

Department of Mathematical Sciences Fall 2002 Newsletter

Interested in Student/Faculty Research?

by Mary Lou West

The real fun in physics or in mathematics is attacking and solving an intriguing problem. One avenue for this is student-faculty research collaborations, either a pair or a larger group. Faculty members can ask students or students can ask faculty if they might work together. Sometimes there is an ongoing multi-year project, and other times there is a brand new idea. Projects within courses are sometimes sufficient, or they can grow in depth in an independent study arrangement.

At the end of the spring semester every year (for 25 years!) MSU has presented a Sigma Xi Student Research Conference. Student projects are presented as 15-minute talks or as posters and come from the fields of biology, chemistry, biochemistry, computer science, geology, environmental science, mathematics, physics, nutrition, psychology, and statistics. Besides experience and recognition, students get a nice certificate to frame.

Sigma Xi is a national honorary society to promote research in mathematics and science. At MSU, the officers of Sigma Xi are **Jack Gaynor**, **Mary Lou West**, **Mark Whitener**, and **John Korky**. Visit the following website for more information and to see the entire program from last year:

<http://csam.montclair.edu/~west/sigmaxiconf02.html>.

This year, the Sigma Xi Student Research Conference will be held from 9am - noon on Saturday, April 26, 2003, just before exams begin. Don't be shy. Get involved in research next semester!

Here is a list of the student presentations from our department and the advisors involved:

May, 2002

- **Mana Mozaffarian** and **Joe Gyulay**: *Simple Mathematical Modeling of the Cardio-Vascular System* (**Dr. Mukherjee**)
- **Carmen Piccolo**: *A Vaccination Model to Prevent Rubella Epidemics* (**Dr. Billings**)
- **Carola Springer**: *Coulomb Constant* (**Dr. Kowalski**)

May, 2001

- **Brian Heinold**: *Strange And Interesting Mathematical Pictures* (**Dr. West**)
- **Stacey Mack**: *Is The George Foreman Lean, Mean, Fat-Reducing Machine Effective?* (**Dr. Devlin**)
- **Tiffany Small**, **Steve Tobar**, and **Denis Kolenovic**: *A Model For Detecting Diabetes* (**Dr. Mukherjee**)
- **Tiffany Small** and **Leah Peniston**: *Sound In An Auditorium* (**Dr. West**)
- **Lynn Vandemeulenbroeke**: *A Mathematical Model Of Environmental Cleanup* (**Dr. Thomas**)
- **Barbara Pinkall**: *Calculating The Spectrum Of A Composed Function* (**Dr. Thomas**)
- **Jaе Gyun Cheong** and **Kei Kaneko**: *General Flip-Shift Games* (**Dr. Jones**)
- **Michelle McDermott**: *Harmonics Of A Microwave Oven* (**Dr. West**)
- **Marc Miele**: *How Does Learning Method (Verbal Vs. Visual) Affect Memory Retention?* (**Dr. Devlin**)

Montclair Students Visit the Princeton Plasma Physics Lab

by Mary Derengowski-Stein

The Princeton Plasma Physics Lab, on the Forrestal campus of Princeton University, is a major center of research in controlled fusion. The lab welcomes tour groups, as long as arrangements are made in advance. Accordingly, on November 8 a group of physics faculty and students drove down to visit the facility and learn about some of the research being conducted there.

During a tour conducted by one of the staff physicists, we saw the main research facilities, including the National Spherical Torus Experiment,

as well as some of the smaller labs in which research projects are being done. It was most interesting to be brought up to date on the state of the fusion enterprise, and to hear about the research opportunities for students at PPPL. All agreed that the trip was worthwhile, and a lot of fun, besides.

Making the trip were professors **Ludwik Kowalski**, **Ernest Ma**, and **Mary Derengowski-Stein**, and students **Sandra Afonso**, **Paul Belony**, **Matthew David**, **Pradeep Gupta**, **Steve Lettieri**, **Jason Long**, and **Juli Stolz**.

