*After*Math

The Newsletter of the Department of Mathematics at Marshall University

Volume 1, Numbers 1 & 2 Fall 2005 & Spring 2006

Welcome to *After*Math. This is our first issue and, as far as we know, our first departmental newsletter ever. We plan to send *After*Math to our alumni, students, faculty, and friends twice yearly.

Before you read any further, let us explain the purpose of *After*Math. We are not soliciting! (If you wish to contribute to the department, we encourage you to contact us.) *After*Math is a forum through which we can all stay in touch and it will be posted on our Webpage as a tool for recruiting new students.

*After*Math is definitely a work in progress. We will have alumni, student, and faculty news, but we need your input. Send us your suggestions and comments. We want to get your feedback and updated information. Send e-mail to aftermath@marshall.edu or phone us at (304) 696-6482.

From the Chair by Ralph Oberste-Vorth

Another commencement has come and gone. Since this is the end of my fourth year at Marshall, the class of 2006 felt like my first true graduating class. Commencement and the more intimate College of Science Graduation Ceremony and Graduate College Hooding Ceremony are wonderful experiences.

It is a time to share in the joy of accomplishment. The memories of that experience will be with the graduates for their lifetimes. For the faculty, this is a special time as well: meeting the parents and extended families of the graduates, being included in the hugging and photos, and the heart-felt thanks. I know that I too will have lasting memories of not only the ceremonies, but the years leading up to them as well.

We graduated students with 21 majors in the department. Among these were a record 10 M.A. degrees in mathematics; nine of them attended the Hooding. On the undergraduate side, there were 10 mathematics majors and 1 applied mathematics major. In fact, Mr. Tue Ly is our first ever to earn a B.S. degree in applied mathematics. Congratulations to all of our graduates!

I have been at Marshall for only four years, having been hired as Department Chair in 2002. This department must be one of the friendliest mathematics departments in the country. The faculty works as hard as any I have ever seen. The education of our students is foremost to our faculty. High quality scholarship is a close second. I am thrilled to have such an energetic faculty.

Faculty Profile: John Lancaster

John Lancaster is retiring from the department this summer after 34 years of service. John earned his A.B., A.M., and Ph.D. degrees from Indiana University in 1966, 1968, and 1972, respectively. After spending a year on the faculty of the University of Hawaii at Hilo, he joined the Marshall faculty as an assistant professor in August 1972 at a salary of $9900.

The well-known mathematician Paul Halmos, then at Indiana University, was one of John's references. He wrote "If you like [David Cusick's] work, I am sure you'll like Lancaster's even better." David and John were students together at Indiana, with David arriving at Marshall in 1971. The department has been fortunate to have these two talented friends and colleagues at Marshall since 1972.

John was granted tenure in 1979, promoted to associate professor in 1981, and promoted to professor in 1987. John also served as department chair from 1980 to 1983.

John was actively involved in student advising since arriving at Marshall. During his career, he advised freshmen in the college, mathematics majors, and mathematics graduate students. He was the departmental Graduate Advisor from 1991 to 2000. In 1997 he received the Moore Auto Group Outstanding Graduate Advisor Award. When the College of Science started centralizing advising in 2005, John was named departmental Undergraduate Advisor for 2005-06.

John was a Yeager Professor in 1987. In 1993, John won the Marshall and Shirley Reynolds Outstanding Teacher Award. He was the first of four Reynolds awardees in the department, preceding Karen Mitchell (1995), David Cusick (1998), and Bonita Lawrence (2005). In 1997, he received the Distinguished College or University Teaching Award from the Ohio Section of the Mathematical Association of America.

We wish John and his wife Sylvia happy travels and a long and healthy retirement. Bon voyage!

Feature Article:
Solutions Through the Eyes of our Forefathers

by Bonita Lawrence

A physical interpretation of the process of solving differential equations came to life for Clayton Brooks (BA'88) and I, associate professors of mathematics, when we visited the London Science Museum in the summer of 2004. Behind a wall of thick glass designed to keep overly enthusiastic visitors (the likes of me) from touching, sat a machine made of gears, wheels, and rods designed by Vannevar Bush in the 1930s to solve differential equations. The machine was primarily created and developed for the practical purpose of finding answers for questions that related to the war effort during World War II.

