



Department of Mathematical Sciences Newsletter Spring 2005

Research Opportunities for Commuter Students (R.O.C.S.)

By Michael A. Jones and Diana M. Thomas

Research Opportunities for Commuter Students (R.O.C.S.) is a program developed by **Drs. Michael A. Jones, Mark Korlie, and Diana M. Thomas** to provide students at Montclair with a research experience similar to a traditional NSF sponsored *Research Experience for Undergraduates* (REU) program. Typically, an REU runs over the summer months and provides students with a stipend, living expenses, travel money, and supplies such as books and software in order to conduct research with a faculty member at the sponsoring institution. The REU provides students with the opportunity to conduct research in a focused manner without outside distractions such as other courses, work, and family.

Unfortunately, many students at Montclair State University and nearby institutions are unable to take advantage of an REU opportunity. Many of our students work during the year and have many different external obligations and as a result cannot afford to be absent from the area for an entire summer. Therefore, R.O.C.S. was developed to provide our students with an in house year long research structure research experience that rivals the research experience at a traditional REU.

Similar to an REU program, there are a variety of research topics presented at R.O.C.S. ranging from mathematical biology to combinatorial game theory. Currently, there are seven Montclair math faculty participating as mentors in the program; **Drs. Michael Jones, Mark Korlie, Aihua Li, Arup Mukherjee, William Parzynski, Baojun Song,** and Diana Thomas. In addition, **Dr. Brian Hopkins** has joined as a faculty mentor expanding the program to include Saint Peter's College. Several other universities in the North Jersey area have expressed interest in participating in the project.

Originally, students were chosen by the faculty mentors by invitation in the instructor's courses. Due to the growing interest and to provide the opportunity to all interested students, there is a

formal application to R.O.C.S. available to all students this year. R.O.C.S. is not limited to mathematics majors and has had students in biology, biochemistry, and physics participate in the past.

In order to provide a bonding experience for R.O.C.S. students similar to a traditional REU, students and faculty mentors will begin the research program by having an overnigher at the New Jersey School of Conservation in late August. During the fall semester, R.O.C.S. students are enrolled in a three credit research course: MATH 497, Research I. The course is listed in the schedule book to meet on Tuesdays from 2:30pm-5:00pm. Students begin by learning the math typesetting software, LaTeX, through assignments tailor made for the program by Dr. Mark Korlie. Faculty mentors also present their research problems along with exploratory homework assignments based on the research problem that all R.O.C.S. students are required to complete. This allows students to determine what type of research they would like to work on and also provides them with the foundational material required to understand each others research problems. After the first month, students choose a research problem and then begin to meet their specific corresponding faculty mentor. R.O.C.S. continues to meet as a group for scheduled presentations on their research. These scheduled presentations are evaluated by the faculty mentors and a discussion by the entire R.O.C.S. (students and faculty) follows each presentation.

As a requirement for the fulfillment of the course, students must complete a technical report in LaTeX on their work and a poster as a final presentation, which will later be used in the Sigma Xi student research conference. Students who wish to further their research experience will continue to meet their faculty mentor in the Spring semester and develop a technical report for a peer reviewed publication. In addition, the students who continue the program into the Spring will give external presentations either at

the Joint Meetings of the AMS/MAA and/or local conferences like the MAA-NJ sponsored Garden State Undergraduate Math Conference. To date, two students from R.O.C.S. have competed in the Undergraduate Poster Competition at the Joint Meetings and both have won a prize for their work.

Many of the students in the program decide to go on to graduate school. As a result, R.O.C.S. students join faculty mentors during visits to

other universities. For example, two R.O.C.S. students visited Wesleyan University last semester, met the faculty there, and sat in a graduate course. To this point, every R.O.C.S. student that has applied to graduate school has been fully funded.

A proposal for R.O.C.S. is under review at the National Security Agency. The R.O.C.S. faculty are also seeking funding from the REU program at the National Science Foundation.

