

The Integral



Department of Mathematical Sciences
December 2013

Volume 2/Issue 2

From the Department Chair

Greetings! Here is a brief update on the programs and people of our department.

This fall I began my first year as chairperson, succeeding Sheryl Stump, who provided five years of excellent leadership. Our excellent administrative staff, consisting of Susan Bourne, Joel Bozell, and Carol Deiwert, has made my transition to the chairpersonship a pleasant one. I give a special thanks to Carol Deiwert for designing and editing this newsletter.

The actuarial science major is thriving. There are now approximately 120 undergraduate students in the major, making actuarial science the most populous major program in the department. Many students in this major are distinguishing themselves as excellent students. For example, students Dulton Moore and Daniel Widmann each won scholarships this fall for top scores on their respective actuarial exams.

The department is proposing a new master's program and related certificate in "foundational" mathematics instruction at the community college level. Community college instructors wishing to teach math courses below calculus will benefit from this program. Courses will be offered online in order to reach an off-campus target population.

Our mathematics major, though small in comparison to actuarial science and mathematics education, continues to be strong. Ellen Weld, a recent mathematics graduate, began mathematics graduate coursework at Purdue this fall. Hannah Turner, a senior mathematics major, completed an REU undergraduate research program at Iowa State University and is planning to pursue graduate work in mathematics.

Beginning this fall we have one new tenure-track faculty member in our department (Yayuan Xiao, harmonic analysis), two new full-time contract faculty members (Alina Florescu and John O'Connell), and two new half-time contract faculty members (Catherine Frazee and Chris Moore). More information about our new faculty members is available in this newsletter. This year we are searching for three new tenure-track mathematics faculty.



Faculty members primarily take sabbatical leave to immerse themselves in research projects. We are happy that Gary Dean, our Lincoln Financial Distinguished Professor of Actuarial Science, has returned from his productive, year-long sabbatical. Munni Begum and Rich Stankewitz are on sabbatical this fall, and Sheryl Stump will be on sabbatical in the spring.

The faculty love to hear from our alumni, and we know that you do, too. So, if you have any news you would like to share in an upcoming newsletter, please send me an email. In the meantime, I wish you well.

Sincerely,
Dr. John Lorch
Chairperson
Department of Mathematical Sciences
jlorch@bsu.edu

Inside this Issue:

- Meet our New Faculty p 2 - 3
- Sabbatical Leave p 4
- Faculty Presentations & News p 4 & 5
- Where Are They Now? p 5 & 6

New Faculty

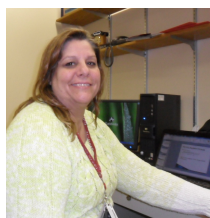


Alina Florescu joined the Department of Mathematical Sciences in August 2013 after recently completing her PhD in mathematics at the

University of Iowa. Alina's research work is in the area of generalized integer factorizations, a subfield of commutative algebra.

As a graduate student, Alina presided over the math graduate student organization at the University of Iowa. She also organized a career panel for the Sonia Kovalevsky High School Mathematics Day, an annual NSF-sponsored program designed to interest young women in math and encourage them to continue studying and to pursue careers in the STEM fields.

Alina came to the United States approximately 11 years ago to study at Mount Holyoke College in South Hadley, MA. The very first day she arrived in New York City she said it felt just like the American movies she would often watch back home. Alina visits her family in Romania every summer.



Catherine Frazee began teaching MATH 111 and MATH 125 for the department this fall. Previously she worked for 15 years as the accountant for a construction

business while raising six children - four boys and two girls with her husband, Mark. She earned a bachelor's degree in 2006 in print and web journalism with a minor in writing from Austin Peay State University, Clarksville, TN. This was during the short time she thought she would like to do something other than math. But math called her back when her oldest son, who always excelled at math, was suddenly struggling. As she helped him and his friends, she realized she enjoyed teaching. Catherine returned to college with

the Woodrow Wilson Fellowship and received a master's degree in mathematics from IUPUI in 2012. She taught high school math for a short time, while also teaching college algebra at Ivy Tech.



Chris Moore completed his master's degree in mathematics at BSU in May of 2013 and became a part of the faculty this fall. He also received his bachelor's degree from Ball State in

secondary mathematics education.