As the development of the machine progressed, many involved in the effort, including Arthur Porter, stated a strong belief in the educational value of the machine. Porter, the first Ph.D. student of Douglas Hartree in physics at Manchester University, England, constructed the first machine in England from Meccano (the British version of Erector Set) parts in 1935.

With the educational merit of the machine in mind, the Marshall Differential Analyzer Project was born. The DA Team, originally a group of three undergraduate mathematics majors, was given as its first assignment a search for the nearest working differential analyzer. At this point in time the primary objective of the project was an intensive study of the history and theoretical underpinnings of the machine.

The Team's inquiries turned up Tim Robinson, a computer engineer living in California who recently built a working model of the Hartree and Porter machine in his home in a room that was probably used for a pool table by the previous owners of the house.

The initial contact with Robinson resulted in direct contact with Porter who is currently living in Advance, NC near his only son and family. The Team has traveled to visit both Porter, in Spring 2005 (supported by the College of Science), and Robinson, in Fall 2005 (supported by WVEPSCOR). In addition, both scientists have come to Marshall to meet with the Team and give lectures on the historical development of the differential analyzer and other such machines.

In his lecture to a standing-room only audience in April 2005, Porter described the life of the budding scientist during 30s and 40s. Among the prestigious scientists who visited the Manchester DA in the 30s was Lord Rutherford! Rutherford was so impressed by the machine that he asked permission to run the machine himself.

The Marshall DA Team members are still amazed at their luck at finding Porter and Robinson, two invaluable mentors for the project. The current focus of the team is the construction of a four integrator machine modeled after Hartree and Porter's original design.

Spring 2006 was spent learning about gearing and necessary torque amplification through the construction of a mini-DA, a very basic two integrator model designed to solve second order problems similar to the pendulum motion model. Construction of both the mini-DA and the Marshall DA are being supported by a grant from a gift from the estate of Bliss Charles, a graduate of Huntington High School, 1928, through the Marshall University Foundation, Inc.

Joining us on the Marshall DA Team are Aaron Bevins (B.S.'05), Anthony Justice (junior, mathematics), Richard Merritt (junior, mathematics), Mike Morrison (senior, mathematics), and Stacy Scudder (graduate student, mathematics).

If you are interested in the seeing or working with mini or joining the Team for the first (and subsequent) runs of the Marshall DA when construction is complete, please contact me (lawrence@marshall.edu, (304) 696-3040) or Clayton (brooksc@marshall.edu, (304) 696-6702). Once construction is complete, area high school teachers and university professors and their students will be formally invited to visit our campus and work with the Marshall DA.

A Poem

A mathematician was obsessed with things prime.
He thought about them almost all of the time.
Said to his dear wife, "It truly seems right
That we should only make love on a prime-numbered night."
His wife thought for a bit ('cause she was no dummy),
"At the month's start this does seem quite yummy,
For there's two, three, five, seven
A three-night hiatus and then there is eleven.
But of the month's end I start to be wary
Near the twenty-third day of the month February.
For the next prime day after will be March the first
Such sexual continence might cause me to burst!"
He shook his head sadly, "As it's commonly reckoned,
The next prime day would be found on the second."

—John Drost

(reproduced from *Amer. Math. Monthly* **112**(2005))

Faculty News

Laura Adkins (BA'81, MA'82) has been assisting students, faculty, and community members with data analysis and probability in such areas as education, political science, law, and biology. She has recently become involved in an NSF grant proposal to support a project providing undergraduate students with hands-on research opportunities exploring the connections between mathematics and biology.

Alfred Akinsete was a speaker at the United States Conference on Teaching of Statistics (USCOTS) in Columbus, OH during May 2005, and the Joint Statistical Meetings in Minneapolis, MN during August 2005, and attended the Appalachian Association of Mathematics Teacher Educators Conference in Lexington, KY during September.

Ariyadasa Aluthge gave a presentation at the Southeastern Analysis Meeting, held at William and Mary University, Lexington, Virginia in April, 2005.

Clayton Brooks (BA'88) was awarded tenure. He attended conferences in Istanbul and Munich last summer with **Bonita Lawrence**.

Matt Carlton gave a talk to Beta Alpha Psi in April 2005 concerning the actuarial profession.

