A SLICE OF

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Crista Arangala Receives Fulbright

Associate Professor of Mathematics Crista Arangala has been selected as a 2013-14 Fulbright U.S. scholar to teach in Sri Lanka. Chosen by a presidentially appointed board, Fulbright scholars receive funds appropriated by the U.S. Congress. Arangala will live in Sri Lanka from February through August 2014 and will teach linear algebra at the University of Colombo.

As a Fulbright grantee, she will join the ranks of distinguished participants in the program. Fulbright alumni have become heads of state, judges, ambassadors, cabinet ministers, CEOs, university presidents, journalists, artists, professors and teachers. They have been awarded 43 Nobel Prizes. Since its inception more than 60 years ago, approximately 300,000 Fulbright

recipients have participated in the program. The principal purpose of the Fulbright Scholar Program is to increase mutual understanding between the people of the United States and the people of the more than 150 countries that currently participate in the Fulbright Scholar Program.

Awtrey Awarded Undergraduate Research Grant



Assistant Professor of Mathematics Chad Awtrey has been awarded an external grant from the Center for Undergraduate Research in Mathematics. Funded by National Science Foundation grants and administered by Brigham Young University, CURM seeks to increase the number of students entering graduate programs in mathematics by awarding mini grants (up to \$21,000) to a small number of mathematicians across the United States to engage in research with talented undergraduates at the faculty member's home institution for one year.

During the 2013-14 academic year, Awtrey will work with Elon students Nicole Miles, Chris Shill and Erin Strosnider on two projects related to *p*-adic numbers (the primary focus of Awtrey's research program). The grant awards \$3,000 stipends to each undergraduate researcher, travel

monies for the students, funds for Awtrey to present at CURM in Spring 2014, a course reassignment for Awtrey, and other miscellaneous costs. In addition to producing publication-worthy results of interest to many researchers in Awtrey's field, these undergraduate students will be exposed to some of the most important unsolved problems in mathematics, including the Riemann Hypothesis. The Riemann Hypothesis concerns the distribution of prime numbers, and the truth of its generalized version would assert the correctness of the best algorithms for constructing large prime numbers, which are employed daily by Internet users for use in public-key cryptosystems.

Russell Chosen as Associate Director of CATL



Alan Russell has been selected as the new associate director for the Center for the Advancement of Teaching and Learning (CATL). His four-year term will begin in fall 2013. He will officially move his office to CATL but will continue teaching three courses in the department each year. The mission of the Center for the Advancement of Teaching and Learning is to promote engaging, inclusive and effective teaching and the scholarship of teaching and learning at Elon University. Russell's new duties will include consulting with faculty members in support of their efforts to be innovative teacher-scholars, working with departments and programs on pedagogical and curricular initiatives, helping to create new programs, and supporting scholarly teaching. His familiar Hawaiian shirts have been replaced by coats and ties as he begins his new assignment. Russell has recently served as a consultant for a \$1.7 million

National Science Foundation grant at N.C. State University to investigate using origami for engineering innovations.



SANDRA WEISS '13 RECEIVES OUTSTANDING MATHEMATICS EDUCATION STUDENT AWARD

Sandra Weiss, a senior math education major, was recognized as the Outstanding Mathematics Education Student for the Central Region of North Carolina on Oct. 25, at the annual conference of the N.C. Council of Teachers of Mathematics. Fifteen Elon students have received this award since 1986, the most recent in 2010, 2011 and 2012.

Weiss is an Honors Fellow from Atlanta. A President's List student, Weiss is a member of Phi Beta Kappa, Phi Kappa Phi, and Pi Mu Epsilon, mathematics honorary society. Her honors research, mentored by Jan Mays, is titled "A Case Study on the Experiences of High Achieving Mathematics Students in the Elon Academy: How has Academic Support Contributed to Their Success?" She plans to return to her native state of Georgia to teach high school math next year.

