THE UNIVERSITY OF CENTRAL ARKANSAS

DEPARTMENT OF MATHEMATICS NEWSLETTER

≥ Signs of Mathematics %

Volume 6, No.6
January 2010

Editor:

Dr. Ramesh Garimella

Assistants:

Mrs. Brenda Graham
Mrs. Jennie Welter

Send comments to:

Department of Mathematics
UCA Box 4912
201 Donaghey Avenue
Conway AR 72305
Ph. 501-450-3147
Fax 501-450-5662

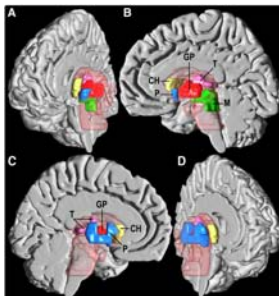For more information about the Mathematics Department visit:

http://www.uca.edu/math/

Funded Research

Dr. Patrick Carmack, Assistant Professor of Mathematics, has received contracts in the amount of $104,837 from the *University of Texas Southwestern Medical Center at Dallas,* over the past two academic years and summer 2009, for conducting statistical analysis in brain imaging research to improve spatial modeling to better detect affected portions of the brain in diseased subjects. These improvements have already been successfully applied to compare three dimensional single photon emission tomography (SPECT) brain scans of people suffering from Gulf War Syndrome with those of a healthy control group (see image). His current efforts are focused on extending the three dimensional methodology to diffusion tensor imaging (DTI) and four dimensional functional magnetic resonance imaging (fMRI) data to identifying differences in white matter and brain activation patterns. Spatial modeling works by by borrowing information from neighboring locations to optimally denoise these inherently weak signals.

Cluster Computing

Three mathematics faculty members **Drs. Clarence Burg, Pat Carmack,** and **R.B. Lenin** along with professors **Sinan Kockara** (Computer Science) and **Scott Meador** (Fine Arts and Communication) were recently awarded an internal grant of $25,670 to purchase UCA's first research computer cluster. Dr. Burg is the lead faculty members of this project. The research cluster will consist of 64 processing cores

An advanced Text Book in Math

Dr. Weijiu Liu, Assistant Professor of Mathematics, has written an advanced textbook: *Elementary Feedback Stabilization of the Linear Reaction-Convection Diffusion Equation and the Wave Equation.* The book was published by *Springer* under the series *Mathematiques & Applications Vol 66*. Unlike existing advanced control theory books written in an abstract setting, Dr. Liu presents control theory of partial differential equations and demonstrates important methods for solving feedback control problems by means of concrete examples. Dr. Liu joined the Mathematics Department in 2005. He has published over 40 papers in professional journals.

A Book Chapter

Dr. Donna Foss's paper "*Narrowing the Gap between a Vision of Reform and Teaching Practice: Middle Level Teacher's Reflections*," presented at the Rocky Mountain Educational Research Association meeting held in October 2009, received a $250 cash prize and an invitation to the national meeting of the American Educational Research Association in Denver. It will appear as a chapter in "*The Purposes, Practices, and Professionalism of Teacher Reflectivity: Insights for 21st Century Teachers and Students*," a monograph by the Association of Teacher Educators to be published by Rowman & Littlefield in early 2010.

FROM THE CHAIR'S DESK...

The year 2009 was another exciting and productive year . Our search for a tenure-track statistician was successful and we are pleased to have hired **Dr. Bhavandan Rathinasamy** a queuing theory specialist with a doctoral degree from a primer engineering school in India. See page 3 under *Spotlight* for more information about Dr. Lenin. In 2009, the Department awarded 18 undergraduate degrees and a record 14 graduate degrees. See the next page under *2009 Alumni* for the names. For the first time, the Department is creating a computing cluster to establish a vibrant computational community with a strong undergraduate/graduate research component. The cluster will be made available to the UCA research community. Productivity in the department continues to be high. In 2009, Math faculty members were responsible for 12 top-tier refereed publications, funded research, a graduate text book in control theory, a book chapter, three invited lectures, and several conference presentations . The Mathematics Department offered a summer program in mathematics and sciences, known as *MSI'09*, for high school students during the third week of July 2009. The topic was: Loudspeaker Audio Engineering. Once again, the ACTM State Math Contest, organized by **Dr. Charles Watson** , Associate Professor of Mathematics , was held on our campus during the last Saturday in April 2009. Approximately 250 high school students from all over the state came to participate in the contest. In March 2010, the Department will host the annual national meeting of the *Research Council in Mathematics Learning* (RCML). **Dr. Carolyn Pinchback**, Professor of Mathematics, played a crucial role in bringing the RCML conference to UCA. These are some excellent signs of mathematics at UCA. With all the best wishes in the New Year, Dr. Ramesh Garimella, Chair.

