**University of Arkansas at Little Rock**

**Department of Mathematics and Statistics Newsletter**

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[](http://www.wga.hu/art/r/raphael/4stanze/1segnatu/1/athens.jpg)

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**Christy Jackson is this year’s College of Arts, Letters, and Sciences, Recipient of the**

**Faculty Excellence in Teaching Award**

Ms. Jackson’s recent award follows her receipt of the Student Government Association’s Student Choice Award as Outstanding Faculty member. Among her many achievements, Ms. Jackson, in addition to being an excellent teacher as demonstrated by her student evaluations and the comments of her peers, has also developed classes and programs to meet the special needs of UALR’s students. At the request of the College of Business, she designed and offered an accelerated version of the Business Calculus course, which has earned “Quality Matters Certification,” awarded by the non-profit organization dedicated to quality assurance in Online Education. This program also received the Arkansas Blackboard Users Group Exemplary Course Award in April 2015 which indicates the course was rated exemplary in the areas of Course Design, Interaction and Collaboration, Assessment, and Learner Support. Accelerated Business Calculus will be submitted for the Blackboard Catalyst Award during the 2015-2016 school year. Ms. Jackson also has developed a four-hour PreCalculus course designed to help students who are not quite ready for the Calculus course series. Moreover, every Fall, she works with the Science Scholars and the LSAMP Scholars in a class designed to review the math skills necessary for chemistry and biology. She also teaches in the *Girls in STEM* program at the Museum of Discovery. The *Girls in STEM* is a week-long summer camp for girls in middle school to introduce them to activities and careers in the fields of science, technology, engineering and mathematics. The Department applauds her many accomplishments and her well-deserved awards.

**The Department of Mathematics and Statistics Responds to the Needs of Students**

The Department of Mathematics and Statistics currently offers ten different programs from licensures, to minors in Math and Statistics, to BS and BS degrees, to masters and PhDs. In the Graduate program alone, the Department has fifteen masters and ten PhD students. In addition, the Department is heavily invested in assisting students in their Mathematics classes. The Mathematics Assistance Center (MAC), directed by Senior Instructor Denise LeGrand, offers free mathematics, physics and statistics tutoring for UALR students, and last year had over 5000 visits by almost 800 different students. The MAC program, however, is not the only program offered by the Department to meet the special needs of students enrolled in the University, nor is the Department only concerned with those students already enrolled, but offers assistance to those who may potentially enroll.

**Dr. Charles W. Donaldson Summer Bridge Academy**

By Rebecca Streett



In an effort to mitigate the need for remediation among incoming freshmen at UALR, the Department of Mathematics and Statistics has supported the Dr. Charles W. Donaldson Summer Bridge Academy since its inception two years ago. The Bridge Academy is a three-week residential program aimed at preparing incoming freshmen for college-level work by eliminating the need for them to take remedial math and English courses.

Senior Instructor Melissa Hardeman helped develop the program in 2013, and I was fortunate enough to join her last year. We worked closely with over 90 students in an effort to increase their algebra skills, and prepare them for the rigors of college-level mathematics. Students thrived in the program, with 97% of them bypassing remedial math altogether. The experience was extremely rewarding for all involved. In addition to boosting student morale, success in the Bridge Academy also translates into a significant savings in tuition for these students.

For more information, read more about the Academy on the UALR website: <http://ualr.edu/news/2014/08/15/summer-bridge-scholars-celebrate-90-percent-plus-success-rates/>

**Mathematical Remediation Efforts at UALR**

By Annie Childers

According to a recent report from Complete College America, at most public universities, only 19% of full time students earn a bachelor’s degree in four years. In Arkansas, only 16% of these full time students earn a bachelor’s degree in four years. Part of the problem is the stumbling block of inadequate academic preparation. This causes students to have to take remedial coursework, which can be costly and very time consuming for the student. This same report states that only one in ten remedial students will ever graduate college.

Here at UALR, we enroll around roughly 500 students in remediation mathematics courses each semester. We address the mathematics remediation need though what we call the Pre-Core Mathematics program. It is a sequence of courses designed to allow the student to work self-paced in a modularized fashion. In order for a student to be eligible to enroll in the course Quantitative and Mathematical Reasoning, he/she must complete 8 modules. In order for a student to be eligible to enroll in College Algebra, he/she must complete 10 modules. Completion of modules and which course to take depends on the major.

Last fall, we implemented two changes to the Pre-Core program with success. First, we added two Pre-Core academic coaches to the program. The purpose of these coaches was to give the students extra support outside of the classroom. These coaches met weekly with identified students to help them with time management, scheduling, and motivation. The students identified for coaching were selected based on missing required deadlines and/or missing too many classes. We housed the coaches in offices right next to the Pre-Core classroom, which provided easy access for students.