DIMACS Satellite RE-CONNECT Conference at MSU

By Arup Mukherjee

The re-connect conferences, under the DIMACS (The Center for Discrete Mathematics and Theoretical Computer Science) umbrella are designed to expose faculty teaching undergraduates to the mathematical sciences research enterprise by introducing them to a current research topic relevant to the classroom through a series of lectures by a leading expert and involving them in writing materials useful in the classroom. Sponsored by the NSF, and organized by **Dr. Arup Mukherjee** at MSU and **Dr. Fred S. Roberts** at Rutgers University, reconnect started as intense two-week workshops in 1998 at DIMACS and continued in that format until 2000. After a year's break, the new incarnation of re-connect was a week long and beginning in 2003, two satellite locations were added in addition to a weeklong workshop at DIMACS. Salem State College, Illinois Institute of Technology, Lafayette College and St. Mary's College have hosted Satellite re-connects over the last two summers. During the summer of 2005, MSU and Spellman College will host Satellite re-connects with the MSU re-connect running from Sunday, June 12 to Saturday, June 18. **Dr. Donald G. Saari**, Director, Institute for Mathematical Behavioral Sciences, University of California, Irvine and **Dr. Michael A. Jones** from MSU will be the lecturers on the *Mathematics of Elections and Decisions*. The announcement for the conference quotes:

Elections and voting

We have done this all the time starting from that kindergarten class when our teacher asked for a "show of hands." Sounds simple, but is it? We

know from too many examples, and from Arrow's Theorem, which asserts that "no election rule is fair," that this can be a complicated topic. During this week, we will introduce "the mathematics of voting" to see how the muscle power of mathematics can resolve many complex issues in elections. The results are surprising and discouraging. Topics covered include showing how to understand, and create, all possible voting paradoxes that could occur with any of the standard methods, a discussion of how symmetry groups help us understand decision procedures, commentary on the mathematics of strategic and manipulative behavior (which will show you how to "win" during your next departmental discussion), and a discussion showing that the famous Arrow's Theorem does not mean what we have believed for the last half century. Time permitting, other discussions will show how all of this material extends to topics such as "power indices" (a way to measure the political power of a group), economics, and even statistics.

The week long workshop offers the opportunity for faculty to advance to research questions in a new area of the mathematical sciences. Participants will also acquire materials and gain ideas for seminar presentations and for undergraduate research projects. Approximately twenty-five faculty members from mathematics, economics, computer science, statistics and science, technology and society from all over the country will reside at MSU for the week. Detailed program information is available at <http://dimacs.rutgers.edu/reconnect/Montclair/>.

MathEd SIG at the National Council of Teachers

By Mika Munakata

Members of the Mathematics Education Special Interest Group (SIG) participated in the 2005 Annual Meeting of the National Council of Teachers of Mathematics (NCTM) in Anaheim, California from April 4-9. Participating were faculty members **Drs. Evan Maletsky, Mika Munakata, Tony Piccolino, Gideon Weinstein, and Ken Wolff**. Three doctoral students, **Michelle Sarver, Ray Siegrist and Janice-Lyn Shuhan**, also attended the meeting. In addition to gaining insights into new research findings, attending workshops, meeting colleagues, and learning about innovative mathematics teaching methodologies, group members also gave presentations.

Dr. Tony Piccolino, presented a session on his grant entitled "A Model for Professional Development in an Urban Setting." His co-presenters were **May Samuels**, director of Math in Newark, and **Robert Schorr**, associate professor at Rutgers University.

Dr. Gideon Weinstein gave a teacher-oriented version of his Math Day and Visiting Professor talk "Climbing the Ladder of Mathematics from Caveman to Astronaut." It was attended by about a 100 teachers and teacher educators. One audience member was so impressed by the way he played historical fictional characters discovering the operations of arithmetic and learning about the order of operations (an alternative to teaching PEMDAS) that she suggested Gideon videotape his performance and market it!

Dr. Mika Munakata presented ideas for including topology in the middle and high school classrooms in her presentation, "Topological Puzzles to Tickle the Senses."

Dr. Evan Maletsky demonstrated how paper-folding can be used to explore various mathematical concepts in his presentation which is titled "Using a Single Iteration Activity to Explore Many Big Ideas in Mathematics."