MATHEMATICS MAJORS NAMED NOYCE SCHOLARS

The second cohort of Elon Noyce Scholars includes five mathematics majors, all rising juniors. Robin French, Jaime Morin and Stephanie Stanglin were selected last fall, and Sarah Neuhauser and Lauren Johnson selected this spring. The Robert Noyce Teacher Scholarship Program provides funds to institutions of higher education "to support scholarships, stipends and academic programs for undergraduate STEM (science, technology, engineering and math) majors and post-baccalaureate students holding STEM degrees that earn a teaching credential and commit to teaching in high-need K-12 school districts." Each of these students will receive \$21,900 scholarships during both their junior and senior years. Their program will be supplemented with special experiences, including extra mentoring by university and secondary-school educators during both their undergraduate experiences as well as in their early years of teaching. Rising seniors, Crystal Edwards and Madelyne Rooney, were selected in the first cohort of Elon Noyce Scholars last year.

STUDENTS SHINE AT REGIONAL CONFERENCE Alison Miller '13 Receives Top Award



Chris Shill, Chad Awtrey, Laura Taylor, Ali Miller and Kirstie Doehler Statistics major Alison Miller '13 and mathematics major Chris Shill '14 presented their research at the 8th Annual UNC-G Mathematics and Statistics Conference in Greensboro last November. Miller won the conference's undergraduate research presentation competition for her talk, "A Comparison of Seminonparametric (SNP) and Nonparametric Survival Estimation." Through numerous computer simulations, Miller, mentored by Kirsten Doehler, demonstrated increased efficiency of SNP methods over traditional techniques for modeling survival functions, which is crucial in medicine, economics, pharmaceuticals, engineering and numerous other disciplines. Miller is an Elon College Fellow and the president of Elon's chapter of the Alpha Phi Omega Service Fraternity.

In his talk, "Galois 2-adic Fields of Degree 12", Chris Shill, mentored by **Chad Awtrey**, demonstrated his computations for all degree 12 extensions of the 2-adic numbers. Shill's work pushes forward the frontiers of research in the area of p-adic numbers, and his work has important applications to some of the most famous unsolved problems in mathematics, to mathematical physics and to cryptology. His research appeared in the *Springer Proceedings of Mathematics and Statistics*. Shill is a Rawls Scholar. He has been accepted into a National Science Foundation Research Experience for Undergraduates (REU) program at Cornell University in Ithaca, N.Y. for this summer.

STUDENTS & FACULTY PRESENT AT MAA CONFERENCE



A total of 11 mathematics majors and faculty members attended the annual meeting of the Southeastern Section of the Mathematical Association of America at Winthrop University in Rock Hill, S.C. in March. Two students (Alyse Keim '13 and Christopher Shill '14) and two faculty (Jeff Clark and Chad Awtrey) presented research talks. Keim's talk "Agent-based modeling of malaria transmission: investigating the Ross-Macdonald model" used mathematics to model the spread of the malaria disease in human populations. Her research was mentored by Todd Lee and Crista Arangala. They are in the final stages of editing their research paper before they submit it for publication. Rawls Scholar

Chris Shill's talk was titled "Galois 2-adic fields of degree 12." Shill and Elon student Brett Barkley '14 are in the process of writing the results from a recently-finished research project, mentored by Awtrey.

Jeff Clark's talk, "Derivative sign patterns," discussed results of a paper published in the *College Mathematics Journal* related to ways that undergraduate calculus students can prove far-reaching results about a wide-range of important mathematical functions. Clark's work has had an impact on the math research community, which is evidenced by the fact that other researchers are publishing papers that leverage his results and apply them to novel situations. Awtrey's talk, "Counting dihedral p-adic fields," detailed joint work with undergraduate Trevor Edwards '12 (currently a graduate student at N.C. State) about symmetry properties of roots of p-adic polynomial equations that are related to regular polygons. Their results have been published in the *International Journal of Pure and Applied Mathematics*.

OUR STUDENTS' ACHIEVEMENTS

The following students from the Class of 2013 are going to graduate school: **Ted Berkowitz** to Duke University in biostatistics, **Andrew Rouiller** to Massachusetts College of Pharmacy, **Erin Palmer** to Vanderbilt Divinity School and **Ali Miller** to N.C. State University in statistics. Other graduates are heading into the workforce: **Rachel Wilson** - Shodor, a computational science education company in Durham; **Alyse Keim** - Credit Suisse; **Emily Buehler** - the Japanese Exchange and Teaching Program to teach English in Japan; **Jessica Roycroaft** - Research Triangle Institute as an introductory-level statistician; **Lauren DiFiglia** – U.S. Census Bureau; **Andrew Sevigny** - Unum Insurance as an actuary; **Blair Zachary** - Wells Fargo; **Kileigh Browning** - Provident Funding; and **Jill Padfield** - AmeriCorps. **John Moody** will continue to take courses at Elon to satisfy the prerequisites for the physician assistant program.