Report on Math 102: The New Student Experience in Mathematics and Physics by Linda Tappin

This fall for the first time our department offered its own New Student Experience course. This one-credit course, Math 102, will satisfy the current University requirement for the freshman experience portion of the curriculum. Offering this course within our department has many benefits. We get to know our new majors, they get to know us, and most importantly, they get to know one another. In addition, by limiting enrollment to mathematics and physics majors, we can focus on issues concerning them.

Besides reviewing time management and study skills, we discussed departmental curriculum options, careers in mathematics and physics, mathematical problem solving, and library holdings that relate to mathematics and physics. We also covered use of email, exploring the Internet, and using PowerPoint to enhance an oral presentation.

Of special interest was the visit by **Joseph Gyulay** (MSU '02), a very enthusiastic graduate from our department who has just begun teaching at Hackensack High School. MSU senior **Michael DeBarbieri** joined Joe, and together they held an exciting forum that revealed the perils and joys of being a new high school teacher. Their conversation

also reflected a very positive impression of the mathematics program at MSU, and the degree to which it prepared them for the *real world*.

At the end of this first semester, it seems that Math 102 has achieved its goal of welcoming our new majors and promoting a sense of community within our department. Hopefully, we can continue to promote this sense of community among our majors even after their first semester at MSU.

Our new majors involved in the course:

Jessica Barnes David Burger Mauricio Bustos Natalie Carola Laura Corporan Michael Deavila Anthony Emmons Oreoluwa Fasehun Douglas Finke Keona Foreman Stephen Fox Maha Hamdeh Jamie Hayes Karla Kelsey	Barbara Kikolski Andrew Licht Iris Lozano Joseph Manochio Kristina Oriente Joe Pecora Charles Pigeon Anna Rodzen Jennifer Rogacki Margaret Tarabokija Milan Vasic Jennifer Youngworth Lisa Zerebecki
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MATH 530 - Mathematical Computing

Spring 2003, Monday 5:30-8:00 p.m., RI-226

Instructor: **Dr. Mark Korlie**

Announcing our new graduate course for the Spring semester! One of the most important traits in modern applied mathematicians, especially nonacademic mathematicians (working in industry, business, and government), is knowledge of and experience with computation. This course will provide students with a broad knowledge of and experience with computation and mathematical software packages. Applications will be selected from various areas of mathematics, the sciences, engineering, and business. The emphasis will be on solving the mathematical problems using the power of computers.

Visit Our New Department Webpage!

www.csam.montclair.edu/mathsci/mathsci.html

With the help of our GA, **Jordi Donadeu**, we've been working hard to upgrade our department web page. Some improvements include an updated faculty database with weekly schedule links, contact information for our adjuncts and GA's, current undergraduate and graduate advisement tools, and news about upcoming talks and events. Another new addition is the Classroom Resources page that includes reviews and links to web sites that help integrate technology into the classroom. If you have any additions or suggestions, please contact **Dr. Lora Billings** or **Dr. Arup Mukherjee**.

Upcoming Events and Important Dates

- Math Day: Wednesday, March 26, 2003.
- Sectional MAA-NJ Spring Meeting is at Kean University on Saturday, April 5, 2003.
- Sigma Xi Student Research Conference: Saturday April 26, 2003

Student Achievements

This is a summary of a few of our students' outstanding achievements.

Jennifer Clark and **Kirsten Maggie Viz** will compete in the MAA undergraduate poster session at the Joint Mathematical Meetings in January. Their poster is based on a recently submitted article title "The Ducci Map on Equivalence Classes of Shifts" written jointly with student, **Dennis Kearney** and **Dr. Diana Thomas**.

Carmen Piccolo will also be at the Joint Meetings to present "A Cross-Cultural Study on the Effects of Immunization Against Rubella." This talk based on a recently submitted article of the same title written jointly with **Dr. Lora Billings**.

