



2013

## Bytes of $\pi$ , Fall 2013

Department of Mathematics, Bridgewater State University

Volume 4

Number 1

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### Recommended Citation

Department of Mathematics, Bridgewater State University. (2013). *Bytes of  $\pi$ , Fall 2013*. 4(1).

Retrieved from: [http://vc.bridgew.edu/math\\_news/7](http://vc.bridgew.edu/math_news/7)

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# Bytes of $\pi$

Newsletter of the BSU mathematics department

Volume 4, No. 1: Fall 2013

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## Letter From the Chair

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*In my first letter from the chair, I thought it might be helpful I outlined what I would like for you over the next three years:*

- *To see purpose for your time in the Mathematics Department.*
- *To be an active member of our Mathematics community.*
- *To help you take full advantage of the opportunities we offer.*
- *To see you succeed in your studies and future careers.*
- *To see the value of working together.*
- *To see the beauty and scope of mathematics.*
- *To be inspired!*

*In short, I would like the best for you, both students and faculty members.*

*Best wishes for the rest of the semester!*

*Becky*

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## Profiles

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### Paul Fairbanks, Alumnus and Faculty Member



**Submitted by Paul Fairbanks.**

Paul Fairbanks transferred to BSC from Northeastern U. at the start of his junior year. In his first math class, Abstract Algebra with Joe Chiccarelli, he found himself seated next to Diane Borges, his future wife.

Captain of the BSC basketball team, he graduated in 1966 to teach high school math for one year on Long Island. He didn't care for it, and joined the US Air Force.

After 167 combat missions and getting shot down over Hanoi, the Air Force sent him to Southern Illinois U. in

1973 to get a master's degree in mathematics with a directed assignment to teach at the US Air Force Academy. "Joe Chic" had prepared him well for graduate school. He found that in many ways his math background was as good as or better than that of his fellow students from schools including UCLA, Michigan U., Notre Dame, Ohio State.

After teaching for two years at the USAF Academy, he was selected to pursue a doctorate in mathematics at the U. of Northern Colorado. His dissertation topic was "Polya's Property W, Disconjugacy, and the Conjugate Point Function".

He spent the four years after receiving his Ph.D. at USAFA where he also served as faculty Executive Officer, men's cross-country coach, and varsity football tutor.

His final assignment in the military was at Hanscom AFB as Deputy Director of the Rome Air Development Center (RADC). While there, he engaged in extensive research on digital image processing, stealth technology, and electronic countermeasures. While at Hanscom he crossed paths with his old flame, Diane, and got married.

He retired as a lieutenant colonel in 1987, then applied for a faculty position at BSC where he has enjoyed the past 26 years.

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## **Rebecca Metcalf, Chair and Faculty Member**

**Submitted by Jordan Shadburn.**



Dr. Becky Metcalf joined the Bridgewater State faculty seven years ago. She received her M.A. in Mathematics and Ph.D. in Mathematics Education from the University of Buffalo. Her work in both Mathematics and Mathematics Education positioned her to serve a unique role at Bridgewater State. As the Mathematics Education Liaison for the Department of Mathematics, she was the only person at any state school in Massachusetts to have a specialty in math education and work in a mathematics department. Her skills and experience have been sought-after by Mathematics programs, at both the state and national level, including Mathematics and Computer Science Collaborative (MACS), CONNECT Math, as well as multiple state-wide taskforces. Bridgewater State recognized Dr. Metcalf's leadership and offered her an early promotion to Associate Professor, as well as her most recent promotion to Chair of Mathematics. In only her first few months serving as Chair, Dr. Metcalf is already overseeing considerable changes to the Mathematics Department, the most notable of which are the addition of two new concentrations, namely, Pure Mathematics and Statistics. The coming changes to the department are a direct result of Dr. Metcalf's commitment to providing students with the best possible experience at BSU. She feels honored to serve as Chair and would like students to know that her door is always open.

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## New Hires

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**Jaqueline Anderson** comes to us from Brown University where she received her Ph.D. in Arithmetic Dynamics – a blend of number theory and dynamic systems. This semester she is teaching precalculus and multivariable calculus, working with the Math Club and Pi Mu Epsilon, and coordinating the department seminar.

**Judith Morin**, class of 2012, is our new administrative assistant. Her hard work, cheerful encouragement, and infinite patience have kept us going since September 2012.

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## Jump for Math!

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Story by John Winters, G'11, Office of University Advancement.

Photo by Tessa Pinkham, class of 2015.



Nathaniel Bruno is an excellent student who enjoys math. Recently, the 6-year-old Bridgewater resident joined more than 90 fellow students from 18 communities in Massachusetts and Rhode Island at Bridgewater State University to take part in the Math Kangaroo, an international competition designed to help students develop their skills and enjoy mathematics.

“It was pretty fun,” Nathaniel said. “There were a lot of people who did different things, like multiplication and addition.”

As for how he did on the test. He was confident. “I tried my best,” he said.

