

# AN <sup>Online</sup> SLICE OF $\pi$

THE NEWSLETTER OF THE DEPARTMENT OF MATHEMATICS & STATISTICS

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## Chad Awtrey receives grant from National Security Agency



We are very excited to announce that Dr. Chad Awtrey has been granted a National Security Agency grant to fund an REU program at Elon starting this summer that would support 8 students, selected from a national pool, to stay at Elon over the summer and work with Chad on problems related to his research program. These students will join and enhance Elon's SURE program as well.

Chad has been a leader regarding research mentoring at Elon. He currently serves as the Associate Director for Undergraduate Research and is one of the main organizers for the UCG Regional Mathematics and Statistics Conference. Chad has mentored 16 Elon student research projects since coming to Elon and many of them go on to present at both national and regional conference. In addition to the many Elon students that he mentors, Chad also works with Robin French '15 and other faculty and students at Williams High School on research and other enrichment activities. This opportunity is funded through the Mathematical Association of America.



Dr. Awtrey with colleagues and students at the MAA meeting in Georgia Spring 2017



Robin French and Dee Sizemore helping Dr. Awtrey with the math students from Williams High



Dr. Awtrey, Colleagues and students at the UCG Conference in Fall 2017

# Announcements from the Chair – Crista Arangala



As the number of majors in our department continues to grow, we are looking to many of our alumni to get involved. **YES YOU!!**

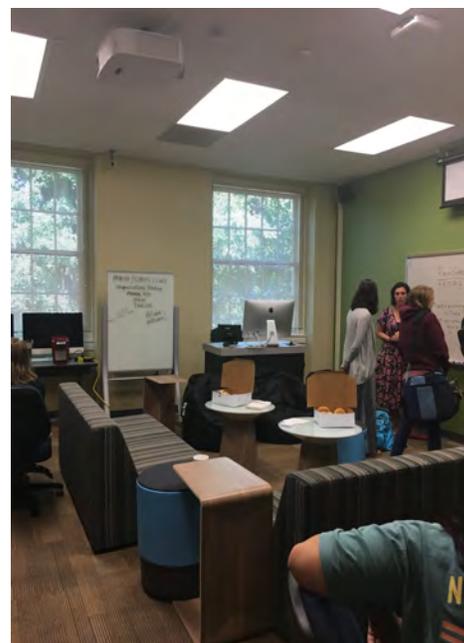
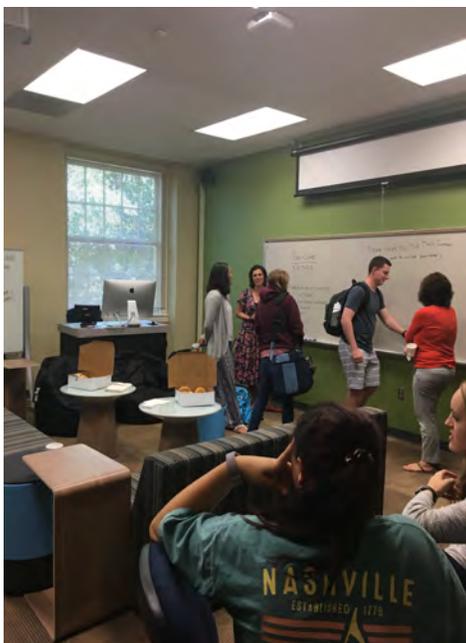
We will have our first Statistics Practicum (aka Statistics Seminar) in Fall 2018 and teams of current statistics majors are hoping to work on amazing consulting projects that you can propose from your company. If you think your company might have some data that they would like analyzed **for free** by a team of statisticians (both faculty and students) please email me or Dr. Doehler by April 1. You can find more information on the Statistics Practicum on our departmental website.