Physics Enlightens the World

By Dean Hamdem

On the evening of April 18, 2005 lights were switched off in Princeton, NJ, to commemorate the 50th anniversary of Einstein's death. At 8:45pm a light originating in Princeton, where Einstein spend most of his late years, was transmitted to Montclair State University via Radio waves and other stations along the 50 mile route north. **Dr. Dean Hamdem** and 50 of his students in the College Physics course were stationed on the roof of Science Hall to receive and transmit light on its route west. MSU was part of a worldwide group of 120,000 relay stations in relaying a light which illuminated the world. MSU transmitted light by Radio waves, Torch, Lasers, Search lights and High flying Flairs to a station atop the mountain in Chatham on its way west. Light was transmitted in a similar manner across the United States and by optic cable across the Pacific into China. The route takes the light overland across China into Asia and Europe to return by Optic cable across the Atlantic. It reached land in South Jersey and returned to Princeton 24 hours later on April 19, 2005. It was exciting for all the students to

participate in this worldwide effort as part of the World Year of Physics celebrating the 100th Anniversary of the publication in 1905 of Einstein's Theory of Relativity, Quantum Physics and Brownian motion.



MSU College Physics course students, under the guide of Dr. Dean Hamdem, participated in the enlightenment ceremony relay commemorating the 50th anniversary of Einstein's death.

World Year of Physics 2005

By Dean Hamden

In October 2002, the International Union of Pure and Applied Physics unanimously adopted a resolution declaring 2005 as the World Year of Physics.

In 1905, Albert Einstein wrote his legendary articles which provided the basis of three fundamental fields in physics: the theory of relativity, quantum theory and the theory of Brownian motion. The World Year of Physics in 2005 will provide the opportunity to celebrate the 100th anniversary of this Miraculous Year while raising the public awareness of physics. Arguably the most famous physicist, Einstein's international renown will be the natural vehicle to attract public interest.

We at Montclair State University will be participating in the World Year of Physics. We are planning **an all day event for April 27 on the Quad in front of the Student Center from 10:00am-2:30pm** Many activities are planned, including Science demonstrations and contests, acapella singing groups, water balloon and egg throwing contests, Segway the human transporter rides, Einstein ice cream cones and bicycle rides. Your School may want to join in this important event.

Below is a partial list of activities and themes which may appeal to the general public. Feel free to send us your ideas to add to the lists.

List of Activities

10:00am - 2:30pm

See Einstein riding a bicycle

10:00am - 2:30pm

See Einstein ride the *Segway*, human transporter. Ride the *Segway*

10:00am - 2:30pm

Take a picture with Einstein

10:00am - 2:30pm

Time travel demonstration

10:00am - 2:00pm

Science Demonstrations

10:30am, 2:00pm

Einstein Wheel of Science, contest, prizes

10:30am, 2:30pm

Defy gravity and win \$1000. Center of mass challenges, win prizes

10:30am, 12:30pm

Test your velocity and acceleration, sack races and prizes

11:00am, 1:30pm

Water balloon throwing contest, prizes

11:00am, 1:00pm, 2:00pm

Acapella groups singing of Relativity and science

11:00am, 12:00pm, 1:00pm, 2:00pm

Barrel Dunk

11:30am, 12:30pm, 1:30pm

Egg and grape throwing contests, prizes

11:30am, 12:30pm

Science Karaoke

12:00pm, 1:00pm

Pie throwing contest, prizes

12:30pm, 1:30pm

Join a Science Rap contest, prizes

1:30pm

Einstein look alike contest, \$100 prize

Theme for Activities

Promotion of public understanding of physics and physical sciences

Physics in Education

Physics as the basis of many other disciplines and incubator for newly emerging scientific and technological fields

The great challenges of physics for the 21st century

Physics in developing countries and Physics for development

Women in physics

The cultural heritage of physics, from the Egyptian and ancient Greek legacy to modern physics

For more information, contact Dr. Dean Hamden (Email hamdend@mail.montclair.edu) and stay tuned. For international events and activities log onto <http://www.wyp2005.org>.

Update on the Department Seminar

Our department has had an active seminar series this semester thanks to co-organizers **Drs. Youngna Choi, Baojun Song, and Diana Thomas**. Two colleagues from around the country have stopped by to give research talks to our faculty and students.

