

Department of Mathematical Sciences Newsletter Spring 2003

New Program in Financial and Actuarial Mathematics

Headed by **Dr. Youngna Choi**, the Department of Mathematical Sciences is launching a new program in Financial and Actuarial Mathematics at MSU. Dr. Choi is developing a new course called the Mathematics of Finance. It will cover the basic mathematics currently used in financial industry, including interest theory, security pricing and portfolio selection. The goal of this course is to give students an introduction to and a foundation for the application of mathematics in the field of finance. Although this course is intended for advanced mathematics students, it might also be useful for students in the Business

Program with a strong mathematics background. The target semester for this new course is Fall 2005.

Dr. Choi also leads a seminar designed for students who are preparing to take Examination Course 1 offered by the Society of Actuaries (SOA). She is currently working with two students. This seminar will be offered every semester for the May and November examinations. The new Mathematics of Finance course can be used to prepare the Examination Course 2 by the SOA.

Update on the Department Seminar

Our department has had a very active seminar series this semester thanks to co-organizers **Dr. Michael Jones**, **Dr. Arup Mukherjee**, and **Dr. Diana Thomas**. Several colleagues from around the country have stopped by to give research talks to our faculty and students.

Watch the bulletin boards and our department web page for the upcoming schedule. If you have any suggestions for future speakers or topics, please contact one of the co-organizers. Most talks are geared towards students, so majors are encouraged to attend.

The diverse list of talks from Spring 2003:

- Dr. Donald Mills, "Avoidable Families of Sets of Positive Integers"
 - Dr. Michael O'Leary, "Using Epidemiological Models to Analyze the Spread of Computer Viruses"
 - Dr. Gareth Roberts, "Central Configurations and Their Importance in the N-Body Problem"
 - Dr. Elyn Rykken and Maureen Carroll, "On Thin Ice: Problems with the New System for Judging Figure Skating."
 - Amanda Serenevy, "Paper Folding Math"
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MSU's Dinner to Benefit the Sciences



Carmen Piccolo, Steven Lettieri, and Jan Stonick

Hosted by the MSU Foundation Board of Trustees, MSU's Dinner to Benefit the Sciences was held on March 31. It honored several people who have helped the University's science programs grow: Dr. Jonathan Spicehandler, Barbara Brummer, Margaret McCormack Sokol, and Josh and Judy Weston. Several CSAM students were on hand to present posters of the research they have participated in with their faculty advisors. **Steven Lettieri**, **Carmen Piccolo**, and **Jan Stonick** represented the Department of Mathematical Sciences. These posters will be on display again at PharmFest on April 30, 2003.

The Department of Mathematical Sciences Master's Thesis Option

In addition to course requirements, there are now two options to completing the MS degree in the Department of Mathematical Sciences: a written comprehensive exam or a master's thesis. Each option has its own merits in completing this course of study, and a student is encouraged to think seriously about this choice.

The MS Comprehensive Exam is given twice a year, usually in November and April. After the student has turned in the application, the graduate coordinator will send the student study guides for each section the student has selected. The study guide contains an outline of topics, suggested references and sample questions. If the student has any questions he or she should not hesitate to contact the graduate coordinator.

A graduate thesis is a permanent record of a significant contribution made by a student to a

particular field of knowledge. Expectations are that the thesis should be new and original. It should be something that is publishable, leading to at least one peer-reviewed article. Students are responsible for following the requirements set forth in the thesis guide. Expect that a project will take at least one year to finish, concluding with an oral examination and a written report of the research results that must be approved by a thesis committee.

Students should make a decision between the thesis and comprehensive options four or more semesters before their planned degree completion date. Both options are very demanding, but in different ways. The decision should depend on the student's strengths, interests, and particular situation. Switching from one option to another is not encouraged due to the time involved in preparing for each option.