Spring is the season of giving and **Tuesday, March 13, 2018** is **Elon Day**. The department will be deciding on next year's scholarship winners for both current and incoming students in March and your generous donation will be directly applied to helping our majors. If you are considering a larger gift and would like to consider contributing to an endowed scholarship, the department is eagerly seeking donors so please contact me directly instead of going through the online Elon Day contribution system.

Lastly, we are excited to welcome back **Jessica Stewart Kelly '09**, Assistant Professor at Christopher Newport University, to address our students at our senior celebration in May. If you interested in getting more involved in the department as an alumni please contact us.

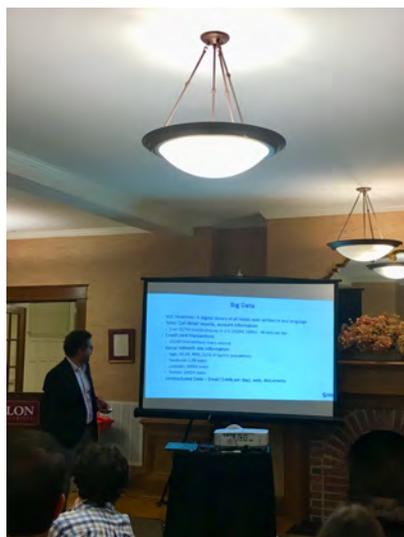
## New Study and Tutoring Room

Need a stress free place to relax and study? Come to Duke 304! This room is equipped with rolling white boards, computers, couches, tables and bean bags. There is a tutoring schedule on the outside of the door to let you know when tutoring is available. The tutoring is FREE!! We started the year off right with a coffee and donut social to introduce the room. Make sure to see Tracy in Duke 209 to get the access code.



## Math and Stats Department Holds Second Annual Welcome Dinner

On November 2, 2017 the Math and Stats Department held the second annual welcome dinner for new and current students that may be interested in a major or minor in Math, Applied Math or Statistics. The evening started out with a panel of Majors that talked about their experiences during their course of their academic success at Elon. The panel consisted of **Morgan Ferguson**, Applied Math Major '19, **Chase Moyer**, Statistics Major '19, **Ben Rogers**-Math with Teacher Licensure Major '19, **Angie Sanders**, Statistics Major '18 and **Kiley Shannon**, Math Major '18. The interested students were given a chance to ask the panel about their experiences, classes and even professors! Following the dinner we were honored to have Mr. Sanjay Arangala, Director of Analytical Consulting at SAS Corporation speak to the group. He spoke about Big Data and why it matters. Once again it was a very successful evening.



Mr. Sanjay Arangala



Our panelist from L to R:  
Kiley Shannon, Angie Sanders, Ben Rogers,  
Chase Moyer and Morgan Ferguson



Welcome Dinner in full swing

## Josselyn Geyer '18 recognized with the Outstanding Mathematics Education Student Award

In an effort to encourage student enjoyment of mathematics and mathematics education, NCCTM recognizes outstanding mathematics education students at colleges and universities across the state. The winning students are invited to attend the State Mathematics Conference in October where they are recognized and receive their awards. **Josselyn Geyer '18** was the recipient of the 2017 Outstanding Mathematics Education Student award by the North Carolina Council for Teachers of Mathematics on Nov. 2 at its annual conference in Greensboro, N.C.



Jan Mays, Senior Lecturer in Mathematics with **Jossie Geyer** receiving her award.

As part of the Teaching Fellows program, Geyer has served over 100 hours observing and assisting in high school math classrooms. She participated in undergraduate research on the effects of serving as a teaching assistant on pedagogical content knowledge. Geyer also works in Elon's Classroom Resource Center, which provides books and materials for candidates to use in their classrooms.

Geyer has maintained a stellar academic record and is well regarded by faculty in the mathematics and statistics department where she was inducted into the Elon University chapter of Pi Mu Epsilon, the national mathematics honorary society. She has also completed many hours of volunteer work through her membership in Epsilon Sigma Alpha.