On April 13, **Dr. Jim Wiseman** of Swarthmore College spoke about computations in dynamical systems, which is described in his own words: *In dynamics, we study the long-term behavior of complicated, possibly chaotic, systems. We can numerically approximate this behavior with computers, but the accumulated errors can render the results meaningless. One way around this problem is to compute topological invariants, which will be the same for the numerical approximation as for the actual system. I'll introduce one of these invariants, the Conley index, and discuss how we can use it to detect chaotic behavior.*

Our second speaker, who speaks on May 3, is **Dr. David Bailey**, Chief Technologist in the Computational Research Department of Lawrence Berkeley National Laboratory. He is known for developing a new formula for π in

1996 with Peter Borwein (brother of Jonathan Borwein), Simon Plouffe:

$$\pi = \sum_{k=0}^{\infty} \frac{1}{16^k} \left(\frac{4}{8k+1} - \frac{2}{8k+4} - \frac{1}{8k+5} - \frac{1}{8k+6} \right)$$

From Dr. David Bailey's website:

This formula, now known as the "BBP formula for π ", permits one to compute the n -th binary or hexadecimal digit of π , without computing the first $n-1$ digits, by means of a simple scheme that requires very little memory and no multiple precision software. More recently, Richard Crandall and I have shown that there is a connection between the new pi formula and the centuries-old question of normality (ie, statistical randomness of digits in a certain sense) of π and various other math constants.

His work on π has been featured in recent issues of Science News and Scientific American.

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 many mathematics majors are encouraged to attend.

Student Achievements

On Tuesday, April 19, 2005, the Council on Undergraduate Research (CUR) will welcome 60 undergraduate students from across the nation to Capitol Hill to present the results of their independent research in science, engineering, and mathematics. The students were competitively chosen from several hundred applicants. **Marie McCrary**, from the Department of Mathematical Sciences, was selected to present her research on "Epidemics in Multi-strain Disease Dynamics." This is joint work with her advisor **Dr. Lora Billings**. Marie will display her research poster to Members of Congress, federal agency funding officers, and invited guests.

The Department of Mathematical Sciences continues getting graduate students involved in research. On April 12, **Kirsten "Maggie" Viz** successfully gave her Master's thesis defense on "Disease Outbreaks in Coupled Populations: An Application of Measles Spread in Cameroon." On her thesis advisory committee was **Drs. Lora**

Billings (chair), **Arup Mukherjee**, and **John Stevens**.

The Math office's highly valued worker **Mallika Thomas** received an Outstanding Student Employee Award. She was one of 78 students nominated for the award, which included a \$100 gift certificate. Congratulations to Mallika from all of us in the office and the many students that you have helped. Thanks for all your efforts and excellent work.

Congratulations to the following graduating seniors who will earn their Bachelor's of Science this spring: **Douglas Betza, Jacqueline Butler, Darren Carfano, Jr., Jason Casella, Raymond Coccioli, Matthew David, Matthew Dodd, Mamdouh Elanani, Imama Fatima, Robert Fucso, Margot Gotay, Douglas Hahn, Maha Hamdeh, Stanley Huddy, Michelle Kane, Paulette Lanzerotti, Mark Maloney,**

Jonathan McClary, Marie McCrary, Gemar Mills, Christine Moliterno, Christopher Monaco, Susan Moss, Lisa Nepil, Khanh Nguyen, Dhara Patel, Rodrigo Quintero, Laurie Rossiter, Olga Sagalchik, Kristin Salotti, Anthony Sedlacek, Jennifer Seiden, Bennett Shelley, Peter Strama, Omar Syed, Joel Thornton, and Allyn Vig, Jr.

At the time of publication, the future plans for the following graduates were known: **Stanley Huddy** will attend Clarkson University for graduate studies in mathematics. He received an NSF sponsored fellowship for full financial support for his first two years at Clarkson. Stanley Huddy is a R.O.C.S. student who was mentored by **Dr. Michael A. Jones**. **Jennifer Seiden** will continue as an actuarial analyst at Horizon Blue Cross Blue Shield of NJ. She plans to take the actuarial exam in May under the mentoring of **Dr. Youngna Choi**. **Jonathan McClary** will continue to work for McDonald

Information Services, a firm specializing in eliminating risk for Wall Street accounts. Both Jennifer and Jonathan got their current positions while talking *Mathematics of Finance I and II*. Finally, **Omar Syed** and **Christopher Monaco** will actively seek employment upon graduation.



Mallika Thomas is awarded the Outstanding Student Employee Award.

CSAM 2005 Service Awards

To recognize the essential nature of faculty service in keeping the Academy alive and moving forward, we have the annual CSAM faculty service awards. The awardees represent individuals who have made important and lasting contributions to the Department, College and/or University. This year's recipient from the Department is **Dr. Bill Parzynski**.

