones (Arizona), Paula Hamby (UNCG), David Roberts (Minnesota), Thomas Alden Gassert (UMass Amherst), Sebastian Pauli (UNCG), David Ford (Concordia), Christine McMeekin (Cornell), Brett Tangedal (UNCG), Khoa Nguyen (UC Berkeley), Brian Sinclair (UNCG)

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Acknowledgements

The conference organizers were:

Sebastian Pauli   Filip Saidak   Brett Tangedal   Dan Yasaki

David Ford, Concordia University

14.3 International Conference on Advances in Interdisciplinary Statistics and Combinatorics

Conference Profile

The conference took place, as planned, during October 5-7, 2012, and was a great success. The conference was inaugurated by CAS Dean Tim Johnston and featured around 180 presentations including 42 by students. Delegates came from many countries including Australia, Canada, Denmark, Germany, Greece, Hungary, India, Italy, Japan, Mexico, Pakistan, Portugal, Spain, Sweden, Turkey, UAE, UK, and of course the United States which contributed the largest number of participants. Student participants and young researchers had the opportunity to network with senior researchers from North Carolina and beyond. Plenary

Sat Gupta, Main Organizer

speakers included John Stufken (University of Georgia), Sastry Pantula (NSF and N C State University), Richard Davis (Columbia University), Alan Gelfand (Duke University), Len Stefanski (N C State University), N. Balakrishnan (McMaster University), Jim Berger (Duke University), Marie Davidian (N C State University), Pranab Sen (UNC Chapel Hill) and Ross Leadbetter (UNC Chapel Hill). A short course on Bayesian analysis using SAS was offered by Mike Patetta of SAS.

True to its name, the conference featured academic sessions on many diverse topics ranging from wild fires management, environment, anthropology, medicine, insurance, weather modeling, and network security etc. The conference provided an opportunity to highlight the research, teaching and service contributions of many ASA members in North Carolina. At the dinner banquet, service and contributions to statistics of four North Carolinians, Marie Davidian (ASA President 2013), Alan Gelfand (Duke University), Ross Leadbetter (UNC Chapel Hill) and Sastry Pantula (NSF, 2010 ASA President) were recognized. An NC State University music band, The Fifth Moment, entertained the guests with music numbers covering Cramer-Rao Lower Bound, Bayes Theorem, Asymptotic Theory and the Central Limit Theorem! An Open Forum for the North Carolina Chapter of ASA was also organized just before the evening reception on the opening day of the conference. The conference also featured an Editors' Forum for the *Journal of Statistical Theory and Practice.*

Four graduate students and three undergraduate students received "Best Paper Presentation Awards". The graduate student winners were Thais Paiva (Duke University), Kyle White (NC State University), Sara Becker (University of North Carolina, Chapel Hill) and Archana Polisetti (UNC Greensboro). Undergraduate student winners were Anna Tuck, Tracy Spears Gill and Caitlin Ross (all from UNC Greensboro). All student awardees received a certificate, a plaque, and a cash award ranging from $100–$200.

Sponsors:

- The conference was sponsored by
- University of North Carolina- Greensboro
- National Science Foundation
- IMA- Institute for Mathematics and its Applications
- SAS
- North Carolina Chapter of ASA
- American Statistical Association
- Pearson
- Taylor and Francis

Conference Proceedings:

The conference proceedings will be published as special issues of two different journals published by Taylor and Francis. These journals are the *Journal of Statistical Theory and Practice,* and *Communications in Statistics – Simulation and Computation.* The submitted papers are currently going through a review process and the special issues will be ready by early 2014.

Conference Website and Abstract Book:

Conference details including all the abstracts are available on the conference website at http://www.uncg.edu/mat/aisc/

Professor Len Stefanski (N C Sate University), and Professor Sat Gupta, (UNC Greensboro & Conference Chair) at the conference banquet.

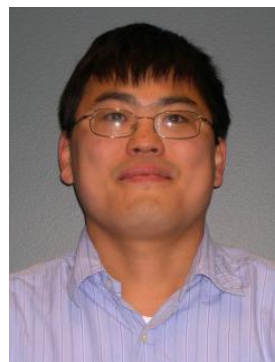**Conference attendees enjoying the conference banquet.**

15. Math Club & Pi Mu Epsilon Chapter

15.1

Thomas Parrish

President

Dan Yasaki,

Faculty Advisor

The 2012-2013 academic year was the second year of the UNCG Math Club, whose goal is to create a community for Undergraduate and Graduate Math enthusiasts. The club met every other Wednesday. Turnout was great and they quickly attracted a core group of members. Most meetings centered on talks given by the department's very talented Faculty and Graduate students. And the talks covered fun and glamorous topics such as the graph theory, cellular automata, and the mathematics behind penalty kicks in soccer. The Math Club has begun a research project with Dr. Filip Saidak, coordinated by Treasurer Steven Kaufmann, exploring the density of twin primes and other prime gaps. The project has produced interesting results and will continu e into the new school year. UNCG's Math Club celebrated Pi Day with the eating of pie. They held elections, with the winners Cassandra Brownell as President, Adam Eury and David Barron as Secretary, and Thomas Parish as Treasurer. The club has been so successful with Dr. Dan Yasaki as the club's advisor, their status received official recognition by UNCG.