## Pi Mu Epsilon guest speaker discusses cryptography

Elon's chapter of Pi Mu Epsilon, the national mathematics honor society, hosted Jenny Fuselier on Wednesday, Sept. 13, 2017, for a guest lecture on the mathematics behind the art of data encryption.

Fuselier, an associate professor of mathematics at High Point University, gave her talk "From passing notes to making and breaking codes" to a crowd of 25 Elon students and faculty. Fuselier began by recounting tales from her childhood about when she and her friends wanted to communicate in secret. They would pass notes that had been encrypted in some fashion, such as changing each occurrence of the letter "A" with "J", each occurrence of "B" with "K", and so on.

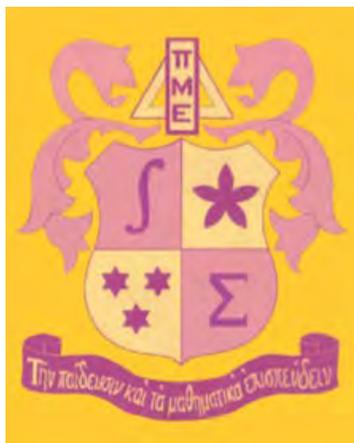
Fuselier admitted that while this encryption scheme was quite easy to break, there are underlying mathematical forces at work behind the scenes. Such mathematics can be exploited to create more secure encryption schemes.

Fuselier ended her talk with one such example, the so-called RSA public key encryption scheme, named after Ron Rivest, Adi Shamir and Leonard Adleman, who first publicly described the algorithm in 1978.

Fuselier's talk was part of the Pi Mu Epsilon Colloquium Series that began at Elon in the fall of 2013. The series now hosts about one speaker each month during the academic year and attracts an audience of 25 to 30 attendees, though often this number is much higher. The speakers come from a variety of institutions and talk about many different areas of mathematics and statistics.

Pi Mu Epsilon faculty advisor A.L. Hook Associate Professor **Chad Awtrey** has secured grant support from the Mathematical Association of America and the national office of Pi Mu Epsilon. This will allow the Colloquium Series to host additional talks this coming academic year. Here are the details:

Feb. 28, 2018, 4 p.m., TBD - Allison Henrich of Seattle University  
March 8, 2018, 8:30 a.m., TBD - Lola Thompson of Oberlin College  
March 28, 2018, 4 p.m., TBD - Nicholas Scoville of Ursinus College  
April 18, 2018, 4 p.m., TBD - Anil Venkatesh of Ferris State University  
May 2, 2018, 4 p.m., TBD - Dewey Taylor of Virginia Commonwealth University



## SPOTLIGHT ON STUDENTS

Students **Morgan Ferguson '19**, **Nick Hadgis '18**, **Ben Rogers '19**, and **Kiley Shannon '18** represented the Math and Stats department at the MAA State Dinner at Wake Forest in October 2017.

Congrats to our majors who were accepted into Phi Eta Sigma: **Kylee Gomilla'20**, **Meagan Hanratty'20**, **Taylor McFadden'20**, **Hannah Parker'20**, **Abigail Phillips'20**, **Ashley Pritchard'20** and **Jonathan Shaw'20**.

**Jacie Cooper '18**, **Morgan Ferguson '19**, **Nicholas Hadgis '18**, **Peter Komlofske '19**, **Olivia Lennox-Sanzone '18**, **Kiley Shannon '18** and **Janae Williams '18** presented at the 13th Annual Regional Mathematics and Statistics Conference held at UNC-Greensboro on Nov. 3-4, 2017. A total of 232 students and faculty attended the conference, including 22 from Elon University. Elon accounted for 18 percent of all undergraduate presentations; the highest percentage out of all 40 participating institutions. **Morgan Ferguson '19** was one of these recipients this year, marking the fourth time an Elon student has received an award at this conference. **Nicholas Hadgis '18** also participated as a panelist on Saturday afternoon, where he discussed the benefits of engaging in undergraduate research.

