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# Math Department Newsletter, 2017

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## DEPARTMENT OF MATHEMATICS NEWSLETTER

### August 2017

#### Table of Contents

- [Chairperson's message](#) page 1
- [Thanks for your generosity](#) page 3
  - [Mathematics Scholarships](#) page 4
- [Awards to faculty and alums](#) page 5
- [MathEvents at UD](#) page 7
- [Faculty Updates](#) page 9
- [Faculty Activities](#) page 10
  - [Individual Reports](#) page 10
  - [Capstone Requirement](#) page 15
  - [Skills Tests](#) page 16
  - [New Courses](#) page 16
  - [Colloquium](#) page 17
  - [Problem of the Fortnight](#) page 17
- [Activities of Undergraduate Students](#) page 18
  - [Math Club, Pi Mu Epsilon](#) page 18
  - [Pi Mu Epsilon Induction](#) page 18
  - [High School Math Competition](#) page 19
  - [Honors Symposium](#) page 20
  - [Putnam Competition](#) page 21
  - [REUs and Internships](#) page 21
  - [Actuarial Exams](#) page 22
  - [Undergraduate Awards](#) page 22
- [Stander Symposium](#) page 22
  - [Integration Bee](#) page 23
  - [Poster Sessions](#) page 23
- [Degrees Conferred](#)
  - [Undergraduate](#) page 25
  - [Graduate](#) page 26
- [Alumni/ae News](#) page 28
  - [In Memoriam](#) page 28
  - [Individual Reports](#) page 29

#### CHAIRPERSON'S MESSAGE

Dear alums, colleagues, students and friends,

I have now completed my first year as chair of the Mathematics Department. I want to thank Joe Mashburn for helping me find my footing and always answering the many, many questions I have had. I thank my colleagues for their good will, their input and their indulgence. And I could not function without Vicki Withrow, our administrative assistant, whose institutional knowledge, patience and all-around great attitude keeps the place running.

This year has been an eventful and successful one. The university has a new president, Eric Spina, who has spent the last year getting to know UD and engaging in a university-wide visioning process. He has articulated some of the ideas he has for UD's future during his inaugural address, which you can find [here](#). More concrete plans will be developed over the next few years.

The Mathematics Department had a good year as well. In September 2016, the University of Dayton and Wright State University hosted a joint colloquium. We

hope to make this a regular event. The inaugural speaker was **Rick Schoen ('72)**, who is the Excellence in Teaching Chair at the University of California, Irvine. We all take pride in the fact that this year Rick won the prestigious Wolf Prize in Mathematics, as well as the Rolf Schock Prize and the Heinz Hopf Prize. More on Rick Schoen's accomplishments can be found elsewhere in this newsletter.

The department was very fortunate to receive a sizeable gift that will help us support activities of students interested in mathematics. Dr. **Pieter Wiersema ('74)** made a \$10,000 gift to the Mathematics Department in honor of **Harry Mushenheim ('55)**, a long-time faculty member who retired a few years ago. On behalf of the students who will benefit from his generosity, we extend our gratitude to Dr. Wiersema.

The department is growing again. We have hired two new tenure-track faculty who will join us in the fall of 2017. Ying-Ju Tessa Chen received a PhD in statistics from Bowling Green State University in 2015, and she comes to UD from Miami University, where she spent two years as a visiting assistant professor. James Cordeiro received a PhD in Operations Research from the Air Force Institute of Technology in 2007. His academic experience includes stints at AFIT and the United States Air Force Academy. Most recently, he has been working at MediaDyne Systems Engineering and the Air Force Research Laboratory at Wright Patterson Air Force Base. We are excited to welcome Tessa and James to our department.

I want to express my gratitude to our alums for continuing to support our students and faculty. I have met a number of alums this year, and I relish hearing your story and telling you about ours. As I conducted exit interviews with our graduating seniors, I heard from many how much they appreciated the chance to talk to our alums at our department events, most notably the career seminar and our undergraduate conference, Undergraduate Mathematics Day. We will continue to offer these opportunities to our students, and we hope that you will consider coming back to UD and sharing your experiences. We also welcome your suggestions and insights into how we might adapt our course offerings and degree programs to better prepare our students for the job market and the various graduate programs they might consider.

I am sure that as you read this newsletter, you will agree with me that our faculty and students continue to do outstanding work. I hope you all join me in celebrating our collective achievements.

Wiebke S. Diestelkamp



[Back to TOC](#)

## About this newsletter:

Readers may navigate this newsletter by clicking the links in the Table of Contents (TOC). At irregular intervals, there is a link entitled "[Back to TOC](#)" that will take the reader back to the first page of this newsletter. Other links in the newsletter take you to related items within this document or to related websites.

This newsletter reports on the activities of those associated with the Department of Mathematics. Faculty news reported in this newsletter is from the calendar year 2016, while news of students and their activities covers the academic year 2016-2017 and the summers preceding and following that year. We do not have time restrictions on news that alums wish to share with us.

Many of the photographs used in this newsletter were provided by Art Busch, Wiebke Diestelkamp, Aparna Higgins, Pete Hovey and Muhammad Usman. Some photographs were taken from publicly available websites. Photographs do not necessarily correspond with the text near which they appear. We adhere to the University of Dayton guidelines on publishing photographs, so we try not to include photographs of those who attended our activities but are not associated with the University of Dayton.