Chris had a great experience student teaching at Avon High School. However, once he graduated with a Bachelor of Arts degree with a minor in German, he decided that he wanted to teach higher-level material (with fewer discipline problems!). He went back to get his master's degree because he knew he still had a passion for teaching and being involved in the classroom. Chris taught for three semesters as a graduate student at BSU and gained valuable experience to help the transition from graduate student to faculty member.

Chris also had the opportunity to teach mathematics and science at Cedarbridge Youth Center, which is a juvenile detention center in Muncie. He developed both an entirely new curriculum and education system for CYC and had very positive results with Indiana State Department of Corrections auditors.

Chris is an avid baseball fan and tries to watch every Atlanta Braves game that he can. He is also a big fan of the Indianapolis Colts and Indiana Pacers. He really enjoys learning about all types of science, especially marine animals and astronomy.

Chris and his fiancé, Brittney Klauser, plan to marry May 31, 2014.

New Faculty

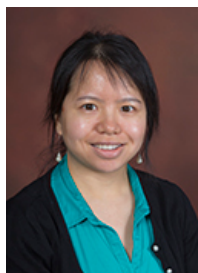


New to the department this fall is John O'Connell. John earned his bachelor's degree in secondary mathematics education from Purdue University Calumet where he was the department of mathematics, computer

science, and statistics Outstanding Student of the Year 2003/04. He earned his master's degree in mathematics from Indiana University Bloomington where he was awarded the David A. Rothrock Teaching Award in recognition of his outstanding performance in teaching mathematics at IUB.

Currently he is teaching three sections of MATH 125, one section of MATH 161 and one section of MATH 221.

John has also worked as a dealer in Las Vegas casinos, passed several actuarial exams, and taught mathematics for several years at Vincennes University and in China.



Yayuan Xiao also joined the department this fall as an assistant professor. She earned a master's degree in mathematical statistics and a PhD in mathematics at Wayne State University.

Yayuan's primary research interests lie in the areas of harmonic analysis, partial differential equations, and biostatistics. One part of her research focuses on the theory of spaces of homogeneous type, which includes theory of multi-parameter Hardy spaces of homogeneous type, Wolff potentials, and integral systems on spaces of homogeneous type. Another part of her research is on weighted multi-parameter analysis associated with Zygmund dilation, which involves the theory of Hardy spaces, BMO spaces, Carleson measures and Ricci-Stein multi-parameter singular integrals. She has published a paper on the human genome with single nucleotide polymorphism (SNP)

data by using mismatch distribution. She is a member of Mathematics Research Communities (MRC), a program of the AMS for nurturing early career mathematicians.

Yayuan has wanted to become a teacher since childhood. Because her parents are both teachers, teaching has a special sentimental value for her. She thinks teaching mathematics is a delicate, challenging, and rewarding task. She is proud to be a part of this ancient discipline. She states it will always be a joy for her to teach students, to interact with students and other teachers, and to learn from them.

BSCTM

By Ellie Schaefer, BSCTM President and Maddie Tylenda, BSCTM Vice President

The Ball State Council of Teachers of Mathematics (BSCTM) is the campus chapter of the professional development organization, NCTM. We strive to prepare secondary mathematics education majors and elementary education majors with a math concentration for future landmarks in the degree as well as for the professional world. This fall we had a large increase in attendance, especially that of elementary education majors, and also retained many members from last year.

This semester we held several meetings for the pre-service mathematics teachers. Topics for the meetings have ranged from preparation for a landmark in the secondary education degree to using manipulatives and mathematical games effectively in the classroom. In the past we have had a math and science game night for parents of students at the laboratory school on Ball State's campus, and hope to hold again in the spring. We are currently in the process of facilitating a volunteer experience with Southside High School to get our members involved in schools in the community. We have been, and will continue to be, helping the math education and math concentration students to develop into the best teachers they can be.

Sabbatical Leave

Curtis Gary Dean

I want to tell you about a couple of accomplishments while on sabbatical leave last year. Currently we have about 150 actuarial science majors and our top priorities are teaching and mentoring students leaving little time for research when school is in session. Sabbatical leave allowed me to focus on the important activities of scholarship and research.