**Cooper** presented "Regression analysis of significant variables in women's lacrosse." She was mentored by Mazur.

**Ferguson** presented "Face recognition on the MORPH-II database." This research was conducted as part of the summer NSF-funded REU (Research Experience for Undergraduates) Program at UNC-Wilmington.

Statistics major **Molly Phillips'18** traveled to India for winter term.

**Bethany Blake '18** has published a paper titled: Analyzing metabolomics data for association with genotypes using two-component Gaussian mixture distributions.

**Hadgis** presented "Classifying Eisenstein polynomials of degree  $2p$ ." He was mentored by Awtrey.

**Komlofske** presented "Cyclic polynomials of degree  $p^2$  and  $p^3$ ." He was mentored by Awtrey.

**Lennox-Sanzone** presented "Modeling throws in ultimate frisbee." She was mentored by Mazur.

**Shannon** presented "Symmetries of degree 8 polynomials." She was mentored by Awtrey.

**Williams** presented "Counting  $p$ -power extensions of the  $p$ -adic numbers." She was mentored by Awtrey.

**Maddie Jaudon '18** will present her Research Report, Surveying Professors' Perception of Incorporating History into Calculus I Instruction, at the 21st Annual Conference on Research on Undergraduate Mathematics Education. The event takes place in San Diego, California, February 22-24.

Math majors **Meagan Hanratty '20**, **Camille Kelley '19**, and **Sara Murphy '20**; and statistics majors **Alonzo Cee '18** and **David Higgins'18** took part in the winter term course "Dominican Republic: Baseball and Tourism"



### Mazur publishes in American Mathematical Monthly

We are very excited about Dr. Mazur's featured article "Approval Voting in Product Societies" in the first issue of The American Mathematical Monthly in 2018. This is a great accomplishment and we look forward to many future publications from Dr. Mazur and her students.

## FACULTY UPDATES

Professor **Jeff Clark** is currently serving as Chair of the Southeastern Section of the Mathematical Association of America through March, 2019.

He will also be chairing the Mathematical Association of America's Committee on Minicourses as of February 1, 2018 through January 31, 2021.

**Clark** presented at the annual Joint Mathematics Meetings in San Diego January 10-13 2018.

Assistant Professor **Aaron Trocki** is working with Maddie Jaudon to present their research report, Surveying Professors' Perception of Incorporating History into Calculus I Instruction, at the 21st Annual Conference on Research on Undergraduate Mathematics Education. The conference is sponsored as a Special Interest Group of the Mathematical Association of America. The event takes place in San Diego, California, February 22-24.

A.L. Hook Associate Professor **Chad Awtrey** publishes a research paper with alumni Taylor Cesarski '17 and Peter Jakes '17 in the latest issue of an international number theory journal. The paper is titled "Determining Galois groups of reducible polynomials via discriminants and linear resolvents" in the latest issue of the JP Journal of Algebra, Number Theory, and Applications (volume 39, issue 5, pages 685-702).

**Awtrey** also recently delivered an invited talk on Nov. 16 at Roanoke College in Virginia as part of the college's Mathematics, Computer Science and Physics Conversation Series. **Awtrey**, whose visit was sponsored by the national mathematics honor society Pi Mu Epsilon, spoke on recent research results he obtained with his undergraduate students.

Associate Professors **Jim Beuerle**, **Chad Awtrey** and Jade Schrader published a paper in North Carolina Journal of Mathematics and Statistics, 3 (2017), 21–33. titled "Constructing Galois 2-extensions of the 2-adic Numbers."

Lecturers **Andi Metts** and **Ryne VanKrevelen** along with Senior Lecturer **Lisa Rosenberg** and Associate Professors **Laura Taylor** and **Kirstie Doehler** are working on incorporating data collection and statistical analysis into STS 110. Students will work with citizens living in a virtual world. This group will begin work in the Spring 2018.

