



Mathematics and Computer Science

Message from the Chair

The past year has been a very full one in Albion's Mathematics and Computer Science Department. We successfully conducted a search for a new tenure-track faculty member, and were very pleased to hire Heather Jordon, most recently of Illinois State University. Heather is an accomplished graph theorist with many years of teaching experience and many new ideas for the department.

As Heather arrives, Darren Mason is on sabbatical this year. He will be visiting Michigan State University and collaborating with colleagues in MSU's actuarial science program. Ultimately, we hope that this will lead to a formal 3/2 program in actuarial science, similar to the current pre-engineering program, so that Albion students might benefit from the resources and opportunities available at Michigan State.

Under the leadership of Ellen Kamischke and Karla McCavit, the department partnered with the Admissions staff this past May to host the first W. Keith Moore Mathematics Competition for 9th and 10th grade students. The contest is named in memory of former

department chair Keith Moore, and we are hopeful that by reaching these students early, some of them will choose Albion and the DMCS when they are looking at colleges. The second contest is scheduled for Friday, May 12, 2017.

Albion continues its leadership transition, with biologist Marc Roy completing his first year as provost. We have been encouraged by his support for our programs, including his willingness to advocate for the reinstatement of the computer science major. The College as a whole is entering a new strategic planning cycle, which is a good time to evaluate all of our programs and make the case that mathematics and computer science have an important place at Albion.

Faculty News

Mark Bollman, Chair
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I spent much of the summer of 2016 working on projects related to gambling mathematics. Following the AP Calculus reading in Kansas City, I took the long way home through Nebraska to investigate some local variations of keno that will appear in my next book, on the mathematics of keno and lotteries (Look for it in early 2018, if all goes well). I directed some summer research with Justin Leeds ('19) on poker hands with nonstandard card decks. After some time in the Caribbean checking out their lotteries (really), I gave a talk at Mathfest in Columbus, Ohio on "Penny Keno and Integer Programming". Oh, and my calculator collection has hit 971 different models.

HOME COMING OCTOBER 15

Math/Physics reception after football game in the Atrium of the Science Complex, drop in!



Faculty News

Continued

Paul Anderson

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I worked with a graduate student at MSU on proving asymptotic results for periodic autoregressive processes. These processes will ultimately be useful in the modeling of climatological time series. Many of these series are daily time series, so we will use Fourier periodic autoregressive models to describe and forecast such series. Other projects will emerge as we investigate the modeling of climate data.

Heather Jordon

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As a new faculty member in the Mathematics and Computer Science Department, I am very excited about working with students and teaching mathematics at Albion. After receiving my Ph.D. in mathematics from Western Michigan University, I went on to teach at Grand Valley State University, the University of Vermont, and most recently, Illinois State University where I also served as the Undergraduate Director in the Mathematics Department.

My work is in the mathematical area of combinatorics, specifically graph theory and graph decompositions. Graph theory is a field of mathematics that has been instrumental in many different areas as it can be used to model many types of relations and processes, for example in physical, biological, social and information systems. From a very practical point of view, it can help you make more connecting flights, help get your GPS unstuck in traffic, and even help you

manage your Facebook posts. Graph decompositions, loosely speaking, involves partitioning or breaking a large graph into smaller, often times uniform, pieces. In 2006, I was awarded the Hall Medal for my work on the Cycle Decomposition Problem by the Institute of Combinatorics and its Applications (ICA). The ICA has about 1000 members worldwide, and the Hall Medal recognizes extensive quality research by an ICA member in mid-career.

This fall I am teaching Multivariate Calculus and Precalculus and I am very much looking forward to getting to know the students in the department and on campus.