Congratulations to seniors **Emily Buehler**, **Jill Padfield** and **Sandy Weiss** for their induction into Phi Beta Kappa. **Andrew Fischer** and **Alyse Keim** were inducted into ODK, leadership honors society. **Brett Barkley, Jeremy Guinn and Mackenzie McCraw** have had their research "Resolvents, masses, and Galois groups of irreducible quartic polynomials" accepted for publication in the *Pi Mu Epsilon Journal*.

Amy Zemanick '14 has been accepted into the National Institute of Standards and Technology's Summer Undergraduate Research Forum. She will work this summer in the Informational Technology Lab applying her statistics and R computing skills to explore geologic compositions. Zemanick is the first statistics major to apply to the NIST-SURF program.

Jill Padfield received the Arnold Strauch Student Teaching Award, the most prestigious student award in the School of Education. It is awarded annually to recognize excellence in student teaching. The award is named after the first chair of the Department of Education and Psychology, Arnold Strauch. Erin Palmer, a math and religion double major, received the Best Undergraduate Paper Award at the Southeastern Commission for the Study of Religion. Jaclyn DeVincent is the Academic Section Editor of the Yearbook, an Alumni Association Student Ambassador and a member of Alpha Phi Omega (a co-ed service fraternity).

Erin Krupa '02 Receives 2013 Elon College Distinguished Alumna Award



President Leo M. Lambert, instructor Helen Walton, Erin Krupa '02, Associate Professor Janice Richardson and Dean Alison Morrison-Shetlar

Three outstanding alumni from Elon College, the College of Arts and Sciences were honored at a special luncheon on May 2 for their accomplishments in the arts and humanities, social sciences and the natural, mathematical and computing sciences. Erin Krupa '02 received the Distinguished Alumna Award in Natural, Mathematical and Computing Sciences. Krupa received her master's degree at Wake Forest University and later earned a doctorate in mathematics education at North Carolina State University. She is an assistant professor in the Department of Mathematical Sciences at Montclair State University in New Jersey. A prolific scholar, Krupa has made 16 presentations including presenting a paper, "The Effects of an Integrated Mathematics Professional Development Project," at the International Symposium

for Research in Mathematics Education, Fortaleza, Brazil in 2012. She was a keynote speaker for the 2012 N.C. Council of Mathematics Conference in Greensboro and is the author of five peer-reviewed articles. Her research examines the learning opportunities provided to students within the classroom and how teachers can increase opportunities for all students, regardless of demographics.

NEWS FROM OUR ALUMNI

Bob Ruggeri '59 writes that he was a member of the only undefeated Elon football team in school history. He comes back to reunions of his team each year during homecoming weekend. Upon graduation, he taught high school math in Carteret, N.J. for seven years. He then worked for more than 30 years in computer systems and software development for a Fortune 500 company. He retired in 1998 and moved to Myrtle Beach. He and his wife have three grown children and four grandchildren. He is currently tutoring math at a local high school.

Mary Ruth '65 is living in Uplands Village in Pleasant Hill, Tenn. She and her husband, Bill, spend much of their time volunteering through Partners In Service. In January and February, they volunteered at Slumber Falls Camp and Retreat Center in Texas. In March, they were at Heifer Ranch in Arkansas.

Anne Saleeby Selna '82 is living in Northern California, near San Francisco, working as an IT Business Analyst/Project Manager for RPM Mortgage, Inc. She says that her career was completely shaped by the guidance she was given while at Elon. During her college days, she had an internship at GE in Mebane, which gave her a "real world perspective." Two senior level programmers at GE taught her the techniques that helped her become more proficient in systems analysis and programming. Recently she took her 17-year old daughter for a tour at Elon.

Donna Phillips Shore '84 recently passed both the Series 7 and Series 66 exams in General Securities for brokers and dealers. She is a registered client associate in Winston-Salem. Her son, Jean-Claude, just received an Elon Junior Scholars award.

Matt Wright '91 is still with Blue Cross Blue Shield of North Carolina working on Health Care Informatics in preparation for Health Care Reform.