The Margaret and Herman Sokol Science Lecture

Dr. Brian Greene, Professor of Physics and Mathematics at Columbia University, delivered the second Margaret and Herman Sokol Science Lecture on March 5th. Dr. Greene's area of research is superstring theory, a theory that purports to give us our first sensible theory of quantum gravity as well as a unified theory of all forces and all matter. As such, superstring theory has the potential of realizing



Einstein's long sought for dream of a single, all encompassing, theory of the universe. In his best-selling book, "The Elegant Universe," Greene recounts how theories of general relativity and quantum mechanics transformed our understanding of the universe. Dr. Greene also visited with our physics students and led a lively discussion of the ramifications of special relativity.

A New Faculty Addition

We are pleased to welcome our newest faculty member this fall, **Dr. Baojun Song**. Dr. Song received his Ph.D. in the field of Biometrics from the Department of Biological Statistics and Computational Biology at Cornell University in August 2002. His research has focused on non-linear dynamical systems, epidemiology (targeting tuberculosis, HIV, smallpox, etc.),

statistics and simulations of epidemic models, and theoretical projects that combine genetics factors in dynamical epidemic models. He has over 15 publications and a textbook on mathematical modeling. The College of Agriculture and Life Science of Cornell University recognized him with the Outstanding Teaching Assistant award in 2001.

Congratulations to our 2003 graduates!
Commencement will be held on Friday, May 9, 2003 at 10:30am
For full information visit: www.montclair.edu/commencement

Spring 2003 CSAM Seminar in Mathematical Science

Dr. Arthur Powell, Professor of Academic Foundations at Rutgers University, Newark, was invited to speak in the CSAM Seminar in Mathematical Sciences on April 3, 2003. He gave the talk "Heuristics of Students Building Isomorphisms," which described a framework for analyzing the discursive interactions of learners to ascertain the mathematical ideas they build. Using video data of four, 12th-grade students engaged in solving a combinatorial task set in a non-Euclidian context, he inquired into the early and later ideas that the students build about heuristic methods and isomorphisms.



Dr. Eileen Fernandez and Dr. Arthur Powell

Student Achievements

Steven Lettieri was awarded the Undergraduate Alumni Citation Award for 2003-04. This \$1,500 award is sponsored by the Alumni Association and is presented annually to one student in each college. It is based on academic achievement, scholarship, creativity, and community service. Steve is a double major in Mathematics and Physics. He has been studying algebraic dynamics under faculty member Dr. Diana Thomas and recently gave a talk about his research results on maps over finite fields at the College of the Holy Cross.

Paul A. Belony Jr., a junior who is double majoring in physics and mathematics, has been accepted into the 2003-04 Minority Academic Careers Undergraduate Fellowship Program, beginning with the Spring 2003 semester. This program is funded by the State of New Jersey and is designed to provide incentives for minority students who are interested in entering the academic profession and to increase their awareness of a rewarding and productive college teaching career. Paul's faculty mentor during this program is Dr. Ernest Ma.

Both **Paul A. Belony Jr.** and **Steven Lettieri** have been accepted to the NSF-Supported Summer 2003 Research Experiences for Undergraduates (REU) program in the Department of Physics at Lehigh University. The REU covers research topics in several areas: Solid State Physics, Statistical Physics and Fluids; Atomic, Optical, and Plasma Physics;

Astrophysics; and Elementary Particle and Nuclear Physics.

Kirsten Maggie Viz presented her research under Diana Thomas at Trenton's Posters Under the Dome program. Six students from Montclair State University along with six students from the College of New Jersey participated in the event. The event showcased undergraduate research projects to NJ legislatures. Kirsten's poster is currently being displayed in the cabinet on the second floor of Richardson outside of the Department Office.

Jennifer Clark and Kirsten Maggie Viz presented their research in the MAA sponsored Undergraduate Research Poster Competition at the January Math Meetings in Baltimore. Both students received a lot of feedback and attention. There were over eighty posters in the session and several of the Montclair faculty judged posters. This includes, Dr. Lora Billings, Dr. Mark Korlie, Dr. Arup Mukherjee and Dr. Diana Thomas.