Dr. Parzynski started his career at MSU in 1968 and has served the Department of Mathematical Sciences and the university in many positions and on several committees. Some of them include Graduate Advisor (1973-1979), Graduate Coordinator (1998-2001), Associate Chair of the department (1981-1987) and Chair of the DPAC (2001-2003). He is currently working on the Assessment Committee for the department to develop mission statements, goals, outcomes and assessment (2004-present).

He also led in the development of the curriculum for a two-track concentration in Applied Mathematics (1979, 1980) and in the revision of Graduate Program in Pure and Applied Mathematics (1999). Both program have been

implemented and are currently in use. He is a coauthor of a textbook in Advanced Calculus which was used extensively at MSU by different Mathematics professors for 20 years. Outside the department, he served on the Faculty Council, Graduate Council, School PAC, and School Research Committee in the 1980's.

Our congratulations to Dr. Parzynski. Recent awardees from the Department were **Dr. Mark Korlie** (2004) and **Dr. Helen Roberts** (2003).



2005 CSAM service awardee Bill Parzynski

MAA-NJ Spring Sectional Meeting

The Mathematical Association of America New Jersey Sectional Meeting was held on Saturday, April 2, 2005 in conjunction with the second annual Garden State Undergraduate Mathematics Conference (GSUMC). Several undergraduates and mathematics faculty participated in the day's events. Undergraduate mathematics major **Mark Maloney** presented his work at the GSUMC with **Dr. Bajoun Song** on bear population dynamics. In addition, undergraduate mathematics major and R.O.C.S. student **Britanny Shelton** presented her work "Optimal play in single pile Nim with a three-element subtraction set" with mentor **Dr. Michael A. Jones** and fellow MSU student **Ryan Huddy** at the undergraduate poster session section of the GSUMC. Representing Montclair State University in the NJ Undergraduate Math Competition were mathematics majors **Oreoluwa Fasehun**, **Maha Hamdeh**, and **Britanny Shelton**. **Dr. Diana Thomas** is a member of Organizing Committee, in charge of the work shop.

Several faculty members gave talks in the MAA-NJ contributed paper sessions. **Drs. Youngna Choi** and **Michael Jones** gave presentations in the "Applications of Math to the Social Sciences

and Finance" session, organized by Dr. Choi. Dr. Choi presented "Comparing the Actual Cost of Debt: Point vs. Compensating Balance" and Dr. Jones presented "The Geometry Behind Voting Paradoxes of Voting Power". **Drs. Kimberly Burch**, **Aihua Li**, and **Diana Thomas** presented in the "Discrete Mathematics: Pedagogy, Projects, and Research" session. Dr. Burch presented "Graph Theory Project on the Melting Point of Alkanes", Dr. Li presented "Polynomial Modeling of Discrete Time Series", and Dr. Thomas presented "A k -parameter Dynamical System Induced by the Nim game. Dr. Choi led an MAA lunch table discussion on "Implementation of Financial and Actuarial Mathematics". **Drs. Mark Korlie** and **Michael Jones** are MAA Chair Elect and Public Information Officer, respectively, and played active roles behind the meeting.

Drs. Burch, **Choi**, and **Li** also participated in several sessions for the NJ-NeXT fellows. Dr. Burch led a lunch table discussion on "Balancing Responsibilities". Other sessions included "How to Choose a Textbook", "Applying for Grants", and "How to Get Students Actively Involved in Their Learning".

Faculty Activities

Dr. Lora Billings had two articles appear, "Direct characterization of chaotic and stochastic dynamics in a population model with strong periodicity," (with W. W. Tung, Y. Qi, J. B. Gao, and Y. Cao) in *Chaos, Solitons and Fractals* 24 (2005) 645–652 and "Noise induced dimension changing bifurcations," (with I. B. Schwartz, D. S. Morgan, and Y. C. Lai) in *Proceedings from SPIE: Noise in Complex Systems and Stochastic Dynamics* (2005). She also gave two presentations, "Epidemic Models and the Pattern of Outbreaks," at the University of Akron, OH in March, and "Stochastic Epidemic Outbreaks: Why Epidemics Are Like Lasers," at the Canadian Mathematical Society National Meeting in Montreal, Canada last December.

Dr. Kimberly Burch presented her paper entitled "Matching Covered Graphs" at the

Thirty-Sixth Southeastern International Conference on Combinatorics, Graph Theory, and Computing held March 7-11, 2005 at Florida Atlantic University.