Dia Collins '99 has been a high school mathematics teacher since graduation. She became the 2012-13 Teacher of the Year for Reid Ross Classical School and was a finalist for the Cumberland County teacher of the year. In January she accepted an offer to become a mathematics coach at Westover High School.

Kate Mansi Merrill '00 will complete her doctorate in educational leadership from UCLA in June. Her dissertation is *Teacher Resilience in High Poverty Schools: How do High Quality Teachers Become Resilient?* Her other degrees include an M.S. in mathematics education from N.C. State in 2003, and an Ed.S. in educational leadership from the George Washington University in 2007. She lives with her husband, Jonathan '01, their 3-year-old son, Andrew, and their dog, Doppler, in Los Angeles. Her husband is an officer in the US Air Force, and they are being transferred to Alabama this summer.

Leanna Briles Giles '02 joined Burlington Day School last summer as director of enrollment.

Jennifer Hornback Weakland '03 and her husband welcomed a baby girl, Ansley Rose Weakland, in January.

Josh Rowan '04 is a teacher at a public high school in Georgia, where he is leading the ninth grade Gifted and Accelerated Program.

Diana Liberto '05 is currently teaching AP calculus, linear algebra, math logic, algebra 2 and SRT (Science Research and Technology) at the Math and Science Academy at Aberdeen High School in Harford County, Md. This year she earned National Board Certification and was a finalist for Teacher of the Year.

Briana Yoho Long '05 married Chris Long last September, and they are expecting a son this September. She is working for the Social Security Administration as a supervisory accountant.

Matthew Christian '07 was married last July. He and his wife, Anne, have moved back to North Carolina from New Jersey. Matt is currently working at Patheon in RTP as a sales operations analyst.

Hilary Sheets Bowers '09 married Logan Bowers in 2010. Logan currently works as a system administrator for a law firm in Winston-Salem. Hilary has been teaching math at Orange High School in Hillsborough. This summer she will enter UNC's Master of Accounting Program, a one-year program designed for non-accounting majors. She will be eligible to take the CPA exam when she completes the program in May 2014.

Karen Hooper Ellis '09 was married last June. She and her husband just bought their first house together.

Abby Lauer '09 began a new job at the George Washington University Biostatistics Center on April 1 as a MS Biostatistician, and she now lives in Washington, D.C.

Phillip St. Clair '09 is still teaching pre-calculus, calculus and advanced functions and modeling at The Fletcher Academy in Raleigh. He is also coaching their ultimate frisbee team.

Melissa Gaisser '10 received her master's in science from Florida State University in May. She was recognized as the best first year student in applied statistics for 2011-12 by the Graduate Statistics Department. In June, she will start work as a business intelligence developer at Epic located in Verona, Wis. (just outside of Madison).

Abigail Baumann Garcia '11 was married in March to Angel Garcia, an Elon assistant director of Residence Life and the Multicultural Center.

Amanda Ketner '11 is still teaching math at Woods Charter School in Chapel Hill. She is planning to spend July in Antigua, Guatemala interning in an elementary school.

Brandon Landreth '11 received his master's degree in public health from East Carolina University in May. Next fall he will attend the East Carolina University School of Dental Medicine to pursue a doctorate in dental medicine.

Greg Mader '11 is in his second year of graduate school at North Carolina State University working toward a Ph.D. in biomathematics. He is part of a research group dedicated to developing mathematical models to describe cardiovascular dynamics. He has served as a youth trustee on the Elon University Board of Trustees for the past two years.

Trevor Edwards '12 graduated from the Masters of Advanced Analytics at NCSU in May. He will be employed with IBM in Washington DC starting in July. He will be a consultant for Business Analytics and Optimization in the public sector.

Mara Bollenbacher '12 worked in Washington, D.C. last year but is moving to New York City to become an analyst with Appomattox Advisory.

NEW FACULTY MEMBER



Qie "Excel" Li joined the department in Fall 2012 after completing his Ph.D. in statistics at Bowling Green State University in Ohio. His research focuses on developing hierarchical models, multiple comparisons in mixed models, Markov chain Monte Carlo simulation methodology, and unbalanced mixed models in missing data field. A native of China, he received his undergraduate education in New Zealand and his master's degree at Bowling Green. Beside his professional interests, Dr. Li enjoys golfing, tennis, travelling, hanging out with Elon faculty and friends, and spending time with his wife, Xiangyi, and his son, Aaron.