The Math Kangaroo is a competition for students in grades one through 12, held each year around the world on the third Thursday in March, that takes the

form of a multiple-choice test. The atmosphere is fun and encouraging, much more fun and less stressful than MCAS.

“The students all leave with a feeling of success and achievement,” said Dr. Polina Sabinin, assistant professor of mathematics at BSU, who brought the first-ever Math Kangaroo to campus, along with her colleague Professor Rebecca Metcalf. “The goals are attainable and get more challenging as they move up. The kids don’t come out saying they didn’t do well. It’s like a big party at the end.”

The professor has been involved with the event for the past three years and saw a need locally.

“I saw few opportunities like this in the area,” she said. “I really wanted to bring this to BSU to showcase what we do for the community and to provide local kids with a chance to engage with math in a way that’s more approachable.”

The heart of the competition is the 75-minute multiple-choice test. There are 24 questions for students in grades one through four, and 30 for grades five and up. The students work independently and their test is scored; in May, gold, silver and bronze medals are awarded, along with grants and other prizes to the top placing participants. Each student also gets a T-shirt, a certificate and other gifts, to make sure everyone feels like they’ve earned something.

“They loved it and asked ‘Are we doing it next year?’” recalled Lauren Aubertine, a math teacher at New Bedford’s Normandin Middle School. She brought a dozen students to campus for a tour and the competition (funded in large part by Gear Up, a national initiative to encourage more young people to have high expectations, stay in school and study hard). The day had a huge effect on the young mathematicians, Ms. Aubertine said. Not only did the students get to see what a university looks like close up, they got to talk to people who spend their careers in the world of mathematics.

“Plus they got to eat with the BSU students and they thought that was the coolest,” she said.

The competition fits well with BSU’s mission, said Dr. Arthur Goldstein, dean of the Bartlett College of Science and Mathematics. “The K-12 outreach evidenced by the recent Math Kangaroo competition is the kind of work we’ve been doing for some time and will continue to do,” he said.

These types of programs brought the institution in direct contact last year with more than 10,000 area middle and high school students and 350 teachers, he added.

“We believe strongly that this serves the students and teachers of the region, as well as the commonwealth, and also helps to maintain an interest in science and mathematics in K-12 students, helping to guide them in to university degree programs and jobs,” the dean said.

Nathaniel Bruno’s mother, Astrid Rojas said her son wasn’t the only one who benefitted from Math Kangaroo.

“It was an experience for me, too,” she said. “I not only expect the schools to teach, but it’s also my job. It gave me some insight into what to expect when he gets older.”

Dr. Sabinin was assisted throughout the event by roughly 40 BSU student volunteers and a half dozen faculty members. She said attendance at BSU’s inaugural competition wildly exceeded her initial estimates.

“We did not expect this kind of turnout,” she said.

Might there be a Math Kangaroo next March at BSU?

“We’re already planning it,” she said.

Participants hailed from the following communities, Acushnet, Bellingham, Bridgewater, Bristol, Brockton, Easton, Foxboro, Georgetown, Hanover, Mansfield, New Bedford, Norfolk, North Attleboro, North Easton, Providence, R.I., South Easton, Swansea, Taunton and Woods Hole.

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## Games Teachers Play

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**Submitted by Polina Sabinin.**

This year, Polina Sabinin has brought “Games Teachers Play” to BSU under the umbrella of the Center for the Advancement of STEM Education (CASE).



Games Teachers Play (GTP) is an outreach program in mathematics and mathematics education. While playing games and solving puzzles, people of all ages can develop and exhibit more complex levels of reasoning than in any other situations. GTP provides current and future teachers of mathematics an opportunity to share and learn about the world of engaging educational games and puzzles. Teachers will have an opportunity to learn about how to bring games and puzzles into the classrooms and the role games can play in K-12 mathematics curriculum.

The first seminar was on November 4th and focused on games about Logic and Sets. There are two upcoming seminars. On February 4th, the teachers will explore 3-Dimensional Visualization and Geometric Transformations. On April 30th, they will flex the Number Sense muscle. All sessions run 4:00 - 5:30 pm. Locations will be announced at a later date. Please come and join us! There are a few spots reserved for BSU students interested in using games in the classrooms - please direct interested students to Polina for more information.

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## Publications, Grants, & Awards

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**Annala Kelly** gave the presentation: “Optimal Distribution of Alliances for Misère Nim” at the Ottawa-Carleton Discrete Mathematics Days in Ottawa, Canada, in May 2013 and the presentation “Projects in Linear Algebra” at the AMS-MAA Joint Mathematics Meeting in San Diego, California, in January 2013 and was awarded an OTL grant to participate in the Summer Institute: “Learner-centered Teaching”.