Wednesday, September 19th, 2012, Petty 227, 5:00pm
Speaker: Thomas Parish
Title: Automated Video Processing

Wednesday, October 3rd, 2012, Petty 227, 5:00pm
Movie: Flatland

Wednesday, October 31st, 2011, 2012, Petty 227, 5:00pm
Speaker: David Barron
Title: Arithmatrees

Wednesday, January 23rd, 2013, Petty 227, 5:00pm
Speaker: Paula Hamby
Title: Arithmetic on Arithmatrees

Wednesday, February 20th, 2013, Petty 227, 5:00pm
Speaker: Dr. Talia Fernos
Title: Trees and their Automorphisms

Wednesday, March 19th, 2013, Petty 227, 5:00pm
Speaker: David Barron
Title: 1-Dimensional Cellular Automata and Turing Computability

Wednesday, April 17th, 2013, Petty 227, 5:00pm
Speaker: Dr. Roland Deutsch
Title: Penalty Shoot-Outs or A Slightly Different Approach to Game Theory

Rudy Gordh (Guilford College) gives a talk titled, "Generalized Arcs and Cells – Fixed Points, Chaos and Metrization," at the Math Club meeting.
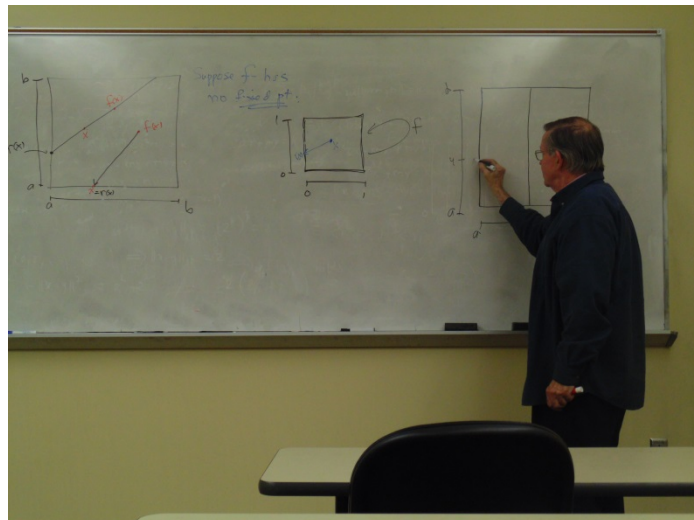
Other Student Clubs and Organizations

15.2 Pi Mu Epsilon Chapter

Pi Mu Epsilon is the national honor society for outstanding students of mathematics.

Each year the faculty carefully screens the academic records of mathematics majors and other students studying advanced mathematics. Those students who
satisfy the rigorous induction requirements and receive the approval of the faculty are extended an invitation to join Pi Mu Epsilon. This year our North Carolina Epsilon chapter inducted ten new members:

We held an induction banquet to honor these students on April 29, 2013, at the Saigon Vietnamese Restaurant. The banquet was attended by new inductees and their guests, and several faculty members.

**Richard Fabiano
Faculty Advisor**

David Sykes, Cassandra Brownell, Jordan Eliseo, Kayla Jackson, Benjamin Manifold, Joshua Martin, Diana Phelps, Jonnell Pozo, Abishek Pratap, and Shiyuan Wang.

Pi Mu Epsilon dinner at Saigon Vietnamese Restaurant

16. Departmental Expansion/New Spaces

The new Math Emporium is located in Graham 303.

The Math Help Center is located in Curry 210 and provides tutoring services to undergraduate students enrolled in mathematics courses at UNCG.

The Jerry & Theresa Vaughan Conference Room is located in Petty 149 and is dedicated for Jerry & Theresa Vaughan for their outstanding contributions to the UNC-Greensboro Department of Mathematics and Statistics.

The new Undergraduate Lounge is located in Petty 206.

The department includes two visitors offices located in Petty 124 and Petty 138 for visiting speakers and researchers.

There are 8 teaching assistant offices located in the Brown Building.