The second change to our program was the addition of required testing deadlines. Before Fall 2014, there were no deadlines in place for students to have homework or tests completed. The course was truly self-paced, and students had the option to test when they wished. This caused a huge “rush” at the end of the semester with students scrambling around to try to pass the course, Thus, for Fall 2014, five required deadlines were implemented. This put a deadline about every three weeks. The students were required to have a module completed and to come test before these deadlines. The purpose was to give students more structure in the program, with the hope that they would test more often and complete more modules.

Because of these deadlines, out of roughly 509 students who were initially enrolled in Pre-Core for Fall 2014, 1937 total assessments were given. We increased the number of assessments given by about 900 nearly doubling the previous semester. Based on these results, it appeared to us that the implementation of this program certainly gave the students a push and an incentive to test more often. The result was that far more students passed the course.

With the first crunch of numbers and a comparison of the Pre-Core program for Fall 2014 with the previous calendar year, the pass rate for Fall 2014 was 65%, a significant improvement over the 54% for the previous Fall, and from the 43% in the Spring of 2014.

While these successes are impressive, there is still more that can be done with the Pre-Core program. Research has shown that offering remediation alongside the college-level course can be beneficial to the student and the institution. We are planning a pilot co-requisite course for Fall 2015, where those students in the ACT range of 17-20 will be enrolled in Quantitative and Mathematical Reasoning at the same time as their remedial math course. Students will attend their QMR course and then directly after class they will go to a lab for extra support and tutoring for the topics just learned. In the future we hope to work to redesign this model as necessary to fit the needs of our students here at UALR.

For more information, please contact me at [abchilders@ualr.edu](mailto:abchilders@ualr.edu).

**Math Department Develops Accelerated Online Program**

The Department of Mathematics and Statistics has been offering many of its courses online since the early 2000’s. Two such courses, College Algebra and Business Calculus (as noted earlier), were redesigned in an accelerated format to meet the needs primarily of students in the College of Business; however, students from all over campus enroll in both courses. Each course runs for seven and a half weeks which means that a student can take College Algebra during the first half of a semester and then Business Calculus during the second half of that same semester. Because College Algebra is a prerequisite for Business Calculus and cannot be taken as a concurrent course, this accelerated partnership between College Algebra and Business Calculus allows students to meet their mathematics requirement along with its prerequisite in one semester.

Both Accelerated College Algebra and Accelerated Business Calculus went through the Quality Matters Certification process and were granted the Quality Matters Certificate. This indicates that the courses meet rigorous standards and show “best practices” in the areas of Course Design, Assessment and Measurement, Learner Interaction, Course Technology, Learner Support, and Accessibility and Usability.

**New Course: Quantitative and Mathematical Reasoning (QMR): Math 1321**

This course was developed as a result of UALR’s participation in the Complete College America Program. The designer of the course, Melissa Hardeman, became very PASSIONATE about this course when she realized the incredible need for a mathematics course that presents mathematics in the context of everyday life while also providing the math skills needed for non-STEM careers and survival in today’s society. Quantitative thinking adds meaning and purpose to a myriad of other courses and content disciplines. This course is offered on campus and online. Students ENJOY this course, and they can APPLY what they learn in this course to their everyday lives and courses in other disciplines.

**Student Activities**

**Department Scholarship and Award Winners**

**Leadership in Science Endowed Scholarship**: Jonathan Whitehead and Anna Marie Seno

**David A. Schonert Endowed Scholarship**: Natalie McCandless

**The Dewoody and Emily Fleming Dickinson Award**: Mai Huynh

**Ma Family Endowed Scholarship:** Rebecca Webb

**Linda and Tom McMillan Scholarship:** Grizel Macias

**Jerry and Sherri Damerow Endowed Mathematics and Statistics Scholarship**: Rachel

Smith, John Siratt, Taylor McClanahan

**Mathematics and Statistics Faculty Endowed Award**: Jessica Caviness

**Outstanding Senior Awards:** Emily Nail, Justin Smith

**Outstanding Achievement by an Undergraduate Award:** Taylor McClanahan, Justin Smith

**Award for Outstanding Teaching by a Graduate Student: S**aqib Hussain, Yajie Yu

**Outstanding Achievement by a Graduate Student Award**: Shan Yang

**Outstanding Tutor Award:** Sam Lawhorn, Justin Turner, Emily C. Nail, Jamie Spickes

**Math Club News**

By Seraphim Lawhorn

The UALR Math Club has this semester instituted Math Movie Mondays, during which math related documentaries and/or movies are played. The Club hopes to continue this trend into next semester by expanding its audience and movie library. The UALR Math Club has also has acquired over 36000 math book titles in an online format and hopes to make UALR the largest repository in the state in the next five years. Another project that has been taken on the Math Club under the leadership of Emily Nail is the restoration of the University’s Planetarium. The Club is currently looking into donors and other sources of funds. Anyone interested in joining us in this worthy endeavor please contact the club president at [ualrmathclub@gmail.com](mailto:ualrmathclub@gmail.com).