KIRSTEN DOEHLER BECOMES SERVICE LEARNING SCHOLAR

Kirsten Doehler, assistant professor of statistics, has been selected as a 2013-14 Service Learning Scholar. This fall Doehler and her students in STS 213: Survey Sampling will work with local partners to collect data and perform statistical analyses that many of the agencies require to support their applications for funding. Six faculty members are selected for the Service-Learning Faculty Scholars Program each year. These faculty attend a series of seminars during fall semester in which they learn about and discuss issues related to service-learning pedagogy. The faculty member makes a commitment to teach the newly designed course during the spring semester. Faculty who complete the program will be asked to serve as mentors for the next year's incoming Service-Learning Faculty Scholars.

CHANGE IN TEACHER-LICENSURE LEADERSHIP

After serving more than 20 years as the mathematics with teaching licensure coordinator, **Janice Richardson** is stepping down from the position. She has been the go-to person for teacher licensure scheduling and has been the catalyst for the strong participation of Elon's mathematics students in the Teaching Fellows program. She has successfully nominated the math students for the NCCTM state awards of excellence, and they have won year after year. She has served as the central command in our department for the professional accreditation reports and Department of Public Instruction requirements. Through the years, she has been our teacher education hero. She is looking forward to leading two study abroad courses in the coming year. **Jan Mays**, senior lecturer, will assume the position in fall 2013.

PROFESSORS RECEIVE DIVERSITY INFUSION GRANTS

The Center for the Advancement of Teaching and Learning and the Multicultural Center announced that two Elon statistics professors have received one of the 2013-14 Diversity Infusion Project grants. Statistics professors **Kirsten Doehler** and **Laura Taylor** will integrate diversity-related data into group projects to challenge student impressions about diversity in their STS/MTH 212 course. In 2012-13, **Ayesha Delpish**, **Skip Allis** and **Todd Lee** received a grant for applying diversity-related data sets into General Statistics. The Diversity Infusion Project's purpose is to develop and implement strategies to infuse the curriculum and pedagogies of the university with the best practices related to human diversity.

MORE NEWS FROM FACULTY

Chad Awtrey has published a SoTL article on writing in mathematics in the latest issue of the journal *PRIMUS* (Problems, Resources, and Issues in Mathematics Undergraduate Studies). The article, "Impossible Geometric Constructions: A Calculus Writing Project," details a series of three inter-connected writing projects that Awtrey has given to his second-semester calculus students. This project was supported by the Center for the Advancement of Teaching and Learning through Awtrey's CATL Scholars grant.

Jeff Clark gave three presentations this year: "Derivative Sign Patterns" at the Southeastern Section of the MAA in Rock Hill, S.C., "Stressing Physics Content in a Multivariable Calculus Class" at the Joint Mathematics Meetings in San Diego, and "Finding a Balance Between Rigor and Exploration in a Non-Euclidean Geometry Course" at Mathfest in Madison, Wis.

Kirsten Doehler published an article with Lisa M. Hooper titled "Assessing Family Caregiving: A Comparison of Three Retrospective Parentification Measures" in the October 2012 issue of *The Journal of Marital and Family Therapy*. **Doehler** and **Laura Taylor**, along with student **Jessalyn Smith**, published "A Study of Faculty Views of Statistics and Student Preparation Beyond and Introductory Class." *Journal of Statistics Education*. Doehler and Taylor will be presenting their updated findings at the United States Conference on Teaching Statistics in Raleigh in May 2013. Taylor also had a publication in the *Journal of the Iranian Statistical Society*. Taylor recently received a National Institute of Standards and Technology Summer Undergraduate Research Fellowship from the Department of Commerce to allow Amy Zemanick to participate in the Gaithersburg, Md. program.

Todd Lee's research involves taking differentials equations into a complete Mathematica+E-Communication environment. **Janice Richardson**, along with two other Elon professors, gave a research presentation titled "Making Teacher Thinking Visible: Shared Classroom Experiences in Teacher Preparation," last September at the North Carolina Association of Colleges of Teacher Education Fall Forum in Raleigh and in February at the annual conference of the American Association of Colleges of Teacher Education in Orlando. **Karen Yokley**'s research on inhaled toxicants was published in the *International Journal of Pure and Applied Mathematics*.