Graduate Students

Awards

Scholarships

Resource Materials

& Invited Talks

Graduate Students

For the 2009-10 academic year, the Department awarded 16 full-time and two half-time graduate teaching assistantships. Each assistantship provides a nine month stipend of **$9,000** and a tuition wavier of **$2,550** per semester. There is an additional $1,300 for summer teaching.

Awards for Majors

At the Honors Convocation, held in April 2009, **Sarah Irico** received the *Dorothy Long Award* (presented to an outstanding female upper classman in mathematics), and **Courtney Davis** received the *O.L. Hughes Award* (presented to an outstanding senior). Graduate student **Kimberly King**, in the MA program, received the *Outstanding Graduate Teaching Assistant Award.*

FACULTY/STUDENT NEWS

Scholarships

Taylor Erwin, and Ethan Hereth who graduated with the MS degree in applied mathematics in summer 2009, accepted $18,000 research assistantship along with tuition wavier for fall 2009 to pursue a doctoral degree in Computational Engineering at the University of Tennessee, Chattanooga. Another 2009 MS applied mathematics graduate, **Osibodu Molade,** accepted a stipend of $20,000/year plus tuition waiver to purse a doctoral degree in mathematics education at the University of Georgia. Also, **Ching-Ying Hsin,** a 2009 applied mathematics graduate, joined the University of Texas at Arlington in a Ph.D. Program. Overall, the Department awarded a record 14 graduate degrees in mathematics during 2009, of which seven received the MS degree in Applied Mathematics and seven MA in Mathematics Education.

Geometry Resource Materials

Dr. Linda Griffith, Professor of Mathematics, is one of the four lead authors for the *Geometry Inspired Materials* published by *Texas Instruments* in August 2009. These electronically delivered materials serve as a resource for high school geometry teachers using the TI-Nspire technology. **Dr. Jean McGehee,** Associate Professor of Mathematics, served as one of four academic advisors for this project.

Invited Talks

In spring 2009, **Dr. Ramesh Garimella** gave an invited Lecture "An Operator equation and invariant subspaces" in the Department of Mathematics at the *University of Toledo.* In October 2009, **Dr. Patrick Carmack** gave an invited lecture "Nonparametric Semivariogram and Nugget Estimation," in the Department of Statistics at the *Southern Methodist University.*

Most Active

Dr. Clarence Burg could easily win kudos for being one of the most active members of the department in 2009. Among other things, last spring he directed three masters theses during the AY 2008-09. They are *"The Numerical Simulations of Subaqueous Debris Flow in One Dimension,"*(Ethan Hereth) *"Applications of Richardson Extraploation to the Numerical Solutions of PDE,"* (Taylor Erwin), and *"FPGA CoProcessing for Computational Mathematics"* (Sam Green). Erwin and Hereth are currently in a doctoral program in computational mathematics and Green accepted an industry job.

External Review

In November 2009, **Dr. Ramesh Garimella** was invited by the *Texas State University* to review their mathematics programs, including two masters and a doctoral program. He was selected as the chair of the Review Committee.

Student Research

Math major **Jackson Fliss**, mentored by **Dr. Danny Arrigo**, will present the poster *Non-classical symmetries of a Burger System* at the *Joint Annual Meeting of the American Mathematical Society and Mathematical Association of America* , in January 2010. At the same meeting, Math major **Jing-Voon Chen**, mentored by **Dr. Weijiu Liu,** will present the poster *Dynamic Output Feedback Controllers For Store-operated Calcium Entry.*

Spotlight

Dr. Bhavandan Rathinasamy (a.k.a. Dr. R.B. Lenin) joined the Department in Fall 2009 as a tenure-track assistant professor**.** R.B. Lenin received a Ph.D. degree in Mathematics from the *Indian Institute of Technology, Madras, India*, in 1998. Prior to joining UCA, he worked as a postdoctoral fellow at the *University of Arkansas* at Little Rock (UALR) for about 18 months, and as an assistant professor at the *Dhirubhai Ambani Institute of Information and Communication Technology*, India, for four years. Earlier, he worked as a post-doctoral fellow at the *University of Twente*, The *Netherlands*, and at the *University of Antwerp*, *Belgium* for about five years. His research interests are in queuing models and simulation of discrete-event systems, and stochastic models. He has published 28 papers in international journals including the Journal *of Applied Probability*, *Queuing Systems*, and *IEEE Transactions on Computers*. He received the 2005 Jacob Wolfowitz Prize for the outstanding theoretical advances for his collaborative work that appeared in *the American Journal of Mathematical and Management Sciences ,* and a book chapter on data mining.