[Back to TOC](#)

## Thank you!

Thank you for your generous support of the Department of Mathematics and its activities. Your support helps us to fund conference travel for our undergraduate and graduate students, to host annual events such as MathEvents, the Integration Bee, and the High School Mathematics Competition, and to provide lunch on the day of the Putnam Competition. The photographs scattered throughout this newsletter give you a glimpse of some of these events.

We are deeply grateful to all of you who contribute to the department.

Early in 2017, the Department of Mathematics was notified of a donation of \$10,000 by Dr. **Pieter Wiersema** ('74) in honor of **Harry Mushenheim**, professor emeritus. Dr. Wiersema is with Cytology Pathology Services, in Indianapolis. Dr. Mushenheim is an alum ('55) who taught mathematics at UD for forty years. Although retired, he continues to volunteer at UD's Marian Library. Wiersema credits Mushenheim for helping him get on the right track academically, and says, "I will be eternally grateful to you for your efforts toward my mathematical education." The Department is very grateful for this generous gift, which will be used for student activities. More details can be found on the College Newsroom site at <https://udayton.edu/blogs/artssciences/17-02-02-eternally-grateful.php>

The University Development Office reports that the following people made donations to the Department of Mathematics during 2016:

Mr. Richard R. Allen ('75)

Mr. Paul A. Bajorek ('73) and Mrs. Carol Wawrzyniak Bajorek ('73)

Mr. and Mrs. Ronald L. Beisel ('63)  
 Dr. and Mrs. Robert E. Buck, Jr. ('69)  
 Drs. Paul J. Campbell ('67) and Melanie Schneider  
 Drs. Joseph and Joan Chmiel ('69)  
 Dr. and Mrs. Paul W. Eloë ('84)  
 Mr. Gary Gross and Mrs. Marla Prenger Gross ('90)  
 Mr. and Mrs. Donald Kavalunas ('65)  
 Ms. Kathleen M. Kern ('79) and Mr. Patrick J. MacVeigh ('79)  
 Mr. and Mrs. David L. Kramer ('68)  
 Ms. Megan Miller ('11)  
 Dr. Charles Mott and Ms. Alicia Fernandez-Mott ('61)  
 Dr. Jane Pendergast ('74) and Dr. Mark D. Hale, Jr.  
 Mr. and Mrs. James R. Peters ('74)  
 Mr. Edward L. Ray and Joyce Thomas Ray ('74)  
 Mr. Timothy J. Rice and Ms. Angela Jacobs ('88, '10)  
 Mr. John F. Robbert and Mrs. Jane Helms Robbert ('73)  
 Dr. Thomas Santner ('69)  
 Mrs. Gail DeFord Santner ('69)  
 Mr. and Mrs. Randall J. Smith ('77)  
 Mr. Robert W. Springer ('77)  
 Mr. Kevin A. Thomas ('76)  
 Mr. Mark A. Turella ('80)  
 Dr. Pieter Wiersema ('74)  
 Mr. and Mrs. Donald R. Wojciechowski ('72)

The following corporations and foundations provided matching gifts:

AON Foundation  
 Cytology Pathology Services, Inc.  
 Fidelity Charitable Gift Fund  
 Network for Good  
 Owens-Illinois Charities Foundation

The **Kenneth C. Schraut, Ph.D., Memorial Scholarship** was established in honor of Dr. Schraut. We thank the following donors for their generosity and support.

Mr. and Mrs. Philip Aftoora ('69)  
 Mr. Richard Allen ('75)  
 Mr. Eugene Bolzan and Ms. Lois Scaife ('69)  
 Dr. & Mrs. Richard J. Fox ('63)  
 Mr. Richard L. Iannarino ('71) & Mrs. Leslie Kirchmer Iannarino ('72)  
 Mr. Robert A. Nero ('68) and Mrs. Mary Strozdas Nero ('70)  
 Mr. Ronald J. Steinkirchner ('76) and Mrs. Pamela Strevell Steinkirchner ('76)

The following corporations provided matching gifts:

Greene County Community Foundation  
 Network for Good

## Mathematics Scholarships

The names of mathematics scholarships established by alums and the undergraduate students who were their recipients this year are listed below.

[Back to TOC](#)

**Arnold P. and Rose M. Schoen Scholarship**  
 Anna Petrick

### **Kenneth C. Schraut Memorial Scholarship**

Nicole Behler  
Kathryn Posey  
Amelia Pompilio

### **Bill and Barbara Scharf Scholarship**

Conor McCormick

### **Katherine Koffel Bruning Scholarship**

Melissa Fox  
Wyatt Ohm

## **CONGRATULATIONS!**

Our faculty and alums received several kudos this year. We list those that we know of.

### **Faculty awards**

**Paul Eloë** received the 2017 George B. Noland Research Award from the University of Dayton's Sigma Xi chapter. Sigma Xi, the Scientific Research Honor Society, is an international, multidisciplinary community of science and engineering professionals dedicated to research excellence, to promoting public engagement with science, and to fostering the next generation of researchers.



The award was presented in April, with a talk by Paul, entitled "Recent Developments in the Study of Ordinary Differential and Related Equations." The talk was followed by a poster session in which students presented their research.