Darren Mason

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In fall 2015 I was a visiting professor at Michigan State University and taught derivative pricing in addition to my usual Albion obligations. This class covered actuarial material contained in both the Financial Mathematics and Models for Financial Economics exams administered by the Society of Actuaries. I ended 2015 with a month-long backpacking trip across India. From mid-December to mid-January I backpacked along the Ganges in India. It was a crazy, wonderful experience, rich in sensory overload—I loved it! In summer 2016 I visited Guangzhou University in China and taught interest theory (annuities, bonds, amortization, and interest rate structures) and the mathematics of derivative pricing. The classes were fast, covering a semester of material in four weeks. I lived on campus, ate amazing Chinese food, and interacted with excellent hard-working students. I also met up in Hong Kong with Tiangyang Cai and Yang Chen, two alumni of the Albion engineering program. We had a nice dinner and spent the evening catching up. I ended my time in Guangzhou with a presentation at the US Consulate on the value of studying STEM at a liberal arts college. During 2016–2017

I am on sabbatical with the mathematics department at MSU, teaching advanced actuarial mathematics and working on research in pricing credit default risk in bonds with partial recovery and imperfect information.



Karla McCavit

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This past May, I worked with others in the Department and in other offices on campus to implement the first annual Moore Mathematics Competition. During this day-long competition, teams of 9th and 10th grade students completed mathematics problems in several events. In this first iteration of the competition, we hosted 6 teams and we hope to grow the event to include more teams this coming May. In other news, I've been working for a while with Dr. Nicolle Zellner (Physics) and other physics and mathematics faculty on a mentoring program for students interested in studying physics or engineering. Since the inception of this program, we have seen an increase in retention of students in these programs of about 20%. Dr. Zellner and I recently wrote a paper, "Using Peer Mentors to Increase Persistence of Physics and Engineering Students", in which we summarize the program and results, and this will appear in a future issue of European Journal of Physics.

David Reimann

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I continue to work on mathematical art, with the broad goal of using visual art to stimulate interest in mathematics. This summer, I worked with Lilliya Chernysheva ('19) on a FURSCA project related to a mathematical construction process where polyhedral edges are replaced by rectangular plates; we are trying to understand the unexpected forms that arise from this process. In August I attended the annual Bridges conference on mathematical art in Jyväskylä, Finland where I gave a talk, exhibited artwork, and led a hands-on build of a (3,1)-Goldberg polyhedral form using 390 colorful squares. My wife Amy ('00) and I have been conducting and publishing interviews with other contemporary mathematical artists to document and help draw attention to their work. I continue to provide cover art for *Mathematics Magazine*, a publication of the Mathematical Association of America. In June I traveled to Providence, RI for a workshop on Illustrating Mathematics held at Brown University. This summer I also served as a grant reviewer for the European Union in Brussels, Belgium. This fall I am working on setting up a laser cutter that is a joint Math/CS and Physics purchase that will be used for research and teaching.

**Ellen Kamischke**

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After the Moore math competition, I spent most of the month of June in Kansas City, Missouri, first grading the AP Calculus exams and then assisting with the grading of the AP Statistics exams. Shortly after that I took off to spend 10 days in Haiti. While there I

provided some computer training for the staff of Living Media International, a non-profit working in the mountain community of Mizak. I also met with teachers at the New Life Primary School in Mizak, which is supported by Living Media. We made plans to add additional classes to the school and discussed fundraising efforts to supply computers and needed monies for salaries and the lunch program. I also spent time alongside my Haitian friends painting the school building. After returning from Haiti the remainder of my summer was filled with writing projects for future publications, and attending the Michigan Council of Teachers of Mathematics annual meeting. I ended the summer with a backpacking trip to North Manitou Island with two Albion alums, Rachel Kamischke '11 and Rachel Eaton '12.



First Keith Moore Math Competition Equals Success

Students from six different high schools in southern Michigan got a day off from school in May to compete in Albion College's first W. Keith Moore Math Competition. The students competed both as individuals and teams, with pencil-and-paper quizzes and even a math scavenger hunt that took them across campus.

Albion's competition honors Keith Moore, a member of the Mathematics Department from

1952 to 1986. Although none of the College's current Mathematics and Computer Science faculty taught with Moore, Quantitative Studies Center Director Karla McCavit says, "When Department members were thinking about an appropriate name for the competition, it seemed natural to honor Dr. Moore. Many of our alumni had strong ties with Keith, and we wanted to recognize the lasting impression of his teaching and work at the College."