One completed task was a book chapter titled "Generalized Linear Models." This chapter will be included in the book *Predictive Modeling Applications in Actuarial Science* that will be published by Cambridge University Press. Predictive modeling is one of the "hottest" areas in actuarial science and there is high demand for actuaries with predictive modeling skills. There is a need for a book that broadly covers the subject from an actuarial perspective.

Another major project was a research paper with the long title "The Optimal Number of Quantiles for Predictive Performance Testing of the NCCI Experience Rating Plan." I co-authored this paper with Jon Evans, FCAS, an actuary at the National Council of Compensation Insurance (NCCI). NCCI gathers workers compensation data and provides essential services to keep the workers compensation system functioning well. NCCI's experience rating plan is used in calculating insurance premiums charged to employers. It must be tested regularly to validate that it is fairly allocating insurance costs across employers. Our paper was submitted for peer-review and publication in *Variance: Advancing the Science of Risk*.

We were fortunate to find Rich Owens to assume many of my responsibilities while I was away. Rich is a Fellow of the Society of Actuaries. He has more than 35 years of industry actuarial experience and was a vice president at MetLife before leaving to teach actuarial

science. Before Ball State, he taught actuarial science at Drexel University. Rich is a perfect match for our actuarial program, which prepares students to enter the workforce of professional actuaries.

Recent Faculty and Student Publications

Fischer, Hanspeter and Andreas Zastrow (2013). A core-free semicovering of the Hawaiian Earring. *Topology and its Applications*, 160(14), 1957-1967.

Karmokar, P.K., Basher, M.A. and **Imon, A.H.M.R.** (2013). *The Impact of Contributory Factors of Boro Rice Production*, Scholars Press, Germany, 144 pages.

Imon, A.H.M.R. and Hadi, A.S. (2013). Identification of multiple high leverage points in logistic regression. *Applied Statistics*, 40(12), 2601-2616.

Karls, Michael A., (2013). Verifying the hanging chain model. *PRIMUS: Problems, Resources, and Issues in Mathematics Undergraduate Studies*, 23(8), 733-747.

Lair, A. V. and **Mohammed, Ahmed**, (2013). Entire large solutions to elliptic equations of power non-linearities with variable exponents. *Advanced Nonlinear Studies*, 13(2013), 699-719

Stump, S.L. (2013). Learning to Lead/Leading to Learn. *Teaching Children Mathematics*, 20(3), 146-153.

Where Are They Now?

Andrea Zentz, Colorado



After graduating from Ball State University in 2008 with my bachelor's degree in secondary mathematics education, I took a job teaching at Valparaiso High School. I thoroughly enjoyed my time teaching there with great colleagues and students and learned what it was like to be a teacher on a day-to-day basis. After two years, I took a teaching job in Cherry Creek School District at Prairie Middle School in Aurora, Colorado. While there, I have led the staff in developing curriculum for students who are one or two years ahead of their grade level mathematically, as well as aligning our school with the new Common Core State Standards. I currently teach sixth and seventh graders who are classified as gifted and talented, and my experiences at Ball State have helped me take these students to the next level mathematically.

I have also continued my work with Destination Imagination, a creative problem-solving association for kids at all levels. Last year, I became one of the Affiliate Challenge Masters for Instant Challenge in Colorado, and I work with training team managers, appraisers, and coordinators on how to teach their kids teamwork, creativity, and problem-solving skills. I also work as a head appraiser at Global Finals, where teams from all over the world compete.

My years at Ball State have certainly prepared me for the challenges I've faced, and the opportunities that have come my way have no doubt been due to the skills I learned there. I look back on my time at BSU fondly, and hope to further my career in Colorado by pursuing a master's degree in mathematics in the near future.

Faculty News

Munni Begum presented "Exploration of Transcription Regulatory Networks through Exponential Random Graph Models" at the Purdue University Statistics Colloquium, Lafayette, IN, in November.

Curtis Gary Dean presented "Predictive Modeling" at the BSU Faculty Colloquium in October.

Hanspeter Fischer presented "Word Calculus in the Fundamental Group of the Menger Curve" at the International Conference on Topology and Geometry at Shimane University, Japan, in September.