The George B. Noland Award, named for a former Chair of the Department of Biology at the University of Dayton and established in 1977, is awarded annually to one Dayton-area scientist or engineer for research excellence. The award of \$1000, sponsored by the University of Dayton Research Institute, acknowledges outstanding research in the sciences and engineering.

[Back to TOC](#)

**Muhammad Usman** is the recipient of the 2017 Schraut Faculty Research Award. He intends to use the award for travel associated with his research.

**Alan Veliz-Cuba** received an Early Career Award from the Mathematical Biosciences Institute (funded through NSF grant DMS-1440386). The award of \$24,000 allowed Alan to spend the spring semester of 2017 at the Mathematical Biosciences Institute at Ohio State University. He also received \$25,000 from the Hanley Sustainability Institute (as a co-PI) to do research related



to sustainability. As reported in last year's newsletter, Alan was the recipient of the 2016 Dr. Kenneth C. Schraut Faculty Research Award in Mathematics. The award of \$1200 is designed to aid faculty members in their research. Alan used the award to facilitate his visits for research to the University of Houston, the University of Cincinnati and Clemson University, and to cover expenses for computational resources.

## Alum awards

**Richard Schoen ('72)** won three prestigious international mathematics awards this year. Rick works in geometric analysis and is based at the University of California Irvine, after serving several years at Stanford University. Rick was one of the two recipients of the 2017 Wolf Prize in Mathematics, selected for his work in “geometric analysis and the understanding of the interconnectedness of partial differential equations and differential geometry.” The prize was presented by the President of Israel at a ceremony in the Knesset in June 2017. More details can be found on the College Newsroom blogsite and in the Notices of the American Mathematical Society.



*Photo credit:  
University of California, Irvine.*

<https://www.udayton.edu/blogs/artssciences/17-03-20-international-math-wiz.php>

<http://www.ams.org/publications/journals/notices/201705/rnoti-p496.pdf>

Rick will be awarded one of the four 2017 Rolf Schock Prizes at a ceremony at the Royal Swedish Academy of Sciences in Stockholm, Sweden in November 2017. Rick's results have been described as “stunning,” and his work is described as having “outstanding technical skill and a clear vision of geometric relevance.”

[http://www.rolfschockprizes.se/engelskasidor/home/laureates2017/mathematics.56\\_en.html](http://www.rolfschockprizes.se/engelskasidor/home/laureates2017/mathematics.56_en.html)

Rick is also the recipient of the 2017 Heinz Hopf Prize in Mathematics, given by ETH Zurich. The Hopf Prize is awarded every two years, and honors “outstanding scientific achievements in the field of pure mathematics.” As this year's laureate, Rick will present the Heinz Hopf Lectures at ETH Zurich.

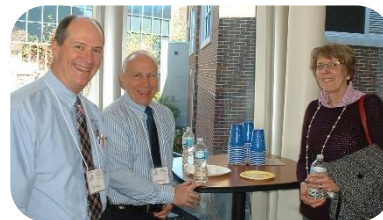
<https://www.math.ethz.ch/news-and-events/events/heinz-hopf-prize-and-lectures.html>

**Jeff Neugebauer ('06, MAS '08)** was the recipient of the Excellence in Research Award of the College of Science at Eastern Kentucky University for 2016-17.

**Paul Judd ('82)** was selected as the recipient of the David B. Lawrence Outstanding Undergraduate Teacher Award for 2016-17 at Drake University, Des Moines, IA.

## MathEvents

The twenty-seventh Biennial Alumni Career Seminar was held on Saturday, 12 November 2016. The format of the afternoon is lunch and mingling, followed by the Schraut Lecture, and then brief introductions to various professions from a panel, comprised mostly of alums.



**Katie Posey ('18)**, President of the Math Club, welcomed the audience members and introduced **David Diller ('90)**, who delivered the 17<sup>th</sup> annual Kenneth C. Schraut Memorial Lecture. Dave is currently the Vice President of computational biology at CMDbioscience. Dave presented a talk titled “A Role for Mathematics in Understanding and Curing Disease?” Dave’s field is molecular modeling, which uses mathematical modeling to help understand biological activities at the molecular level.

The talk, full of colorful pictures and diagrams of how pharmaceutical drug molecules can be designed to attach themselves to disease-causing agents, caught the attention of all the students, including those who were in a major different from mathematics and biology. Although Dave’s Ph.D. from Northwestern University in 1996 was in the area of nonlinear partial differential equations, he was introduced to the biomolecular world during a post-doc at the University of Washington, where he worked in the Structural Biology Department on tropical diseases, and saw the use of mathematics in understanding this area.



The Biennial Alumni Career Seminar provides an opportunity for alums of our department to connect with our current students. It allows the alums to give us an insight into the variety of careers in which a mathematics major can succeed, and to give the students some career advice. Our students benefit from seeing the number of interesting careers displayed on the panel, and they enjoy the interaction with the alums in breakout sessions held after the plenary panel. **Peter Kawiecki ('19)**, President of Pi Mu Epsilon, moderated the panel and introduced each panelist. The panelists were full of good advice, and were excellent ambassadors of their careers. **Neil Bitzenhofer ('69)** spoke of his career in software and the importance of software testing; the actuaries -- **Christopher Bomba ('02)**, **Katherine Campbell ('15)** and **Robert Phipps ('01)** -- pooled their minutes and spoke about various aspects of actuarial work; **David Diller** explained to students how they should be alert to opportunities that they may not have previously considered; **Lisa Diller ('90)** spoke of her work in an engineering career; **Vincent Velton ('82)** also spoke about his work in engineering and exhorted the undergraduates to take more mathematics courses; **Lanre Oriowo ('08)**, **Dominic Masotti ('16)**, **Thomas Santner ('69)**, and **Alan Veliz-Cuba** provided their insights on teaching and academe; **Robert Kasprzak ('68)** spoke of his experiences in industry relating to acquisitions evaluation,



strategic planning, business turnarounds, new product development, sales training and market research, and he also shared some new stories about Doc Schraut; and **Yi Zhao ('11)** described her work in analyzing data to improve crop yield for farmers.

