

Signs of Mathematics

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Department

of

Mathematics

2009 Newsletter

University of Central Arkansas

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Retirement

After 30 years of distinguished service to the Department of Mathematics at UCA, *Dr. David Peterson*, Professor, will retire officially at the



end of this May. Dr. Peterson regularly taught Calculus sequence, Applied Mathematics and Number Theory. Also, he advised several undergraduate and graduate students on research projects. He played an important role in developing and initiating the masters program in Applied Mathematics, which began in 2006. After retiring, Dr. Peterson, plans to continue his interest in making musical instruments and teaching others to play dulcimer. One can be sure that Dr. Peterson will continue his favorite summer activities of hiking, camping, and canoeing. A reliable source tells us he has not given up on his ambition to canoe the Mississippi River. We wish Dr. Peterson and his wife, Donna, all the best.

Outreach: MSI'08

Whether observing the melodious interplay between mathematics and violins, entering the world of medicine and science, - or touching whale flubber - nearly thirty boys and girls from various central Arkansas high schools attended the Math and Science Investigator Program (MSI'08), hosted by the Department of Mathematics, during the week of July 14-18, 2008. The summer program was designed to enhance students' interests in mathematics, physics, and biological sciences. Students spent a week learning about the muscular physics involved the movement of the

human arm. The science of pharmacokinetics demonstrated how medication accumulates in the body, and how this can be simulated using a mathematical model. Computer simulation was used to illustrate water waves, and the relationship between wave speed and water depth. UCA faculty members *Drs. Danny Arrigo, Clarence Burg, Lawrence Huff* and David Peterson (all from Mathematics), *Dr. Umadevi Garimella* (Biology), and *Dr. William Slaton* (Physics) helped the students with the various activities. The students were also introduced to various lunchtime activities such as touring the model of a giant whale, learning about the



Scanning Electron Microscope, visiting the Planetarium in the Department of Physics and Astronomy, and assessing their mathematics skills using ALEKS software (provided by the McGraw Hill Publishing Company). UCA Faculty members *Dr. Scott Austin* (Astronomy) and *Mr. Jerry Mimms* (Biology) helped with lunch-time activities. "It is essential that our youngsters develop interest in the areas of mathematics and sciences early on. (continued on page 4)



FROM THE CHAIR'S DESK.....

The year 2008 was a memorable year. The MS program in Applied Mathematics, which began in 2006 with much anticipation and excitement, graduated its first cohort of students last year. Five students received their MS degree in 2008. The first master thesis in the department was produced by *Timothy Bennett* entitled "*Growth and survival models for the alligator snapping turtle*" under the direction of Dr. David Peterson. In the 2008 calendar year, thirty six students graduated with a degree in mathematics. See the next page under *2008 Alumni* for the names. Undergraduate/graduate research

activities continue to be one of the focal points of the department, and has resulted in seven presentations by the students at the Oklahoma-Arkansas Sectional Meetings of the Mathematical Association of America (MAA), the National Joint Meetings of American Mathematical Society and MAA and at a highly specialized meeting on Ordinary Differential Equations in Birmingham, AL. Thanks to the funds from the *Arkansas Science and Technology Authority* and the *UCA Foundation*, the Mathematics Department initiated a summer program in mathematics and sciences called *MSI08*, during the second week of July 2008. Faculty members from the Departments of Mathematics, Biology and Physics and Astronomy came together to help 30 high school students in central Arkansas with various hands-on activities. Since the success of *MSI08*, plans are underway to have a similar program for the coming summer. Our search for a tenure-track statistician was successful and we are pleased to have hired *Dr. Pat Carmack*, a biostatistician from Texas. See the next page under *Spotlight* for more information about Pat and his research. In the last eighteen months, six faculty members procured external funding of approximately \$325,000 for scholarly activities. Productivity in the department is at an all time high. With best wishes, Dr. Ramesh Garimella, Chair.

FACULTY/STUDENT NEWS



were awarded teaching assistantships in the MA Program in Mathematics Education. *David Ekrut, Jonathan Johnson, and Sang Lee* won MS teaching assistantships for spring'09.

Awards & Recognitions

Dr. Danny Arrigo, Associate Professor of Mathematics, received a distinguished teaching award from the *Oklahoma-Arkansas Section of Mathematics Association of American* in March 2008.