2009 Alumni

B.A./B.S. Mathematics
Matthew Adams
Benjamin Bell
Courtney Davis
Peggy Enfinger
James Fitch
Newton Foster
Rachel Laymen
Rebecca Nichols
Eric Sellers
Luis Suazo
Jonathan Taylor
Scott Wray
B.S.E. Mathematics Education
Kevin Casey
Natalie Cox
Jessica Elliott
Lori Kegabein
Brittany Russell
Lori Smith
M.A. Mathematics Education
Sara Brown
Ashlet DeBerry
Robyn Jamison

Kimberly King
Jennifer Lachowsky
Khaled Mohamed
Jessica Throesch
M.S. Applied Mathematics
Taylor Erwin
Samuel Green
Ethan Hereath
Ching-Ying Hsin
Jonathan Johnson
Oyemolade Osibodu
William Womack

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. Such people are **Drs. George Bratton** and **Charles Seifert** (who serve on the UCA Faculty Senate), **Dr. Steve Butcher** (represents the college at the Advising Center), and **Dr. Damber Singh Tomer** (scholarship support)

2010 Major Math Events at UCA

(For details, call 501-450-3147)

March 11-13	**RCML National Conference**
March 6	**ACTM Regional Math Contest**
April 24	**ACTM State Math Contest**
June	**Workshops for Concurrent Credit Math Teachers (date to be announced)**
July	**MSI'10 (date to be announced)**

Latest Technology in the Classrooms

In 2009, the Mathematics Department replaced all 19 computers in the Math Computer Lab with iMacs with dual operating systems. The latest versions of the mathematics software such as the *Geometer's Sketchpad*, *Mathematica*, *Matlab,* and *Maple* will be installed on these Mac computers. Three Smart Boards were also installed in classrooms used for the math education program. Smart Boards allow the instructor to write on the screen electronically, use computer software while standing at the board, and save notes electronically for later review. Many of the schools at which our math education graduates will teach, use Smart Boards in their classrooms so teacher candidates are gaining valuable experience with this technology prior to entering the workforce. Also, for the training of our math education students, the Department purchased 40 TI-Nspire calculators and associated interactive classroom equipment, computer algebra system, and software.

Who Wants To Be A Mathematician

In Spring 2009, the Mathematics Department hosted the nationally acclaimed Math Game show, "Who Wants to be a Mathematician" in the Health Science Center Auditorium. Only two universities (UCA and UAF) in the state received the honor to host the event. The game show, sponsored by the *American Mathematics Society* (AMS), *Texas Instruments,* and *Maplesoft,* came to UCA on April 16, 2009. Several high school seniors from Conway, Greenbrier, Morrilton, Mayflower, Little Rock Central, North Little, Parkview, Arts and Science Magnet, and White Hall attended this by-invitation only event. **Joseph Berleant,** a freshman from the LR Central High, won the top prize of $500 from AMS and a TI-Nspire calculator. During the intermission, **Dr. David Peterson**, retired Professor of Mathematics at UCA , delighted the crowd with his lecture on mathematics behind sound and music. He used two dulcimers, guitar , marimba bar , and some recorded music to illustrate equations for harmonic frequencies. Pictures of the contestants and the audience shown are courtesy of **Dr. Mike Breen** of AMS.

Professional Development Workshops for the UCA Concurrent Course Math Teachers

During the week of July 21, 2009, UCA mathematics faculty members **Drs. Danny Arrigo**, **George Bratton, Clarence Burg, Ramesh Garimella**, and **Charles Watson** offered professional development workshops in Calculus and College Algebra for high school teachers in central Arkansas who taught UCA concurrent math courses for AY 2009-10. Funding for the workshop was provided by the *Division of the Academic Outreach and Extended Programs* of UCA.

Summer Program in Math and Science for High School Students

During the week of July 13-17, 2009, several middle and high school students participated in the second annual Mathematics and Science Investigators program (MSI'09) on the campus of the University of Central Arkansas. The MSI'09 was organized by **Dr. Ramesh Garimella**, Chair of the Department of Mathematics at UCA. The topic for summer'09 was Loudspeaker Audio Engineering, taught by **Dr. William Slaton**, Assistant Professor of Physics and Astronomy at UCA. The summer program received financial support from the *Arkansas Science and Technology Authority*, and a seed grant from the *UCA Foundation*. Activities in MSI'09 were focused on the separate parts of a loud speaker by performing experiments to understand the underlying physics and mathematics. Each participant built a speaker which he or she took home. Plans are underway for MSI'10 . For more information please contact Dr. Garimella at 450-3147 or rameshg@uca.edu

Cluster Computing *(Continued from page 1)*

each with two gigabytes of memory and six terabytes of storage. In addition, it will have a dedicated state-of-the-art GPU server. The faculty will lead different research and educational thrusts, enabled by the cluster. Dr. Clarence Burg's research will focus on computational fluid dynamics. Dr. Carmack will perform brain image analysis and data mining, using computationally intensive statistical algorithms that he is currently developing. Dr. R. B. Lenin will focus on numerical simulations of physical processes that involve random processes, such as traffic flow and the wait time for a customer at a bank. Each collaborator will develop or redesign courses to use the cluster. New courses will include spatial modeling, data mining, modeling and simulation and an introduction to computational fluid dynamics. The components for the cluster will be purchased and assembled during the spring semester, with the goal of having the cluster fully accessible by the UCA community during the fall semester of 2010.