The 2nd Annual W. Keith Moore Math Competition is scheduled for May 12, 2017. We hope to have a couple more teams to add to the excitement! Here is the link to register: www.albion.edu/moore-math

Current Students

Angela Morrison, '17

This past summer I had the chance to participate in the SURIAM summer research program at Michigan State University. I worked with roughly seventeen other undergrads from across the country. The subgroup that I worked in dealt with MRI reconstruction using edge information. In short, we manipulated the Fourier partial sums of one-dimensional and some two-dimensional functions in order to better reconstruct these functions using fewer Fourier coefficients. An example of a real world application for our work would be creating images from MRI scans. Our work would be able to approximately locate a change in tissue density, say going from muscle to bone, and would use this information to create a better picture of the scan than standard reconstruction methods that are used today. At the end of my eight weeks of research, my group presented at the University of Michigan-Dearborn Undergraduate Conference as well as Mathfest in Columbus, Ohio.



Besides working with my group on our project, we also had invited speakers give a presentation every Friday. Some of these speakers included representatives from NASA, MSU alumni, and even the NSA. These presentations were mainly geared towards helping each of us decide on a path after graduation. They were also helpful in laying out the steps to reach our goals such as the application process for graduate schools or what kinds of opportunities are available to us outside of academia. I cannot speak for everyone I worked with this summer, but, as someone going into my senior year, these talks were helpful about where I want to go after Albion College.



My time at MSU wasn't all work, though. Our group did a lot of non-math related activities such as a trip to the Detroit Institute of Art, attending a Tigers game, and a picnic at Lake Lansing. Most of these group events were put on by those in charge of all the summer research programs at MSU, but we did do a few activities of our own. We organized a trip up north for Fourth of July weekend, had an ultimate Frisbee game between students and mentors, and even organized a water balloon fight between our group and the physics research group. These activities have given me memories I will never forget. They also made slow weeks and long work days a little less stressful. I could not have asked for a more involved and adventurous group of students to work with.

Overall, I learned a lot about myself, math research, and life plans over the summer. I met a lot of wonderful people that I will hopefully keep in contact with over the years and had the chance to do a lot of cool activities. To anyone thinking about applying for summer research, I highly encourage you to apply. You'll meet a lot of very interesting and talented people, and you will learn things that cannot be taught in a classroom. This summer has definitely been a life changing experience for me, and I hope other people can have this adventure as well.

Alumni

How have you used your Math/CS major since graduating from Albion College?

Paxton Mueller, '15

I use the problem solving skills that I developed as a Math major at Albion on a daily basis.

Will Sturdavant, '13

I have not used my major specifically, but I think that the logical and systematic mindset that came from it has benefited me in medical school so far.

Shea McCavit, '11

I'm working as a Technical Support Analyst at a software company called Aprimo. This is my 4th year here!

Jennifer Polinski, '14

Although my main field is biology, my math major has helped tremendously with the bioinformatics portion of the work I do. My math major helped me get my current job at the Marine Biological Laboratory as a research assistant.

Jeremy Yu, '13

I used my Math/CS major to help me graduate from graduate school. (I studied applied statistics at EMU.)

Brian Wu, '14

Since graduating from Albion College, I have used my Math/CS major to obtain a Master of Science in Applied Statistics at Oakland University and I will continue using my knowledge from Albion to pursue a Doctor of Philosophy in Applied Mathematical Sciences at Oakland University. I have also applied my technical background at Quicken Loans as Technology Intern and at Blue Cross Blue Shield of Michigan as Contact Center Technology Intern.

Stephanie Sanders, '15

I have used math and tools (i.e. Mathematica) learned in my math/cs courses at Albion in my coursework and research as a physical chemistry graduate student at Cornell University.

Culver Ganem-Redd, '11

Since graduating from Albion, my Computer Science major has helped carry me into the start of an excellent career. First as a graduate student in game design at Michigan State University, now as a software developer at TechSmith Corporation, my major gave me the knowledge and skills that acted as a solid foundation to build on with the experience I've been gaining in the working world.

Scholarship/ Award Winners Spring 2016

Sleight:

Tim Szocinski, Shuqi (April) Zhou

Fryxell Scholarship:

Angela Morrison

Lancaster Scholarship:

Angela Morrison

Bragg Scholarship:

Oana Vesa