**Vignon Oussa** has had three papers accepted for publication: V. Oussa, Computing Vergne Polarizing Subalgebras, to appear in Linear and Multilinear Algebra; B. Currey, A. Mayeli, V. Oussa, Shift-invariant spaces on  $SI/Z$  Lie groups, to appear in the Journal of Fourier Analysis and Applications; and A. Mayeli, V. Oussa, Regular Representations of Time Frequency Groups, to appear in Mathematische Nachrichten. Dr. Oussa was also

invited to give a talk at the Spring Eastern AMS Sectional Meeting at the University of Maryland in Baltimore in the special session on Harmonic Analysis and its Applications.

**Ward Heilman** received BSU's 2013 President's Award for Distinguished Teaching.

**Laura Gross** served as Acting Assistant Director of the Honors Program in Fall 2013. She published a review of "Advanced Mathematics for Applications" by Andrea Prosperetti in the SIAM (Society of Industrial and Applied Mathematics) Review in June, 2013 and received a travel grant from Mount Holyoke College to attend the conference New Directions for Mathematics Research Experiences for Undergraduates (REUs) at Mount Holyoke College in South Hadley, MA in June, 2013.

On April 18, 2013, **Philip Scalisi** was presented with the BSU Lifetime Faculty Research Award at the Awards for Academic Excellence Ceremony. In addition, his article entitled "Apatites of the Alps" was published in the book "APATITE", by Lithographie Ltd. Press, Denver, Colorado, 2013. The article contains a crystallographic description of the fluorapatites found in the Swiss & Austrian Alps.

Drs. **Kevin Rion** and **Irina Seceleanu** received a Fall 2012 Faculty Librarian Research Grant (FLRG) grant for work on "A Guide to Dynamical Systems Using Simulation" from BSU's Center for the Advancement of Research & Scholarship.

**Polina Sabinin's** logic game "Smart Cookies" was published by FoxMind Games. Her talk entitled "Aligning Assessments to Problem-based Mathematics Classrooms: Three Examples of Assessment Tools" was accepted for presentation at the 2014 Joint Mathematics Meetings.



**Heidi Burgiel** co-authored a chapter in the book *Enhancing Mathematics Understanding through Visualization: The Role of Dynamical Software*.

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## Student News

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**Math Chats:** The Math Club held undergraduate talks called Math Chats in April, 2013. Vignon Oussa conceived and coordinated the event at which **Joshua Bernard** spoke on "Consequences of Abandoning Specific Assumptions of Economic Models," an Honors thesis advised by Kevin Rion. **Ashley Erwin** spoke on "Computations of Miquel Points and Circles with Mathematica", Honors-contract work with Vignon Oussa. **James Marcotte** spoke about Spirals and M.C. Escher's Sphere Surface, a project done with Matt Salomone. **Joshua Bernard** and **Terry Mullen** presented this semester's Math Chats on December 5<sup>th</sup>. See <http://maxguides.bridgew.edu/mathclub> for images from the presentations recorded by our Librarian, Sheau-Hwang Chang.

**Len Sprague** presented his undergraduate research on Hamiltonian tours by the Archbishop on different sized chess boards in a short talk at the NES meeting of the MAA at Wheaton College on November 22, 2013.

This April, **Joshua Bernard** was awarded the James Fitzgerald Memorial Scholarship in Mathematics for excellence in mathematics, awarded to the senior mathematics major with the highest academic average.

**Robert Guillette** will be presenting a poster titled “Modeling the Retreat of Glaciers in a Changing Climate” at the Joint Mathematics Meetings – the largest annual mathematics meeting in the world – in Baltimore in January. Mentored by Dr. Irina Seceleanu, Mr. Guillette developed a mathematical model of glacier retreat which he used to make predictions about the future of the Folgefonna glacier in Norway.

**Joshua Bernard** competed in the William Lowell Putnam Mathematical Competition on December 7.



**Danica Baker, TingTing Lin, Joshua Bernard and Jaeuk Sim** traveled to the Mathematical Association of America’s Northeastern Sectional meeting at Wheaton College to compete in the 8<sup>th</sup> Annual Collegiate Mathematics competition.

**Ashley Erwin** gave a presentation on “Computations of Miquel Points and Circles with Mathematica” at the conference Women in Mathematics in New England at Smith College in Northampton, MA in September, 2013. She secured a Research Travel Grant from the Office of Undergraduate Research to support her trip.

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## Problems

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**Submitted by Annela Kelly.**

The Seven Dwarfs are having breakfast, and Snow White has just poured them some milk. Before drinking, the dwarfs have a ritual. First, Dwarf #1 splits his milk equally among his brothers' mugs (leaving himself with nothing). Then Dwarf #2 does the same with his milk, etc. The process continues around the table, until Dwarf #7 has distributed his milk in this way. (Note that Dwarf #7 is named Dopey!) At the end, each dwarf has exactly the same amount of milk as he started with! If the total amount of milk was 42 ounces, how much milk did each dwarf have at the beginning?

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To respond to an article in this newsletter or report your news, please email Heidi Burgiel (hburgiel@bridgew.edu). We look forward to hearing from you!