Thanks go to the organizers of this year's Biennial Alumni Seminar, **Paul Eloë** and **Jon Brown**, for another great edition of this seminar, and to **Vicki Withrow**, our department's Senior Administrative Assistant for her efficient and cheerful support.

[Back to TOC](#)

Details of this event can be found at

<https://udayton.edu/artssciences/academics/mathematics/events/alumni-seminar/index.php>

Information on previous MathEvents can be found at <http://academic.udayton.edu/mathevents/>

## **AN INVITATION TO MATHEVENTS: Undergraduate Mathematics Day**

### **SATURDAY, 11 NOVEMBER 2017**

The 2017 MathEvent at UD will be held on Saturday, 11 November 2017. It will be Undergraduate Mathematics Day, a conference in which students present papers. This is a biennial one-day conference, designed to celebrate all forms of undergraduate mathematics. The conference provides an opportunity for students of mathematics to meet and network with more established mathematicians. We invite and encourage students (in high school, or undergraduates or graduate students) to present mathematics talks on topics of research, pedagogy, history or applications. Faculty talks are also welcome. We encourage all alums who are in teaching positions within a couple of hours of UD to consider bringing students to the conference.

Undergraduate Mathematics Day is anchored by the Schraut Lecture. Dr. Joe Gallian, University of Minnesota Duluth, has happily agreed to deliver the 18th Kenneth C. Schraut Memorial Lecture; and Dr. Allison Henrich, Seattle University, will present the morning plenary talk. The conference will begin at about 8:30 am and end at about 5 pm.

This year's conference will be organized by faculty members **Jon Brown**, **Aparna Higgins** and **Dan Ren**. For more information, please visit the website <http://go.udayton.edu/UndergradMathDay>, or send email to one of the organizers.

### **32nd Conference on Topology and its Applications**

**Jon Brown**, **Joe Mashburn** and **Lynne Yengulalp** worked on the preparations for the 32nd Conference on Topology and its Applications which UD hosted in June 2017. Their grant proposal to the NSF was accepted and the conference received \$35,000 in funding. They also secured funding from the College of Arts and Sciences and the Department of Mathematics.

[Back to TOC](#)

# FACULTY UPDATES

## Full-time faculty (with date of appointment)

Atif Abueida, 2000	Peter Hovey, 2001	Maher Qumsiyeh, 2008
Jonathan Brown, 2014	Muhammad Islam, 1985	Youssef Raffoul, 1999
Arthur Busch, 2006	Rebecca Krakowski, 2000	Dan Ren, 2013
Wiebke Diestelkamp, 1998	Catherine Kublik, 2013	Paula Saintignon, 1983
Shannon Driskell, 2003	Andres Larrain-Hubach, 2016	Julie Simon, 2010
Paul Eloë, 1980	Ruihua Liu, 2004	Muhammad Usman, 2007
William Harrison, 2009	Joe Mashburn, 1981	Alan Veliz-Cuba, 2015
Aparna Higgins, 1984	Shirley Ober, 1977	Lynne Yengulalp, 2009

## Adjunct Faculty

Robert Bennington	Mark Hoffman	Eileen Nolan
Michael Braginsky	Susan Holloway	Steven Schoenbaechler
Steve Buerschen	Sandra Johnson	Kevin Schulte
David Carr	Fred Kingrey	Les Steinlage
Martha Carter	Najlaa Khudher	Michael Stuebner
Karen Connair	Christopher Lammlein	Cody Watson
Mark de Saint-Rat	John Loomis	Samuel Wright
Roger Erich	Sam Metry	David Yoder
Robert Flavin	Will Mitchell	Yine Xue
Steve Fuchs	Dawn Mumford	

In addition, the Department of Mathematics employs over thirty students (undergraduate and graduate) each semester to help in delivering our courses. Most of these students are teaching assistants to faculty, but some of the graduate students teach their own classes, usually precalculus or the course for liberal arts majors.

## Retired faculty (with date of retirement)

Bill Friel, 1999	Harry Mushenheim, 2005	Carroll Schleppe, 2001
Tom Gantner, 2001	Jerry Neff, 1999	Gerry Shaughnessy 2012
Robert Gorton, 2015	Richard Peterson, 1998	Lester Steinlage, 2016
John Kauflin, 2005	Ben Rice, 1998	Ralph Steinlage, 2001
Jack McCloskey, 2001		Jerry Strange, 1999

[Back to TOC](#)

Some of the retirees recently gathered to chat and reminisce. Read an article about the gathering, and check out a photograph at <http://www.mydaytondailynews.com/news/retired-math-professors-meet-reminisce/U57xEPueRE75a4NAac1OzO/>

## FACULTY ACTIVITIES

Department faculty members work enthusiastically on their scholarship, on teaching activities, on research with students, and on service. Here is a synopsis of faculty activities for the calendar year 2016.