Luis Suazo, a double major in mathematics and physics, received the 2008 *O.L. Hughes Award*, presented annually to an outstanding senior mathematics major, whereas *Rebecca Nichols*, received the *Dorothy Long Award*, presented annually to an outstanding junior female mathematics major. In August 2008, *Lori Smith* received the first *Charles and Lu*

Rene Jolly Scholarship, given to an outstanding junior or senior pursuing a bachelors degree in mathematics education.

David Watts is the first recipient of the *Outstanding Graduate Teaching Assistantship Award* given at the end of April 2008. David completed his MS degree in Applied Mathematics at the end of summer'08. He has accepted a one year instructor appointment in the department. David's long term goal is to pursue a doctoral degree in mathematics.

Tailgating

During the fall'08, *Dr. George Bratton*, Associate Professor of Mathematics, organized tailgating parties for the College of Natural Sciences and Mathematics for the very first time. Considered a

huge success by all, several faculty members, students, and alumni attended on a regular basis to enjoy Dr. Bratton's southern style barbecue, for camaraderie and of course, the games.

Grant Activities

Dr. Linda Griffith, Professor of Mathematics, received a \$72,547 extension of her previous year's grant from the *Southeast Arkansas Education Services Cooperative* to continue her work on formative assessment. Also, in September 2008, she presented a paper at the *International Assessment in Education Association Conference* held at Cambridge, England.



Student Research

- ◆ *Jackson Fliss*, a sophomore math major, received an undergraduate research fellowship from the *Arkansas Department of Higher Education* to conduct research with Dr. Danny Arrigo.
- ◆ In fall 2008, Luis Suazo, a double major in mathematics and physics, published a paper jointly with his mentor *Dr. Weijun Liu*, entitled *Controlling the Motion of Charged Particles in a Vacuum Electromagnetic Field from Boundary in Automatica*, a top tier journal in control engineering.
- ◆ In spring'08 *Taylor Erwin* and *Matt Brozdek*, mentored by Dr. Clarence Burg, presented papers at the Seventh Mississippi State-University of Alabama Conference in *Differential Equations and Computer Simulations*.

Spotlight

Dr. Patrick Carmack joined the Department of Mathematics at UCA as a tenure-track Assistant Professor in August 2008. Dr. Carmack received his Ph.D. in statistics from the Southern Methodist University in 2004. Prior to joining us, he was in the Division of Biostatistics at the University of Texas Southwestern Medical Center (UTSWC) at Dallas. Dr. Carmack, in conjunction with researchers at UTSWC, is pioneering the use of spatial statistical modeling to analyze brain scan data from Persian Gulf War veterans to identify specific areas of their brains affected by Gulf War Syndrome. The new techniques have already been successfully applied to compare three dimensional Single Photon Emission Tomography (SPECT) brain scans of people suffering from the syndrome with those of a healthy control group. The team is working with renowned UTSW epidemiologist Dr. Robert Haley, one of the foremost experts on the syndrome. Persian Gulf War veterans from across the country are currently being tested at UTSW using a type of four dimensional (space-time) brain imaging called functional Magnetic Resonance Imaging (fMRI) while performing tasks intended to tax regions of the brain suspected to be damaged by the syndrome. Rapid technological advances in medical imaging of the human brain like fMRI are imposing demands for new statistical methods that can be used to detect small differences between normal and dysfunctional brain activity. Dr. Carmack and his collaborators are developing new methods to analyze fMRI brain activation signals from images taken of each subject's brain to determine which patterns are normal and which are due to the syndrome. Previous analyses have been unable to separate real distinctions from noise.



Dr. Carmack's primary research is focused on extending the current three dimensional methodology to four dimensional fMRI data to identifying these differences in brain activation from locations deep within the brain using measured brain signals that are weak and vary from location to location. Spatial modeling uses information from neighboring locations to strengthen the weak signals in active brain locations so the signal can be reliably detected.

2008 Alumni

B.A./B.S. Mathematics

Jonathan M. Bise
David Ekrut
Kara S. Kamruddin
Cedean Kematick
Kimberly LeAnn King
Jason T. Morris
Christine Minkler
Triston Murray
Nicholas Adam Nelson
Benjamin M. Perea
Michael Schelkopf
Tabitha Love Wirges

Courtney N. Franzen
Christine Hankins
Pamela Holt
Tran Hong Khanh Phan
Amber Leah Strain
Sandy R. Webb

M.S. Applied Mathematics

Timothy A. Bennett
Ching Chun Hsin
Ashley Evette Embry
Jason Wayne Torrence

B.S.E. Mathematics Education

Barrett Wayne Buck
Jillian Ann Bullock
Dawn Renee Gabbard
Amanda L. Green
Jennifer Ann Lachowsky
Ashley B. Matthews
Jason T. Morris
Catherine G. Reyes
Benjamin Floyd Rodery
Patrick M. Sichmeller
Brittany Leigh Williams
Matthew Jacob Yielding

M.A. Math Education

Camellia Jean Bowden

Did you Know ?