David Cusick attended a Chautauqua short course held in Austin, TX. The course topic was replacing "useful" mathematics with "beautiful" mathematics in liberal arts courses. Along with aesthetic considerations, students are actually taught to think in new and useful ways. David then presented these ideas in a seminar with a "packed-house" audience of faculty from across the university. He attended the fall and spring meetings of the MAA Ohio Section. David twice presented a talk with Robin Hensel and Sherm Riemenschneider of WVU at the 2005 Higher Education Symposium in March 2005 at Flatwoods, WV.

David Cusick and **John Lancaster** celebrated the 40th anniversary of their friendship with a one-day excursion to Washington, DC.

Yulia Dementieva was also busy this past year with a new son, continued work with the Medical School, and research leading to three poster presentations.

John Drost published a poem. It can be found elsewhere in this edition of *AfterMath*. His wife, **Linda Hamilton**, has continued her research in using Legos to teach students.

Norah Esty wrote a paper on hyperspace topologies, and was invited to give a talk on it in Japan at the International Conference on Difference Equations and Applications this July. She also learned a lot about Foliations, and hopes to get into that field as well sometime soon. Norah took eight students to the MAA conference (Akron, OH) in April. She said that was fun.

Diana Fisher (MA'05) filled in for **Judith Silver** in the department for the academic year.

Alan Horwitz gave a presentation on using calculus to simulate a sliding guitar in April 2005 at the Ohio sectional MAA meeting at Miami University in Oxford, OH.

Basant Karna and his wife welcomed a baby daughter, Brenda, on June 17, 2005. He has still found time to publish lots of mathematics.

John Lancaster has taught at Marshall since 1972. He retires after 34 years. He remarried on Sept 2, 2005. See the profile on page 1.

Bonita Lawrence gave invited lectures in Atlanta, GA, Bowling Green, KY, Istanbul, Turkey, Munich, Germany, Lincoln, NE, and San Antonio, TX.

Bonita Lawrence and **Clayton Brooks** (BA'88) have been working on making their dream of having a differential analyzer at Marshall come true. See the feature article on page 2.

Tracy Marsh (MS'01) is completing her fifth year at Marshall.

Francie Martin was very proud that her class had the highest average on the College Algebra final exam of any class. Francie has enjoyed teaching at Marshall for the past six years and will miss the excitement when she leaves at the end of this semester.

Karen Mitchell (BA'71, MA'79) was busy co-chairing the WV Higher Education Mathematics Symposium with **Judy Silver** in mid-March. Karen organized Math Field Day at the end of April and Math Competition during the second week of May.

David Mitra has been at Marshall as a visiting assistant professor for two years.

Ralph Oberste-Vorth attended a conference celebrating the 60th birthday of John Hamal Hubbard in Luminy, France during June. At a conference in Munich, Germany in July 2005, he gave a talk, as did **Kelli Hall** (BS'04, MA'06).

Ralph Oberste-Vorth and **Bonita Lawrence** had preliminary discussions at the University of Nebraska for a "joint M.A.-Ph.D. program" while attending an AMS meeting in Lincoln in October 2005.

Charles Peele is looking forward to his 40th year at Marshall.

Evelyn Pupplo-Cody has been updating the department history.

Gerald Rubin successfully negotiated with Wolfram Research for a new site license agreement for *Mathematica* for 2005-08.

Scott Sarra was promoted to associate professor.

Peter Saveliev recently entered a new, fast developing field: computational topology. Currently, he is preparing a patent application for a topology-based method of partition, analysis, and simplification of dynamical images and its applications. Peter attended the twentieth Summer Conference on Topology and its Applications in Granville, OH during July 2005. Peter was also granted tenure this past spring.

Kim Shin left the department after the fall semester. She started at MU in fall 2003.

This past year **Judy Silver** has filled in as Interim Associate Dean of the College of Science. About the experience she said, "It's been a marvelous opportunity to get to know more about how the university runs, to meet people, and to do things I've never done before."

Laura Stapleton (BS'84, MS'88) will be leaving at the end of a six year stint. She will continue delivering on-line courses.

Wayne Tabor has been at Marshall as a visiting assistant professor for two years.