DINNER CELEBRATES STUDENTS' ACCOMPLISHMENTS



Award winners Alyse Keim, Chris Shill, Ali Miller, Ted Berkowitz

On April 29, the department held a dinner in Johnston Hall to recognize our graduating seniors, scholarship donors and recipients and award winners. Dr. Gerry Francis, senior executive vice president at Elon University and professor of mathematics, offered advice to the graduating seniors: "Work in a job that you enjoy, and try to make a difference."

Mathematics awards were given to **Sandy Weiss** for outstanding academic achievement and to **Alyse Keim** and **Christopher Shill** for outstanding research. Statistics awards went to **Ted Berkowitz** for outstanding achievement, **Lauren DiFiglia** for outstanding experiential learning, and **Alison Miller** for outstanding research.

The department recognized its scholarship donors and recipients. Donors **Richard Haworth**, **Janie Reece** and **Jeanne Williams** were present at the dinner. **Amy Good** and **Nakhila Mistry** received the Haworth Scholarship.

Mackenzie McCraw received the George and Eileen Hedrick Scholarship, and Madeline Edwards the Thomas J. Hedrick Scholarship. The King Scholarship went to Erin Donahue and the Reece Scholarship went to Christine Dierk and Crystal Edwards. Jessica Brown received the Williams Scholarship.

The program concluded with the induction ceremony for Pi Mu Epsilon, the nation's most prestigious mathematics honorary society, chartered at Elon University on October 23, 2003. The purpose of the Society is to promote scholarly activity in mathematics among the students in academic institutions. Graduating seniors who were inducted were Katherine Easom, Alyse Keim, Alison Miller and Thomas Price. Other inductees were Alison Deatsch, Madline Edwards, Andrew Fischer, Erica Janik, Lauren Johnson, Mary Macdonald, Nakhila Mistry, Sarah Neuhauser, Willem Prins, Chris Shill, Amy Wagoner and Justin Wanner. Also inducted were faculty members Chad Awtrey, Ayesha Delpish, Gerry Francis, Laura Taylor and Karen Yokley.



First row: Erica Janik, Willem Prins, Maggie Macdonald, Alyse Keim, Madeline Edwards, Ali Miller Second row: Lauren Johnson, Chris Shill, Nakhila Mistry, Andrew Fischer, Jill Padfield, Sandy Weiss



Scholarship Recipients: Nakhila Mistry, Mackenzie McCraw, Madeline Edwards, Jessie Brown, Christine Dierk, Crystal Edwards.

Scholarship Donors: Richard Haworth, Jeanne Williams, Janie Reese

THE NEWSLETTER'S NEW NAME

Last spring the department decided to change the name of our annual newsletter, formerly *Math Musings*, to be more inclusive of our statistics majors. We held a naming contest with a prize for the winner. The winning entry is, A *Slice of* π . Thank you to all who participated.

PROCEDURE FOR DONATIONS TO THE DEPARTMENT

The Office of University Advancement has made it easy for donors to send their gifts online directly to departments within the College of Arts and Sciences at www.elon.edu/makeagift. Select the Department of Mathematics and Statistics from the drop down menu so that your gift can be appropriately designated. These donations help us provide money for equipment and projects within the department. The Department of Mathematics and Statistics recognizes with grateful appreciation the following donors for school year 2012-2013: Mr. and Mrs. Jody Booth, Chuck and Lynn Borders, Ritson and Ayesha Delpish, Mr. and Mrs. Thomas Donahue, Mr. and Mrs. Richard Flowers, Amy Flower '04, Amber Gathje '06, Charley and Jan Mays, Dr. Ralph Mueller '83, Scott and Tammy Newbern '94, Dr. Jeanette Olli '03, Rose Cordoro Prey '01, Mr. and Mrs. Michael Rapp, Mr. and Mrs. George Stewart, Lori Tyler '92, W. S. Badcock Corporation, Helen Walton and Mr. and Mrs. Harold Williams, Jr. '66.

CHECK OUT OUR WEBSITE

We have updated our website this year. To learn about our majors, see our photos and get our contact information, visit our link at http://www.elon.edu/e-web/academics/elon_college/mathematics_statistics/. This newsletter is a production of the Department of Mathematics and Statistics at Elon University.

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