**The UALR Math Club’s Poster Project**

Two semesters ago, the newly formed UALR Math Club designed and printed, with the help of the EAST Lab, a poster for the glass cases on the 6th floor of Dickinson. This semester, the Club will expand on its first poster of Leonardo Da Vinci, pictured above, by complementing it with posters of other notable figures in the history of mathematics. The remaining posters, which are scheduled for release by the end of this month, include Hedy Lamarr, Srinivasa Ramanujan and G. H. Hardy, Leonard Euler, and others. The second phase of the poster project will be to trace the educational lineage of the professors of the UALR Department of Mathematics and Statistics. We will keep you posted



**Practical Applications of Mathematics: Mathematical modeling and Scientific Computing**

Mathematical modeling and scientific computing are indispensable vehicles of human's quest for understanding the real world.  Numerical analysis plays a fundamental role in evaluating the correctness, efficiency, and robustness of the mathematical models and simulation algorithms. While numerical analysis naturally finds applications in all fields of engineering and sciences, in the 21st century, the life sciences and even the arts have adopted elements of scientific computations. With fast growth of computer hardware and computational power, numerical analysis plays even more important role in science and engineering practice.

However the research of computational mathematics in the state of Arkansas is significantly behind other states in quality and quantity and cannot meet the need of fast grow economic in Arkansas.

Research experience for undergraduates plays an important role in high education. Four math major students: Seraphim Lawhorn, Emily Nail, Justin Smith and Jonathan Whitehead are doing research projects with Dr. Ye in numerical analysis supported by my NSF grant.

**Additional Faculty Activities**

**Hassan Elsalloukh,** Associate Professor, Graduate Coordinator of Mathematics and Graduate Certificate Director, and Adjunct Associate Professor of Statistics, Department of Biostatistics, College of Public Health, University of Arkansas for Medical Sciences, received for the second year in a row the University’s Graduation and Retention Advocate Award. He has published two articles this year and has one pending, is a referee for *Communications in Statistics-Theory and Methods,* the *Tamsui Oxford Journal of Information and Mathematical Sciences,* the *Journal of Mathematics, Statistics and Allied Fields,* and *The International Journal of Mathematics and Mathematical Sciences.*

**Nickolai Kosmatov**, Professor of Mathematics, has published three papers and has one in press, served as an Editor of the journals ``*Advances in Differential Equations and Control Processes*” *and* ``*The Electronic Journal of Qualitative Theory of Differential Equations*”*.* The following are the publications for this year: ``A non-local problem for a differential equation of fractional order”, *Dynamic Systems and Applications* 23 (2014) 155-161; ``Three-point third-order problems with a sign-changing nonlinear term”, *Electronic Journal of Differential Equations*, 2014, No. 175, 1-10; ``Eigenvalue comparison for fractional boundary value problems with the Caputo derivative”, *Fractional Calculus and Applied Analysis* 17(2014), 872-880.

**Denise LeGrand**, Senior Instructor, the Director of the MAC Lab since 1996. Her College Algebra Accelerated was certified Quality Matters in 2014. She has presented over twenty five international and national conferences about teaching with technology and online courses which have led her to Asia, Australia, Europe, Canada and other wonderful places, which has allowed her to learn new technologies and apply new teaching techniques in her courses and share what she has learned. Mrs. LeGrand is one of the College’s representatives in the University Faculty Senate where she serves as Parliamentarian, and on the Senate’s Planning and Finance, the Faculty Governance, Executive Committees. Mrs. LeGrand additionally serves on the University’s ad hoc Committee for developing a strategic plan for online courses, and currently volunteers with AAIMS (Arkansas Advanced Initiative for Math and Science) here at UALR where she trains high school calculus teachers in Advanced Placement Calculus. She has also worked with STRIVE , an organization that pairs UALR teachers with high school teachers who work together on projects in their field.

**Liangfang Lu**, Assistant Professor in Mathematics Education. She and Dr. Jim Fulmer were awarded a three-year Math and Science Partnership (MSP) grant titled “Improving Teacher Quality in Middle School Mathematics” from the Arkansas Department of Education. In 2014 they conducted 15 workshops including one online workshop for 37 middle school mathematics teachers from 8 schools in Little Rock School District. She also made presentations at national and local conferences in 2014 including Annual Meeting of American Education and Research Associate (AERA), Annual conference of Research Council on Mathematics Learning (RCML), annual meeting of Math and Science Partnership (MSP), Arkansas Curriculum Conference (with Ida and Dr. Fulmer). Just in April  2015,  she and Dr. Fulmer made two presentations at the Annual Conference of the National Council of Teachers of Mathematics (NCTM) in Boston, which had received positive responses from the attending teachers from nationwide. Lianfang Lu is a referee for NCTM *Journal*of Teaching Children Mathematics, Journal of Teaching Mathematics in Middle Schools, and Journal of Research Council for Mathematics Learning.