Juli Stoltz, a junior physics major was chosen from a nation-wide pool to do astronomy research at East Tennessee State University for ten weeks in the summer. Her REU (Research Experience for Undergraduates) was coordinated by SARA (Southeastern Association for Research in Astronomy). She observed galaxies with several different filters with a .9m telescope in Arizona. A few of the interacting or merging galaxies showed evidence of recent star formation episodes, some in visible tails and bridges. She will present a poster of this work at the national meeting of the American Astronomical Society in Seattle in January.

This fall **Juli Stoltz** has been assisting **Dr. Mary Lou West** at the weekly MSU Public Telescope

Nights. A popular new feature has been the once-a-month 7:30 PM early starting time for small children and their families. There are usually 30 - 50 people lined up to look through our portable telescopes including the new 12 inch Meade with GPS start-up. We have used the new CCD camera to take some electronic images. The globular cluster M15 is featured in the showcase by the Dean's office. We hope to take a series of images of M15 and analyze them to locate variable stars.

In June, the poster on "Radio Jove Observations of the Sun" was presented by students **Lori Kiefer**, **Angela Kim**, **Charles Oliveri**, and **Dr. Mary Lou West** at the CUR (Council on Undergraduate Research) Convention at Connecticut College.

Last year, **Carlos Burgos**, **Josh Kiger**, **Mital Smart**, **Emi Tsumura** and **Allison Weeks**, all students majoring in mathematics and preparing to enter the teaching field, participated in activities funded by an Eisenhower Grant awarded to Middlesex County College. The purpose of the grant was to provide enriching experiences for practicing and pre-service mathematics teachers. Each student received a graphing calculator and a stipend for their participation in the activities. Current students planning a career in teaching can contact Darlene Yoseloff by email yoseloff@middlesexcc.edu or phone (732) 906-2554.

New Faces in Our Department

We would like to welcome our new faculty to the department.

Professor Kimberly Burch recently completed her Ph.D. in Mathematics from the University of Pittsburgh. She earned her M.S. from the University of Pittsburgh and B.S. from Youngstown State University. Prior to MSU, she was a teaching fellow at the University of Pittsburgh where she earned the Culver-Teplitz award for excellence in teaching and research. Her research interests are graph theory and chemical graph theory.

Professor Youngna Choi joins us with experience in both industry and academia. She received her M.S. and Ph.D. in mathematics from Northwestern University. She was an Assistant Professor of Mathematics at Case Western Reserve University, then an actuarial analyst for a consulting firm and a

private CPA office. She is responsible for developing the new Financial and Actuarial Mathematics Program at MSU. Her current research interests are dynamical systems and financial mathematics.

Professor Mika Munakata was already an experienced teacher before she joined us. She began her teaching career as a secondary school mathematics teacher. She received an M.A. and M.S. from Teachers College, Columbia University and a Ph.D. in mathematics education from Columbia University. Her research area is mathematics education with emphases on number sense and teacher education. She has taught at Green River Community College and the Fashion Institute of Technology.

Attention all active and prospective physics majors and minors! Come celebrate the end of the semester at our informal dinner on Monday, December 9 at 4:30 PM in RI-261.

Other Faculty Activities

And as usual, our faculty have been very busy this semester.

Dr. John Stevens presented a seminar entitled "The Integral Balance Method: Applications to Heat, Mass, and Momentum Transport" in the Seminar Series of the Department of Chemical Engineering, NJIT, on October 21, 2002. He and his co-authors, G-H. Qian, I. Burdick, R. Pfeffer, and H. Shaw, had their paper "Soot removal from diesel engine exhaust using a rotating fluidized bed filter" accepted for publication in *Advances in Environmental Research*.