Research Publications

- **Akinsete, Alfred**, Dummy variable technique in forecasting modeling, *Proc. Jangjeon Math. Soc*., to appear.
- **Akinsete, Alfred**, Waiting time distribution of tandem queues with correlated service nodes, *Proc. Amer. Stat. Assoc.*, to appear.
- **Aluthge. Ariyadasa**, A note on the spectrum of invertible *p*-hyponormal operators, *Integr. equ. oper. theory*, to appear.
- Davis, J., Henderson, J., **Karna, Basant**, Sheng, Q., and Tisdell, C., Existence of solutions for multipoint boundary value problems for n^{th} order differential equations, *Nonlinear Stud.* **13** (2006).
- **Dementieva, Yulia**, Vance, D., Donnely, S., Elston, L., Wolpert, C., Ravan, S., DeLong, G., Abramson, R., Wright, H., and Cuccaro, M., Accelerated Head Growth in Early Development of Individuals with Autism, *Pediatr. Neurol.* **32** (2005).
- **Drost, John**, Untitled poem, *Amer. Math. Monthly* **112** (2005) [reproduced on page 2].
- **Esty, Norah**, *Orbit structure for groups of homeomorphisms of the circle*, Dissertation, UC Berkeley, May 2005.
- **Hall, Kelli** (BS'04,MS'06) and **Oberste-Vorth, Ralph**, Totally discrete and Eulerian time scales, *Proceedings of the International Conference on Difference Equations, Special Functions and Applications, Munich, Germany, July 2005*, to appear.
- Henderson, J., **Karna, Basant**, and Tisdell, C., Existence of Solutions for Three-Point Boundary Value Problems for Second Order Equations, *Proc. Amer. Math. Soc.* **133** (2005).
- Henderson, J. and **Lawrence, Bonita**, Existence of solutions of even ordered boundary value problems on a time scale, *Proceedings of the International Conference on Difference Equations, Special Functions and Applications, Munich, Germany, July 2005*, to appear.
- **Horwitz, Alan**, Paring and slicing surfaces and peering in, *Mathematica J.*, to appear.
- **Karna, Basant**, Eigenvalue comparison for three point boundary value problems, *Comm. Appl. Nonlinear Anal.* **12** (2005).
- **Karna, Basant**, Kaufmann, E., and Nobles, J., Comparison of eigenvalues for a fourth-order three-point boundary value problem, *Electron. J. Qual. Theory Differ. Equ.* **15** (2005).
- **Lawrence, Bonita** and **Karna, Basant**, An existence result for a multi-point boundary value problem on a time scale, *Adv. Difference Equ.*, to appear.
- **Lawrence, Bonita** and **Oberste-Vorth, Ralph**, Solutions of dynamic equations with varying time scales, *Proceedings of the International Conference on Difference Equations, Special Functions and Applications, Munich, Germany, July 2005*, to appear.
- **Lawrence, Bonita** and **Wintz, Nick** (BS'02, MA'04), Eigenvalue comparisons for impulsive boundary value problems with Sturm-Liouville boundary conditions, *Comm. Appl. Nonlinear Anal.* **12** (2005).
- **Sarra, Scott,** Adaptive radial basis function methods for time dependent partial differential equations, *Appl. Numer. Math.* **54** (2005).
- **Sarra, Scott,** Digital total variation filtering as postprocessing for pseudospectral methods for conservation laws, *Numer. Algorithms* **41** (2006).
- **Sarra, Scott,** Integrated multiquadric radial basis function approximation methods, *Comput. Math. Appl.*, to appear.
- **Sarra, Scott,** Digital Total Variation Filtering as postprocessing for Radial Basis Function Approximation Methods, *Comput. Math. Appl.*, to appear.
- **Saveliev, Peter,** Applications of Lefschetz numbers in control theory, *SIAM J. Control Optim.* **44** (2005).
- **Saveliev, Peter,** Higher order Nielsen numbers, *Fixed Point Theory Appl.* **2005** (2005).

ΠΜΕ News

by Norah Esty

This has been a great year for Pi Mu Epsilon. Our local section of the national math honorary club has been meeting regularly and doing well. Pi Mu Epsilon started off the year with a new faculty advisor, Norah Esty. We had 12 meetings this year, organized fundraisers, ate a lot of pizza, and played a lot of Sudoku.

The high point of each semester was the conference trip. In Fall semester, there was a Pi Mu Epsilon conference on Mathematics and Biology held at Miami University, in Oxford, Ohio. The conference featured a large collection of student talks, as well as two fascinating talks by Carlos Castillo-Chavez on the role of mathematics and dynamics in understanding the spread of diseases like small pox.