Michael A. Karls presented "Modeling a Diving Board" at the INMAA section meeting, University of Southern Indiana, Evansville, IN, in October.

Ahmed Mohammed gave a three-week course on "Topics in Elliptic Differential Equations of Second Order" at Addis Ababa University, Ethiopia, in July.

Ahmed Mohammed presented "Geometric Analysis of PDE and Several Complex Variables" in Sera Negra, Brazil, in August.

Ahmed Mohammed gave an invited talk at Wayne State University in Detroit, MI, in October.

Ahmed Mohammed was a panelist discussing "Publishing Undergraduate Research" at the INMAA section meeting, University of Southern Indiana, Evansville, IN, in October.

Kathy Shafer and graduate student Kyle Murphy presented "Cat and Mouse on Scratch" at the annual meeting of the Indiana Council of Teachers of Mathematics, Indianapolis, IN, in October. The session highlighted work completed by six students from MATH 330 (Spring 2013).

Life as a Graduate Student

Ellen Weld, 2013 BSU Graduate

Many words come to mind to describe my past few months at Purdue University and I suppose the word that comes to mind most often is busy. As a math grad student, I spend most of my waking hours working on homework for various classes and grading or getting ready for one of the three recitations that I teach. There's always something to do and at this point I'm really hoping I survive this semester with my mind intact.

But I suppose, overall, I like it here. I enjoy my classes; they are both courses designed to help me succeed in the qualifying courses I plan to take next semester. I have to pass a certain number of qualifying courses and qualifying exams in order to move on to bigger and better things like my thesis and from what I hear classes which don't require any homework at all (needless to say I'm a little anxious to get all those quals out of the way). As for my recitations (where I mostly answer homework questions and give quizzes), I teach three sections for freshman calculus 1 designed for those already familiar with calculus. This may seem oddly specific, but this is just one of what feels like 20 calculus sequences that are offered; they offer a calculus sequence for liberal arts majors, for life science majors, for those brand new to calculus, for honors, for almost honors – the list goes on. Teaching itself is fine. The only problem is I don't remember much of calculus 1 so I mostly work about a week ahead of the students and pretend I remember more than I actually do. For the most part, the students seem to be fooled.

When I'm not teaching or in class or in my shared office, I pass my time doing homework and grading at my apartment across the river from campus. I live within biking distance of campus which is a plus, and for those days which I don't want to bike I can ride the bus which stops right in front of my apartment complex. Even more fun, my

apartment is situated relatively close to downtown Lafayette which is always a pleasant place to visit with coffee shops and restaurants on every block. I don't visit downtown as often as I should but as I've mentioned I'm usually hunkered down in my room working on something grad school related.

Although I spend more than 20 hours a week just working on homework, I strangely enjoy being a graduate student. The faculty and staff are extremely supportive and helpful and the other students in my classes are always willing to join up for a study party. I'm hoping that next semester I'll have more time for fun activities and having a life but something tells me I'll be just as busy as this semester. But I can dream.

Where Are They Now?

Fr. Joseph Riedman, Connersville, IN

I am advanced in years now but still remember the summers I spent at Ball State University working toward a master's degree in mathematics. I, a Catholic priest, was given great attention by the faculty who made sure that I understood the subject matter. I taught at Scecina High School in Indianapolis for seventeen years. During those years, and beyond, I served the church for fifty-three years. I am currently retired and living in my hometown, Connersville, IN.

The Integral is published by:

Ball State University
Department of Mathematical Sciences.
RB 465, Muncie, IN 47306
Phone: (765) 285-8640
FAX: (765) 285-1721
E-mail: mathsci@bsu.edu
Web site: www.bsu.edu/math/



Mathematical Pursuits

Hannah Turner gave a presentation on October 24 about her Research Experiences for Undergraduates (REU) to student and faculty at the first of the department's Mathematical Pursuits. Hannah, a senior majoring in mathematics, spoke about her research experience at the Iowa State University REU this past summer. The REU projects at ISU are in a variety of mathematical areas, representing the diverse research interests of the faculty in the ISU mathematics department. Students work in teams as part of active research groups at ISU.