**Jon Brown** co-authored (with L. Clark, A. Sierakowski, and A. Sims) “Purely infinite  $C^*$ -algebras that are principal groupoid  $C^*$ -algebras,” *Journal of Mathematical Analysis and Applications*, 439 (2016), 213–234. He was invited to present “Groupoid rings and Leavitt path algebras” as a colloquium talk at the University of Nebraska-Lincoln, “Kirchberg algebras that are principal groupoid  $C^*$ -algebras” at a special session at a sectional meeting of the American Mathematical Society. He was also invited to present “A Weyl type” groupoid for Leavitt path seminar. Jon volunteered for the Dayton Regional Stem Center where he worked with kindergarten and first grade teachers on a series of lessons on data analysis and recycling.

**Art Busch** organized (with **Maher Qumsiyeh**) the popular annual [Integration Bee](#) again this year. Art was busy setting up and managing the on-line [skills tests](#), which are used in all sections of the first two semesters of the mainstream calculus sequence. Art developed many activities using GeoGebra for his students in MTH 218 (multivariable calculus). He also guided a [capstone project](#).

**Wiebke Diestelkamp** co-authored (with Sample, R. B., Jackson, K., Kinney, A., Senia, R. S., Bigelow, K. E.) “Manual and cognitive dual-tasks contribute to fall-risk differentiation in posturography measures,” *Journal of Applied Biomechanics*, 19, 1-24 (2016). Wiebke became chair of the Department of Mathematics on July 1, 2016. Upon the nomination by Dean Pierce, Wiebke participated in Leadership UD, a year-long program designed to bring together a diverse cohort for a series of sessions centered around themes such as transforming UD, understanding one's leadership potential and style, and building community. Wiebke continues her service to the professional community. For example, she is serving on the MAA Committee on Sections, she is participating in the MAA Mentoring Network, which connects early career mathematicians with mentors for one year, and she is serving on the AWM Mentoring Travel Grant Review Committee. Wiebke worked with a student on her [capstone project](#).

**Shannon Driskell** co-edited (with M. L. Niess and K. F. Hollebrands) “Handbook of research on transforming mathematics teacher education in the digital age,” Hershey, PA: IGI Global (2016). This was Shannon’s first experience co-editing a book, and it was a rigorous, eventful, and rewarding 1.5-year journey. She also co-authored two book chapters (with S. B. Bush, R. N. Ronau, M. L. Niess, C. R. Rakes, D. Pugalee) “Mathematics education technology professional development: Changes over several decades” (2016) and (with R. Harrington, C. Johnston, C. Browning, M. L. Niess) “Technological pedagogical content knowledge: Preparation and support of mathematics teachers” (2016). Shannon presented (with S. B. Bush, R. N. Ronau, D. Pugalee,

C. R. Rakes) “A proposed mathematics education professional development process framework and research framework” at the Association of Mathematics Teacher Educators Twentieth Annual Conference. Shannon continued offering professional development (with S. Mitter) developing curriculum for math specialists in the local Kettering City Schools.

**Paul Eloë** continues as Director of Graduate Studies in our department. Paul co-authored a book with Johnny Henderson, “Nonlinear Interpolation and Boundary Value Problems,” 2016, World Scientific, Trends in Abstract and Applied Analysis: Volume 2. He co-authored several papers: (with **Jeffrey Neugebauer** ('06, '08) “Smallest eigenvalues for a right focal boundary value problem,” *Fract. Calc. Appl. Anal.* 19 (2016), no. 1, 11-18; (with **Samerah Al Mosa** ('18)) “Upper and lower solution method for boundary value problems at resonance,” *Electron. J. Qual. Theory Differ. Equ.* (2016), No. 40, 1-13; (with John Davis, John Graef and Johnny Henderson) “Positive solutions for a singular fourth order nonlocal boundary value problem, *International Journal of Pure and Applied Mathematics*, 109 (2016), No. 1, 67-84; (with **Jeffrey Neugebauer**) “Convolutions and Green's Functions for Two Families of Boundary Value Problems for Fractional Differential Equations,” *Electron. J. Differential Equations*, Vol. 2016 (2016), No. 297, pp. 1-13. Paul was awarded the 2016 George B. Noland Research Award from the University of Dayton’s Sigma Xi chapter. ([Read the story elsewhere](#) in this newsletter.) Paul worked with several students on their [capstone projects](#).