Dr. **Ryne VanKrevelen** has been selected to serve on the executive board for the NC Chapter of the American Statistical Association.

Senior Lecturer **Jan Mays** and Professor **Crista Arangala** taught the India Education and Development class this Winter term. This class focuses on the role of science education in the unique development model in Kerala, India. The class also runs a traveling science museum in schools throughout Kerala and interacts with roughly 3000 school children over the 3 weeks. During their fun time, the class trekked in the tea country (Munnar), rested on the backwater houseboats (Allepey) and rode elephants (not that comfortable).



Dr. Arangala and students on the not so comfortable elephant



Prof. Mays and students on their talkative elephant

Prof. Mays with the tour guides David (left) and Kanan (right)



Tea Farm in Munnar

**Dr. Kirstie Doehler** co-taught the winter term course “Dominican Republic: Baseball and Tourism” with Dr. Mark Cryan from the Sport Management Department. Students learned about history, education, and baseball development in the Dominican Republic. Class events included attending multiple games in the Dominican Winter League, visiting museums, and hearing talks by individuals in the tourism industry. Students also studied issues related to U.S. neocolonialism and globalization. Rafael Perez, director of Dominican Operations in the MLB's Santo Domingo office, mentioned to the class that mathematics and statistics are keys to developing critical thinking skills and making good decisions. Twenty-five students took part in the course, including math majors Meagan Hanratty, Camille Kelley, and Sara Murphy; and statistics majors Alonzo Cee and David Higgins.



At Bartolo Colón's Baseball Academy



Dr. Doehler seeing her friend Johniel.



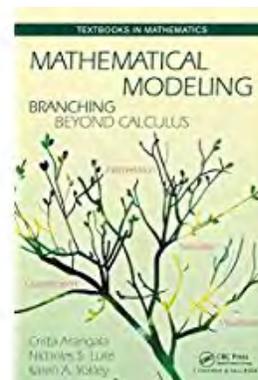
Making friends at the Quisqueya Stadium

## Congratulations to Dr. Alan Russell !!!!

Congratulation to **Dr. Alan Russell** and his wife Jodi Farley! They tied the knot on Saturday, October 28th 2017 in the beautiful mountains of NC.



Visiting Fortaleza San Felipe in Puerto Plata



Professor **Crista Arangala**, Associate Professor **Karen Yockey** and **Nick Luke**, Associate Professor of Mathematics at NC A&T University have written a new textbook titled: *Mathematical Modeling, Branching Beyond Calculus*. The book should be out by the first of February 2018.

## THANK YOU FOR YOUR DONATIONS!

Thank you so much for your donations to our department, which help us provide money for equipment and projects. We are so grateful for the following donors for Fall semester 2017: Amanda Sherman '98, Sara Rodgers '16, Abigail Garcia '11, Mary Neill '92, Mary Hall '10, Samuel Rankin '67, Lori Tyler '92, Ronald L. Earp '56, Matthew Ferretti '15, Jane H. Flythe '69, Gina Maini '12, Jessica D. Kelly '09, Carolyn Wright '16, Nicholas Harrison '02, Matthew Ferretti '15, Michael O'Brien '16, Adam Kolakowski '11, Glynis Ewing '12, Lori See '85, Kathleen Erskine, Erin Krupa '02, Jeanette Morky '03, Jennifer Murphy, Juliet Goodman '18, Karen Ellis '09, Tammy Newbern '94, Nicole Ciotoli '18.

## CHECK OUT OUR WEBSITE

To learn about majors, see photos, and get contact information, visit our link at [www.elon.edu/e-web/academics/elon\\_college/mathematics\\_statistics/](http://www.elon.edu/e-web/academics/elon_college/mathematics_statistics/). Like our Facebook page at Elon University Math and Stats. This newsletter is a production of the Department of Mathematics and Statistics at Elon University.

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