Carmen Piccolo was also at the Joint Meetings in the AMS-MAA-SIAM Special Session on Research in Mathematics by Undergraduates. He presented "A Cross-Cultural Study on the Effects of Immunization Against Rubella," which was joint work with Dr. Lora Billings.

Ming Lu was accepted to the graduate program at NJIT and received a teaching assistantship.

Faculty Activities

Dr. Diana Thomas' work on applications of dynamic equations in time scales will appear in a full-length feature article on the unified theory of time scales in the *New Scientist*. She has applied time scale theory to a phyto-remediation model (joint work with MSU student **Lynn Vandemuelebroeke**) and most recently in a joint article with **Dr. Michael Jones** and **Dr. Baojun Song** on wound debridement.

Dr. Michael Jones was the chair of the Organizing Committee for the Mathematical Association of America's General Contributed Paper Session of the January 2003 Joint Mathematics Meeting in Baltimore; approximately 80 speakers spoke in his sessions. Besides giving two talks at the Joint Meetings, he has also participated in the CSAM Visiting Professor Program where he has delivered the talk "Two Rights Make a Wrong: Strategy and Optimization in a Fair Division Procedure" to students at Montclair High School and Dover High School.

In January, **Dr. Kimberly Burch** and her co-authors Diane Wakefield and Glen Whitehead had their article "Boiling Point Models of Alkanes" appear in *MATCH-Communications in Mathematical and Computer Chemistry*.

Dr. Evan Maletsky was one of the speakers at the NCTM Annual Meeting in San Antonio, TX, this April. The title of his talk was "Patterns, Problems, and Puzzles with Fossils, Frogs, and Fractals." In March, he gave keynote addresses at both the Pre-Calculus Conference at Rutgers University and the Discrete Mathematics Conference at Boston College. Earlier in this

school year, he gave presentations at the Greater San Diego Mathematics Conference, "Creative Classroom Activities and Adventures," the NCTM Boston Regional Conference, "Classroom Counting and Cutting Activities," and at the North West Mathematics Conference in Portland, OR, "Fascinating Reflections from Frogs to Folding to Fractals." Dr. Maletsky will be a featured speaker at the annual Texas Conference for the Advancement of Mathematics Teaching this coming summer.

Dr. Pat Kenschaft was recently appointed Chair of the (national) NCTM Taskforce on Equity and Diversity. Also, she was the co-editor of the January 2003 publication *Environmental Mathematics* by the MAA.

Dr. John Stevens and his coauthors, Drs. R. Barat and T. Slanvetpan of NJIT, had their paper, "Process Control of a Laboratory Combustor using Artificial Neural Networks," accepted for publication in *Computers and Chemical Engineering*.

Dr. Helen Roberts and **Dr. Lora Billings** presented the talk "Using Mobile Teaching Labs" at the Spring Meeting of New Jersey Section of the MAA at Kean University.

In January, **Dr. Lora Billings** also gave an invited presentation "Phase-Space Transport of Stochastic Chaos," at Dynamics Days 2003 in Scottsdale, Arizona. She and her co-authors, Erik Bollt, Dave Morgan, and Ira Schwartz, had their article "Stochastic global bifurcations in perturbed Hamiltonian systems," accepted by *Discrete and Continuous Dynamical Systems*.

CSAM 2003 Service Awards

All too often in a College we fail to recognize the essential nature of faculty service in keeping the Academy alive and moving forward. To help rectify and place service as an important, indeed essential component of faculty life, we have the annual CSAM faculty service awards. This year, the recipients are **Dr. Helen Roberts**, Dr. Edward Boyno, Dr. James Dyer, and Dr. Bonnie Lustigman.

The awardees represent individuals who have made important and lasting contributions to the Department, College and/or University. They receive an individual wall plaque, appropriate press notification, and a College awards luncheon reception. All awardees will have their names mounted on the plaque on display in the Dean's Office.