**Aparna Higgins** spent the first half of 2016 continuing her year-long sabbatical at California Lutheran University in Thousand Oaks, CA. She co-authored (with V. Coufal, K. Fogel, W. Higgins, R. Ray, J. Villalpando, K. Yerion) “Trees for Given Values of the Span, Caps, and Icaps for  $L(2,1)$ -Colorings,” *Congressus Numerantium*, 227 (2016), pp. 139-155. She presented her minicourse on directing undergraduate research at the Joint Meetings in Seattle, and a similar course (for the twenty-second time) to the Project NExT Fellows at MathFest in Columbus. She presented invited talks with pebbling themes at the spring meeting of the SoCalNevada Section of the Mathematical Association of America and in an invited paper session on undergraduate research projects at MathFest. She delivered the Sehnert Lecture at Northern Kentucky University. She enjoyed teaching courses at California Lutheran University in the spring. In the fall, at the University of Dayton, Aparna incorporated more group work with presentations in her classes. She had an enjoyable experience of teaching **Wyatt Ohm** ('18) in an Honors contract course in Intermediate Analysis. (Since students in the University Honors Program may have difficulty in finding enough Honors-designated courses to meet the requirements, they may ask the instructor of a course they are registered in to add on an Honors component of that course.) Aparna recruited for the famed Putnam Competition and conducted weekly prep sessions during the semester. ([Read about UD’s participation in the Putnam Competition.](#)) Just for fun, Aparna also started up a [Problem of the Fortnight](#), open to anyone who stumbled across it (include some alums!), but especially targeted to students in our lower-level mathematics courses, who may not be inclined to declare a major in mathematics, but who like solving problems in logic. Although Aparna did not post a problem each fortnight, she enjoyed corresponding with those who attempted the problems.

[Back to TOC](#)

**Pete Hovey** ('75) Pete has been elected Chair-elect of the Section on Physical and Engineering Sciences of the American Statistical Association. He serves this year as Chair-elect, next year as

Chair and the following year as past chair. Pete is supervising **Allyson Pacifico's** ('18) Honors thesis. Allyson is going to build a simulation model of how students interact while travelling between classes here at UD. Pete also conducted a contract Honors section of Probability and Statistics II for **Wyatt Ohm** ('18). Pete directed three students' [capstone projects](#).

**Muhammad Islam** authored an article entitled "Asymptotically periodic solutions of Volterra integral equations," published in *Electronic J. Differential Equations*, 83 (2016) 1-9, and co-authored (with **Jeff Neugebauer**) an article entitled "Existence of periodic solutions for a quantum Volterra equation," published in *Advances in Dynamical Systems and Applications*, 11 (2016) 67-80. Islam delivered three professional talks, "Asymptotic stability of non-unique solutions of initial value problems," at the Mathematics Colloquium, Nova Southeast University, Florida, in March, "Volterra equations and asymptotic periodicity" at the 36th Southeastern-Atlantic Regional Conference on Differential Equations (SEARCDE), in November, and "Stability of non-unique solutions of differential equations," at the Mathematics Colloquium, UD, in March. Islam worked with a student on his [capstone project](#).

**Catherine Kublik** co-authored (with Richard Tsai) an article "Integration over curves and surfaces defined by the closest point mapping" *Research in the Mathematical Sciences* 3(1), (2016), pp.1-17. She delivered a colloquium talk at the Séminaire EDP et Applications at the Université de Poitiers, France in June, and she participated in, and gave an invited talk at, the workshop "Complex boundary and interface problems" at the Centre de Recherches



Mathématiques (CRM) in Montreal in July. Catherine gave a talk and co-organized (with Richard Tsai) a special session entitled "Recent advancements in computational methods involving implicit or non-parametric interfaces" at a meeting of the American Institute of Mathematical Sciences (AIMS) in July. Catherine received a University of Dayton Research Council Seed Grant for the summer of 2016. Catherine was the faculty advisor for [Math Club](#) and our Pi Mu Epsilon chapter.

Catherine worked with a student on her [capstone project](#).

**Ruihua Liu** authored "Optimal stopping of switching diffusions with state dependent switching rates," *Stochastics: An International Journal of Probability and Stochastic Processes*, Vol. 88, No.4 (2016), 586-605, and co-authored (with J.X. Jiang and D. Nguyen) "A recombining tree method for option pricing with state dependent switching rates," *Int. J. Theor. Appl. Finance*, Vol. 19, No. 2 (2016) (26 pages). Ruihua served as co-chair of the Program Committee of the SIAM Conference on Control and Its Applications (CT17), held July 10-12, 2017, in Pittsburgh.

**Joe Mashburn** completed his term as Chair of the Department of Mathematics in June. He taught a full load in the fall, while also organizing (with **Jon Brown** and **Lynne Yengulalp**) the [32<sup>nd</sup> Summer Conference on Topology and its Applications](#), an international conference which has been awarded a \$35,000 grant from the National Science Foundation to help defray costs of attendance for early career mathematicians.

[Back to TOC](#)



**Shirley Ober** was a member of the CAP ([Common Academic Program](#)) review committee for MTH 137, Calculus I with Review. The committee revised the CAP student learning outcomes and the course learning objectives. It then developed an assessment plan for the course that will be implemented starting in the fall of 2017. Shirley helped at the [Integration Bee](#), along with **Paula Saintignon**, registering students, judging the competition for best team name and cheering on her own students.

**Maher Qumsiyeh** worked with three students on their [capstone projects](#) and with a graduate student on his Math Clinic project. He worked with Art Busch on the [Integration Bee](#) again this year.