Dr. Youngna Choi had an article appear, "On Triangular Arbitrage in the Currency Market," (with Y. Yoon) in the *Proceedings of the Annual Conference of the Korea Money and Finance Association, Oak Valley, Kangwon Province, Korea*, May 2004, pp.765--780). She also gave presentations on her new result in three places, "Topology of Attractors from Expanding Maps with a Discontinuity: a preliminary report" at the Weekly Dynamical Systems Seminar at Northwestern University, Evanston, IL in January 2005, "Topology of Attractors from Two-Piece Expanding Maps" at the Semiannual Dynamical Systems Workshop, University of

Maryland, College Park, MD, March 2005 and at the Midwest Dynamical Systems Seminar at University of Minnesota, Minneapolis, MN, April 2005.

Dr. Michael Jones had an article appear, "Controlling Wound Healing through Debridement", (with Baojun Song, and Diana Thomas) in *Mathematical and Computer Modelling*, 40, n9-10 (Dec. 2004), 1057-1064.

He also presented the paper "Geometric Classification of Paradoxes of Voting Power" at the conferences, Public Choice Society Meetings, New Orleans, LA and gave colloquium talks, based on the paper, "Dynamics of Nim Induced Difference Equations" (with Diana Thomas) at the following institutions: Clarkson University, Potsdam, NY. (January 2005), Lafayette College, Easton, PA. (February 2005), Adelphi University, Garden City, NY. (February 2005) and SUNY Orange, Middletown, NY. (April 2005).

Dr. Patricia Kenshaft spoke at the National Science Foundation on "Women Mathematicians Making Change." On April 14, she gave the keynote speech at Sophia Kovalevskaja Day for high school students at William Paterson University. On April 26, she will speak at an NSF sponsored conference consisting of 700 PI's as an after-lunch speaker on "Who Does Mathematics?"

Dr. Aihua Li had two articles appear, "Linear Transformations on Polynomial Models of Time Series," (with C. Peng) in *International Journal of Pure and Applied Mathematics*, Vol. 17, no. 2, (2004) 235-248 and "Polynomial Models of Discrete Time Series", *Proceedings of Dynamic Systems and Applications*, vol. 4, (2004) 68-73. In February, Dr. Li (together with Gideon Weinstein) judged the team competition "Compute This!" for the CSAM 2005 Science Olympiad. About 30 high school and middle school teams participated in the event. During

the spring break, Dr. Li visited Clemson University in South Carolina and gave a departmental seminar presentation on her current research. Dr. Li is a co-PI for an approved NSF conference grant proposal for the 2005 Nebraska Commutative Algebra Conference to be held in May 7-9, 2005. The conference is in conjunction with the "Wiegand Fest", which is in honor of the 60th birthdays of Professors Roger Wiegand and Sylvia Wiegand. A \$12,000 NSF grant was awarded for this conference.

Dr. Arup Mukherjee had three articles appear in the following journals and book:

"Heat transport in Stokes' Problem with melting: a two-layer approach", (with John G. Stevens) in *the International Journal of Heat and Mass Transfer* 48 (2005) 1554-1562, "Shear flow in nematic liquid crystals: Freedericksz transition as a bifurcation", (with B. Mukherjee) in *Physical Review E* 71, 021703 (2005) and "Boundary Effects in Stokes' Problem with Melting", (with John G. Stevens) in *ICCS 2005, LNCS 3516*, pp. 1084-1087, 2005, V.S. Sunderam et. al. (eds.), Springer-Verlag Berlin Heidelberg.

Dr. Mika Munakata had her article "Constructing Cooperative Logic Problems" appear in *the Mathematics Teacher*, February 2005, Volume 98, Issue 6, Page 386.

Dr. Diana Thomas gave invited presentations at Wesleyan University, the Graduate Center of the City University of New York, and Southern Illinois University, Carbondale. She presented her work on cyclic and transient dynamics of maps over finite fields encompassing joint work from three papers one co-authored with Dr. Michael Jones, and one co-authored with Dr. Michal Misiurewicz and Dr. John Stevens. She also presented recent work on a three tiered model for Alzheimer's disease which is a joint project with undergraduate students, mathematics major **Nicholas Toombs** and biochemistry major **Gustavo Mato**.

Congratulations to our 2005 graduates!

The CSAM Convocation will be held on Monday, May 16, 2005 at 7:00 pm

MSU Commencement will be held on Friday, May 20, 2005 at 10:00am

For full information visit: www.montclair.edu/commencement