Hannah explained how to get involved in a similar program and discussed what to look for in an REU. She also offered advice about where to find other REU programs and how/when to apply.

During the meeting she presented her research from last summer. She investigated the Cayley Isomorphism property, which describes the relation between groups and their corresponding Cayley graphs.

Dan Widmann presented "The Risk of the Roll: A Mathematical Analysis of the Game of Craps" on November 7 for the second Mathematical Pursuits. Dan discussed the probabilities and expected values behind various bets on the craps table. He analyzed the optimal strategy and presented a craps game simulator (coded in Excel VBA) using Monte Carlo methods to analyze different strategic nuances associated with this optimal strategy.

Dan, a senior majoring in actuarial science, is also completing minors in foundations of business for actuarial science and Spanish. He is the past president of Gamma Iota Sigma and has had two summer internships.

Mathematical Pursuits is a colloquium series by students and for students. It is under the direction of Dr. Rebecca Pierce, associate professor and director of undergraduate programs for the Department of Mathematical Sciences.

Honors Breakfast

The Department of Mathematical Sciences had the privilege to recognize students with outstanding performance for the 2012 – 2013 academic year in calculus at the annual Departmental Honors Breakfast held September 28, 2013. The students and their guests were served a light breakfast in the Studio Room in the Atrium and then enjoyed an awards ceremony hosted by Dr. John Lorch. Students receiving awards this year were Max Browning, My Bui, Cory DeWitt, Cory Diemler, Stacey Dubbert, Jaime Fedeler, Tory Fields, Montgomery Flora, Jared Kahlig, Andrea Kuruda, Jessica Lohse, Brandon Longenberger, Todd Miller, Nathaniel Moser, Jenny Nguyen, Christopher Rosene, Zachary Stricklin, Sabrina Weislak, and Samuel Weiss.

Faculty and staff attending were: Joel Bozell, Ralph Bremigan, Crystal Lorch, John Lorch, and Ahmed Mohammed.



Thesis Presentation

Abdulmajeed Albarrak presented "Time Series Analysis of Saudi Arabia Oil Production Data" at Ball State University in November. Mr. Albarrak will graduate in December from Ball State University with a Master's of Science degree in statistics.



B A L L S T A T E
U N I V E R S I T Y.

Muncie, IN 47306

Making a Difference

Your contribution is invaluable to the support of this department. The gift you make may benefit one or several of the accounts listed below. Thank you for your support of Ball State University's Department of Mathematical Sciences. Checks should be mailed to BSU Foundation, PO Box 672, Muncie, IN 47308. Please include the number of the fund you wish to contribute to. Go to www.bsu.edu/giving to give online.

- Funding for mathematical sciences programs - #5501
- Funding for actuarial science graduate program - #5502
- Funding for the actuarial science program - #5506
- L. Harper Whitcraft Fund - #5517
- Dr. Mir Masoom Ali Scholarship - #5518
- Mathematical Sciences Scholarships - #5550
- Levi Shively Memorial Scholarship - #5551
- Higgins/Nelson/Robold/Kappes Mathematics Scholarship - #5552
- Edwards Memorial Scholarship - #5553
- Mr. & Mrs. Herman V. Hallett Memorial Scholarships - #5554
- Undergraduate Actuarial Science Scholarship - #5555
- Emma Whitlock Garnett Scholarship - #5556
- Harold J. Gale Scholarship - #5557
- D. W. Simpson & Co. Actuarial Science Scholarship - #5558
- Ramon L. and Vivian E. Avila Scholarship - #5559
- John A. & Jane K. Beekman Actuarial Science Scholarship - #5560
- Steven D. & Debra L. Myers Actuarial Science Scholarship in honor of John A. and Jane K. Beekman - #5561
- Towers Watson & Co. Actuarial Science Scholarship in honor of John A. & Jane K. Beekman - #5562
- Otto W. Beebe Memorial Scholarship - #5563
- Swiss Re Actuarial Science Scholarship - #5564
- AEGON Actuarial Science Scholarship - #5565
- Ram Lal Seekri Endowed Scholarship - #5566
- CNA Foundation Exam Scholarship - #5568