Dr. Diana Thomas presented an invited plenary talk at the Midwest Dynamical Systems Conference in Cincinnati last October. She spoke on her recent work on the lengths of cycles of the Ducci Map. **Dr. Stevens** and **Dr. Thomas** had their paper title "A Characterization of the Lengths of the N-Number Ducci Game" accepted to the *Fibonacci Quarterly*.

Dr. Mike Jones has had several publications this semester: "Proof without Words: Nonnegative Integer Solutions and Triangular Numbers," *Mathematics Magazine*, December 2002, with M.J. Haines; "Proof of a 'Possibly New' Definition of a Circle" in Reader Reflections, *Mathematics Teacher*, November 2002; "Equitable, Envy-free, and Efficient Cake Cutting for Two People and Its Application to Divisible Goods," *Mathematics Magazine*, October 2002; "Single-Peakedness and Dis-connected Coalitions," *Journal of Theoretical Politics*, July 2002, with S. Brams and D.M. Kilgour.

Dr. Thomas Devlin had his book "JMP Manual for Moore and McCabe's Introduction to the Practice of Statistics, 4th Ed." published in September by W.H. Freeman.

Dr. Pat Kenschaft will be chair a panel on "Sample Mathematics Lessons Integrating Environmental Issues" at the Joint Mathematics Meetings in Baltimore. She is Chair of the MAA Committee on Mathematics and the Environment. This fall, Dr. Kenschaft had the book "Mathematics For Human Survival" published by Whitter Publications, Inc.

Dr. Ken Wolff's article "Elementary Graphics and Animation with your Calculator" appeared in the March 2002 issue of the *Mathematics Teacher*. He also presented at the October 2002 Association of Mathematics Teachers of New Jersey's Annual Fall Meeting, "Continuing Professional Growth." The title of the presentation was *Beginning Computer Graphics with your TI-83plus Calculator*.

Dr. Gideon Weinstein has been busy giving several presentations this semester: "Developing Students' Mathematical Sophistication" at the Tutor Training Conference of the Center for Enhanced Performance, US Military Academy; "Undergraduate Mathematics Education: A Glimpse into a Future of Hybrid Technology and Tradition" and "A Review of Multimedia Enhancements for Calculus" (with **Dr. Lora Billings**) at the 15th Annual International Conference on Technology in Collegiate Mathematics, Orlando, FL. **Dr. Ken Wolff** also attended the Orlando conference. He presented a two-hour workshop on *Animation with the TI-83plus Calculator*.

Dr. Lora Billings presented "Noise Induced Chaos in the SEIR Model" at the Mathematical Biology Seminar at NJIT on September 10, 2002. She had the following paper appear in *Physica D*, "A manifold independent approach to understanding transport in stochastic dynamical systems," December 2002, with E. Boltt and I.B. Schwartz. Also, her paper "Noise-induced unstable dimension variability and transition to chaos in random dynamical systems," with Y.-C. Lai, Z. Liu, and I.B. Schwartz was just accepted to *Physical Review E*.

Dr. Tony Piccolino also gave several presentations this semester: "Integrating Historical and Multicultural Topics into the Mathematics Classroom" at the Annual Meeting of the Association of Mathematics Teachers of NJ; "Focusing Administrators on Standards-Based Mathematics" at the fall meeting of the National Council of Supervisors of Mathematics; and "Mathematical Activities in Colonial New England: An Interdisciplinary Unit" at the Eastern Regional Meeting of the National Council of Teachers of Mathematics.

In July, **Dr. Ernest Ma** and **Dr. Mary Lou West** attended a week long workshop about computational physics methods using Maple, Matlab, IDL, and Numerical Recipes in Fortran and C. They had a wonderful time at Lawrence University in Appleton, Wisconsin and hope to use these powerful methods in our advanced physics courses.

Dr. Mary Lou West, spoke about the active sun at the NJ Science Convention in October. She gave similar presentations at the North East Astronomy Forum and at the New Jersey Starquest this summer.