Based on research of 200 different positions, JobsRated.com reports that for the year 2009 mathematician is the country's best job, followed by actuary and statistician. Stress, physical demands, hiring outlook, compensation and work environment were the criteria used in determining the ranking. For more information, http://www.careercast.com/jobs/content/JobsRated_10BestJobs.

Silent Contributors

A large organization like the Department of Mathematics is successful because of many silent contributors who go beyond their call of duty to make things work. Three such people are *Dr. Clarence Burg*, who takes care of the technical and computer needs of the faculty members, and *Mrs. Brenda Grabam* and *Mrs. Jennie Welter*, who are energetic and innovative and make things run smoothly in the Department.

MSI'08 (cont.)

I am glad the UCA Mathematics Department is providing opportunities for high school students through the MSI'08 program to enhance their mathematics and science skills," said Dr. Ramesh Garimella, Chair of UCA Mathematics Department, who organized the MSI'08 program along with Dr. Charles Watson and Dr. Umadevi Garimella. They received a \$10,000 grant from the *Arkansas Science and Technology Authority (ASTA)* to develop the MSI'08 program. The department also received a \$2,400 seed-grant from the *UCA Foundation* to initiate the summer program.



Dr. Stephen Seidman, Dean of the College of Natural Sciences and Mathematics (CNSM), said, "The grant from the ASTA will enable the UCA Mathematics Department to bring its innovative summer enrichment program to a much larger and more diverse student population in Central Arkansas. The program is designed to introduce students in the ninth through 11th grades to applications of mathematics to the sciences. It is an integral part of the emphasis on mathematics and science education in CNSM." For information about future summer programs in mathematics, call (501) 450-3147 or e-mail rameshg@uca.edu.

Math Contests

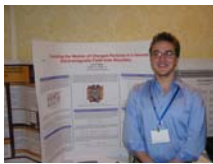
On April 26, 2008, the Department of Mathematics hosted the State Mathematics Contest sponsored by the *Arkansas Council of Teachers of Mathematics (ACTM)*. Approximately 300 high school students from the state came to UCA campus to participate in the Algebra I and II, Precalculus/Trigonometry, Geometry, and Calculus tests. Prizes were awarded to the winners. Visit <http://www.2.uca.edu/divisions/academic/math/actm/> for more details. For 2009, the Regional ACTM Math Contest (organized by Dr. Carolyn Pinchback) will be held on March 7, and the State ACTM Math Contest (organized by Dr. Charles Watson) will take place on April 26. Both contests will be held in the Mathematics and Science Building of UCA.

Who wants to be a Mathematician?

The American Mathematical Society is sponsoring *Who Wants to Be a Mathematician?* - a math contest with Arkansas high school students competing for cash and prizes. The event, hosted by the Department of Mathematics, will take place on April 16, 2009 here on the campus of UCA. Questions will involve pre-calculus topics (including logic and history of mathematics). The top prize in the game is \$2000. Please call 501-450-3147 for more information.

Student Presentations

Undergraduate student Luis Suazo (mentored by Dr. Weijiu Liu) gave a talk and presented a poster, *Controlling the motion of charged particles in a vacuum electromagnetic field from boundary*, and mathematics and physics major Sule Bode(mentored by Dr. Balraj Menon of the Department of Physics and Astronomy) presented a poster, *Symmetries and Conservation Laws in General Relativity* at the national joint meetings of the American Mathematical Society and the Mathematical Association of America held in Washington D.C. during January 4-9, 2009. Both Suazo and Bode came in top 20 of the 220 posters presented at the meetings. Each received a cash prize of \$100 and a certificate of recognition. At the same meeting David Ekrut and Jack Fliss (both mentored by Dr. Danny Arrigo) made a poster presentation, *First order Compatibility of the Schrodinger Cubic*.



For your information...

Last year, 80% of the faculty and staff, and several graduate teaching assistants and math alumni contributed to the *Mathematics Development Fund (MDF)* which is used, among other things, to provide for the Dorothy Long and O.L. Hughes Awards. If you want to contribute to MDF, please call 501-450-3147.