**Youssef Raffoul ('87)** published seven papers. He authored “Necessary and Sufficient Conditions for Stability of Volterra Integro-dynamic Equation Systems on Time Scales,” *Archivum Mathematicum (BRNO)*, Tomus, 52. He also co-authored (with Adivar, M.) “Qualitative Analysis of Volterra equations on Time Scales using resolvent and Lyapunov functionals,” *Applied Mathematics and Computation*, 273(15), 258–266; (with Adivar, M., Koyuncuoğlu, H.) “Almost automorphic solutions of delayed neutral dynamic systems on hybrid domains,” *Applicable Analysis and Discrete Mathematics*, 10, 128-151; (with Kilinc, F., Oni, B.) “Stability and Instability Analysis in Finite Delay Nonlinear Volterra Integro-differential Equations,” *International Journal of Functional Analysis, Operator Theory and Applications*, 8(1), 1-14; (with Raii, H.) “Uniform Stability In Nonlinear Infinite Delay Volterra Integro-differential Equations Using Lyapunov Functionals,” *Nonautonomous Dynamical Systems*, 3(1), 14-23; (with **Ren, D.**) “General theorems in boundedness of solutions of stochastic delay differential equations,” *Electronic Journal of Differential Equations*, 2016(194), 1–14; and (with Sanbo, A.) “Boundedness and stability results for the finite delay nonlinear Volterra discrete system,” *Nonlinear Studies*, 23(1), 87-94. In addition, Youssef was invited to present colloquia: “Introduction to Time Scales with Applications,” at Notre Dame University in Lebanon in August, and “Existence and Uniqueness of Asymptotically Constant or Periodic Solutions in Delayed Population Models,” at Rochester Institute of Technology in November. Youssef also gave invited talks at the fall Southeastern Sectional Meeting of the American Mathematical Society at North Carolina State University in Raleigh on “Stability and Boundedness in Nonlinear Infinite Delay Volterra Discrete Systems Using Lyapunov Functionals” in November; at the Southeastern Atlantic Regional Conference in Differential Equations at Florida Gulf Coast University in Fort Myers on “Stability in Nonlinear Finite Delay Volterra Integro-differential Systems” in November; at the International Conference on Difference Equations and Applications, a meeting of the International Society of Difference Equations, in Osaka, Japan on “Boundedness of Solutions in Almost Linear Volterra Difference Equations Using Fixed Point Theory and Lyapunov Functionals” in July; at the Joint Mathematics Meetings of the American Mathematical Society in Seattle on “Exponential Stability and Instability in Multiple Delays Difference Equations” in January.

**Dan Ren** co-authored (with **Youssef N. Raffoul, ('87)**) “General Theorems in Boundedness of Solutions of Stochastic Delay Differential Equations,” *Electronic Journal of Differential Equations*, Vol. 2016, No. 194, pp. 1–14. Dan gave an invited talk “Optimal retirement plan on a finite horizon” at the annual SIAM Meeting in Boston in July, and she contributed the talk “Shortfall aversion on a finite horizon” at the SIAM Conference on Financial Mathematics and

Engineering in Austin in November. She directed a Mathematics Clinic for **Chenwei Liu** ('17) and is working with **Runze Hu** on his Mathematics Clinic.

**Paula Saintignon (MS '82)** is celebrating thirty-five years of working at the University of Dayton. She joined our department as a faculty member after working at UDRI for a year. Paula helped at the [Integration Bee](#), along with **Shirley Ober**, registering students, judging the competition for best team name and cheering on her own students.

**Muhammad Usman** co-authored (with Dur-e-Ahmad, M., Khan, A., Imran, M.) "Optimal Control Analysis of Ebola Disease with Control Strategies of Quarantine and Vaccination," *Infectious diseases of poverty*, 5(72), DOI: 10.1186/s40249-016-0161-6; and (with Flora, G., Yakopcic, C., Imran, M.), "Numerical Solution and Stability Analysis of a Model of In Vitro Inhibition of Mutation of Cancer Cells," *Int. J. Appl. Comput. Math*, Springer. DOI 10.1007/s40819-016-0201-8. Usman gave two invited addresses at the 10th IMACS (International Association for Mathematics and Computers in Simulation) International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, at the University of Georgia, Athens, on "A Study of Bifurcation Parameters in Travelling Wave Solutions of a Damped Forced Korteweg de Vries-Kuramoto Sivashinsky Type Equation," in March (where Usman also organized a special session "Analytical and computational methods to study nonlinear partial differential equations") and at the 11th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Orlando, on "Bifurcations in traveling wave solutions of the Kuramoto Sivashinsky type perturbed forced equation" in July. In January, Usman presented four seminars at the College of Business and Commerce, University of Gujrat, Pakistan, on "Mathematical Tools for Option Pricing," "Bifurcation analysis of some nonlinear dispersive wave equations," "Computational study of forced oscillations of a Korteweg-de Vries type equation," "Some analysis results on a family of nonlinear dispersive wave equations," "A history and discovery of equation for nonlinear shallow water waves" and a seminar for a general audience on "Some Applications of Computational Mathematics in STEM Disciplines." These seminars were sponsored by the Government of Pakistan and the University of Gujrat. Usman served as an invited member of the Scientific Program Committee of the 10th IMACS International conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, held in Athens, GA, in March. Usman worked with many students this year. Seventeen posters were presented by students in Usman's MTH 219 (Differential Equations) course at the Stander Symposium this year. Details can be found at <https://sites.google.com/a/dayton.edu/musman1/student-research/mth-219-03-keen-course>. In addition, Usman worked on independent research projects with undergraduates **Marina Mancuso** <https://drive.google.com/file/d/0B54CDAB0v98Za2ZmVjZTc2wxVGs/view> and **Chi Zhang**. He advised **Chenye Li** ('17) on his [capstone project](#). He also served as Math Clinic advisor to graduate students **Walla Alharbi** and **James Stewart**. He is directing **William Shovelton**, a student from the School of Engineering, on his Honors thesis.