**Ida Umphers,** Senior Instructor, presented five sessions at the 2013 Arkansas Curriculum Conference (four with Dr. Lu) entitled "Explorations with Pentominoes", "Enhance the Learning of Fractions", "Terrific Tangrams", and "Get 'Leg' Up on Geometry". She was most proud of the one she encouraged a preservice middle school teacher to present. Dustin Dearman did a social studies game for a class project which he modified at Ms. Umphers suggestion for geometry and presented at ACC. He had a standing room only crowd and he did a superb job.  Again, in 2014, she worked with another pre-service middle school teacher, Jacquelyn Penn, to adapt a class presentation for ACC on using the card game War for teaching decimal skills. It also drew a large crowd and the educational products company ETA Hand-to-Mind contacted them to see if they could provide supplies and door prizes for the participants.  Such opportunities benefit the larger education community in the state, and provide an opportunity that greatly enhances the resumes of our graduates as they look for teaching jobs.

**Xiaoshen Wang**, Professor of Mathematics, has published the following papers since Fall 2014:  **“** A Modified weak Galerkin finite element methods for convection-diffusion problems in 2D,” Journal of Applied Mathematics and Computing, (Published online Nov. 13, 2014); **“Homotopy Continuation Methods for Stochastic Two-point Boundary Value Problems Driven by Additive Noises,”**  Journal of Computational Mathematics (JCM), 32 (Nov. 2014) 630–642; “A modified weak Galerkin finite element method for a class of parabolic problems,” Journal of Computational and Applied Mathematics 271 (Dec. 2014) 1–19; “A Modified Weak Galerkin and Discontinuous Galerkin Methods,” Journal of Computational and Applied Mathematics 271 (Dec. 2014) 319–327; “A Modified Weak Galerkin Finite Element Method for the Stokes Equations,” Journal of Computational and Applied Mathematics  (2015), pp. 79-90; "*Theoretical aspects of mixed volume computation via mixed subdivision,*" *Communications in Information and Systems* Vol.14, no.4. (2015); “Shape Regularity Conditions for Polygonal /polyhedral Meshes, Exemplified in a Discontinuous Galekin Discretization,” Numerical Methods for Partial Differential Equations. Vol 31, no 1 (2015), pp 308-325

**Xiu Ye,** Professor of Mathematics, currently is the Principal Investigator of a National Science Foundation Grant of $231,000, has published this past year eleven papers in refereed journals and has two currently in press , delivered nineteen papers in five different states and six foreign countries. In addition, to her scholarship, she supervises eight PhD students. She is noted for involving her students in her research activities including often paying their way to meetings. This year’s publications are the following: “Interior penalty discontinuous Galerkin method on very general polygonal and polyhedral meshes,” *Journal of Computational and Applied Mathematics*, 255 (2014), 432-440; :”A weak Galerkin mixed finite element method for second-order elliptic problems, *Math. Comp*., 83 (2014), 2101-2126; “A posteriori error estimates for Weak Galerkin finite element methods for second order elliptic problem,” *J. of Scientific Computing*, 59 (2014), 496-511; “C^0 Weak Galerkin finite element methods for the biharmonic equation,” *J. of Scientific Computing*, 59 (2014), 437-495; “Numerical studies on the Weak Galerkin method for the Helmholtz equation with large wave number,” *Communications in Computational Physics*, 15 (2014), 1461-1479; “A weak Galerkin finite element method for biharmonic equations on polytopal meshes,” *Numerical Methods for Partial Differential Equations*, 30 (2014), 1003-1029; “Weak Galerkin finite element method for the Helmholtz equation with large wave number on polytopal meshes*,” IMA Journal of Numerical Analysis*, 2014, (DOI) 10.1093/imanum/dru026; “A stable numerical algorithm for the Brinkman equations by weak Galerkin finite element methods,” *J. of Computational Physics*, 273 (2014), 327-342; “Weak Galerkin finite element methods for Darcy flow: Anisotropy and heterogeneity,” *J. of Computational Physics*, 276 (2014), 422-437; “A modified weak Galerkin finite element method for the Stokes equations,” *Journal of Computational and Applied Mathematics*, 275 (2015), 79-90; “Weak Galerkin finite element method for second-order elliptic problems on polytopal meshes, *International Journal of Numerical Analysis and Modeling*, 12 (2015), 31-53..