At the end of March, the Ohio section of the Mathematics Association of America had its Spring meeting in Akron, Ohio. We had eight students go! Three of our students, Tue Ngoc Ly, Bonnie Shook, and John Stonestreet, competed in the student competition at the meeting. Most exciting of all, two of our students, Elizabeth Duke and John Stonestreet, gave talks at the conference!

Elizabeth gave a talk entitled, "Solving Dynamic Equations Over Time Scales" about her master's thesis. She explained some of the numerical methods she used in her thesis to solve dynamic equations of higher order equations by turning them into first order systems.

John gave a talk called, "Is 99,999,989 prime?" about the Sieve of Eratosthenes, a method for testing primality of "small" numbers, and how he implemented it using a computer. Both Elizabeth and John did great jobs.

We are both sad and pleased to have so many of our students graduating this year. Graduating with a B.A. or B.S. degree, we have Kari Adams, Drew Clark, Amy Facemyer, Christi Farley, Mary Haupt, Tue Ngoc Ly, Bonnie Shook, Mikala Shremshock, John Stonestreet, and Gara Williams, and earning their M.A. degrees, we have Meha Darooka, Elizabeth Duke, Kelli Hall, Shannon Miller, Gustavo Sá, and Wen Xue. It is sad to see so many of them go, but we wish them well and hope that they continue to enjoy math wherever they end up. They should be proud of their accomplishments.

At our final meeting in each semester we inducted new members. This year we inducted Amy Facemyer, John Fields, Marisa Rubio, Devon Tivener, and Ashley Tucker. We look forward to seeing them next year!

Alumni News

Send us your news. Where are you now? What have you been doing? How can your fellow alumni and faculty get in touch with you? We may publish short articles of general interest to students, faculty and, alumni. For example, what is it like working for XYZ Corp., how did you use mathematics in you career, and announcements like graduate school graduations. These are only suggestions.

Our 2005–06 Graduates

At the May Commencement, we recognized 21 graduates in the department. They are listed below by degree and major, with second majors shown in parentheses.

Among the bachelors were several with honors. Bonnie Shook and John Stonestreet graduated Summa Cum Laude with perfect 4.0 grade point averages. Drew Clark graduated Summa Cum Laude [3.85,4.00]. Christi Farley and Mary Haupt graduated Magna Cum Laude [3.60,3.85). Tue Ngoc Ly and Kai Nordness graduated Cum Laude [3.30,3.60).

Mary Haupt was a Yeager Scholar; she wrote her Senior Project on gender differences in mathematics majors at Marshall. Drew Clark, Christi Farley, Bonnie Shook, and John Stonestreet were John Marshall Scholars. Christie Farley, Mary Haupt, and John Stonestreet graduated with University Honors.

Bachelor of Science in Applied Mathematics

May 2006

Tue Ngoc Ly (mathematics)

Bachelor of Science in Mathematics

May 2006

Kari Adams (physics)
Drew Clark (chemistry)
Christi Farley (English)
Mary Haupt
Tue Ngoc Ly (applied mathematics)
Kai Nordness (Spanish)
Bonnie Shook (political science)
John Stonestreet

December 2005

Aaron Bevins
Peh Yin Wong

Master of Arts in Mathematics

May 2006

Elizabeth Duke
Kelli Hall
Christopher Johnson
Leslie Kerns
Shannon Miller
Gustavo Sá
Wen Xue

December 2005

Rob-Roy Mace

August 2005

Meha Darooka

Diana Fisher

Masters Theses (advisor names in parentheses)

Elizabeth Duke (Bonita Lawrence)
Solving higher order dynamic equations on time scales as first order systems

Diana Fisher (Alfred Akinsete & Yulia Dementieva)
Convergence analysis of MCMC method in the study of genetic linkage with missing data

Kelli Hall (Bonita Lawrence)
Dynamics on changing time scales: dynamics of given logistic problems, parameterization, and convergence of solutions

Christopher Johnson (Peter Saveliev)
Applications of computational homology

Leslie Kerns(Ralph Oberste-Vorth & Terrance Quinn)
Geometric field stability and normal field curvature of solution sets of ordinary differential equations in two variables

Rob-Roy Mace (Scott Sarra)
Reduction of the Gibbs phenomenon via interpolation using Chebyshev polynomials, filtering and Chebyshev-Padé approximations

Shannon Miller (Ralph Oberste-Vorth)
The dynamics of Newton's method on cubic polynomials

Contact Us

We want to get your suggestions, comments, updated contact information, and contributions.

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