**Alan Veliz-Cuba** published three articles: "Effects of cell cycle noise on excitable gene circuits" (with C. Gupta, M. Bennett, K. Josic, and W. Ott) in *Physical Biology* *Physical Biology*, 13(6): 66007, 2016; "Identification of control targets of Boolean molecular network models via computational algebra" (with D. Murrugarra, B. Aguilar, and R. Laubenbacher) in *BMC Systems Biology* 10(1): 94, 2016; and "Stochastic models of evidence accumulation in changing

environments” (with Z. Kilpatrick, and K. Josic) in SIAM Review 58(2): 264-289, 2016. The last of these articles was featured in the Research Spotlights Section of SIAM Review. Alan mentored **Lauren Geiser**, **Marina Mancuso**, and **Zeyu Wang** in mathematical biology research.

**Lynne Yengulalp** spent the 2016-2017 academic year in Lawrence, Kansas, doing research with colleagues there. She gave two invited talks on her research at the special session on “Women in Topology” at the Joint Meetings in Atlanta and at the Association for Symbolic Logic 2017 North American meeting in Boise, Idaho. Lynne also co-organized the set-theoretic topology session at the Spring Topology and Dynamics Conference in Jersey City, New Jersey. Lynne, together with **Jon Brown** and **Joe Mashburn**, worked on the preparations for the [32nd Conference on Topology and its Applications](#) which was held at UD in June 2017.

[Back to TOC](#)

### **Capstone requirement for graduation**

Undergraduates at UD follow the CAP program ([Common Academic Program](#)) as a requirement of graduation. The program has many components that have been phased in since CAP was implemented. This was the first year in which the component “Major Capstone Course or Experience” was required of all graduating students. The capstone experience “will provide students the opportunity to engage, integrate, practice, and demonstrate the knowledge and skills they have developed in their major courses” and it will “provide students the opportunity to engage in the scholarship, activity and/or practice of their major field and further the students’ understanding of their chosen vocation, career or profession.” (from [https://udayton.edu/provost/cap/cap\\_components.php#capstone](https://udayton.edu/provost/cap/cap_components.php#capstone))

In our department, students approach a faculty member to work with them on a capstone project of mutual interest to them. In addition to the mathematical project, students write a reflection paper and prepare a presentation appropriate for a general audience. A total of twenty-two students completed capstone projects this year, under the individual guidance of nine faculty members. Many of these students presented their work at the [Stander Symposium](#). A brief description of some of these projects is provided below.

**Art Busch** worked with **Nina Bridge** ('17) on her capstone project in discrete optimization. **Wiebke Diestelkamp** worked with **Briar Smith** ('17) on “Mothers as Career Leaders: Do Maternity Leave Laws Make a Difference?” Paul Eloe worked with **Melissa Fox** ('17) and **Emma Whitney** ('17) on “The Stone Weierstrass Approximation Theorem and Applications,” with **Tyler Masthay** ('17), and with **Kathleen Weston** ('17). Three students did logistic regression projects for their capstone requirement under **Pete Hovey**’s direction. **Xueyan Bai** ('17) worked with a set of data related to low birth weight. Pete reports that her results initially surprised them because smoking was not selected as a significant factor. However, hypertension was selected as a significant factor and hypertension is associated with smoking, which explained why smoking may not have had any additional impact over the hypertension. **Jimmie D'Onofrio** ('17) had already done a project involving betting on NFL games and had built a model to predict the spread used by Las Vegas. In his capstone project, he decided to look for factors that might impact whether or not the favored team beat the spread. However, there did not seem to be any factor that would provide a great benefit to someone who wanted to bet on

NFL games. **William Gross ('18)** used data from a national survey on politics and religion. William found that the preferred religion was the strongest indicator of the probability of being conservative, followed by how often someone prayed and income. Region, age, the year the survey was answered, and whether the religion was fundamentalist or not also were important. **Muhammad Islam** directed **Conor McCormick ('17)** in his capstone project “Principal component analysis.” **Becky Krakowski** directed **Nicole Behler ('17)**, **Emily Braisted ('17)**, **Megan Giardina ('17)**, **Molly McCormick ('17)**, **Sarah McGrath ('17)**, **Changyang Liu ('17)** and **Ye Shen ('18)**. **Catherine Kublik** worked with **Jiaying Chen ('17)** on “Numerical integration.” **Maher Qumsiyeh** advised three capstone projects: “Predicting Smoking Rates in the U.S. Using Multiple Regression” by **Marie Bertolo ('17)**, “Predicting How Many Points a Famous NBA Player Will Score in a Game” by **Crystal Brock ('17)**, and “Predicting Baseball Player’s Salary Based on Past Performance and Other Factors” by **Courtney Arand ('17)**. **Muhammad Usman** worked with **Chenye Li ('17)**.

## Skills Tests

Skills tests are now required by the department in the first two semesters of the mainstream calculus sequence. Skills tests are ten-question timed tests with no partial credit and with a passing grade set at 80%. They are used in addition to the usual hour-long tests and other graded events in our calculus courses. Students are not permitted to use calculators on skills tests. **Art Busch** and **Lynne Yengulalp** manage the tests within MyMathLab, the online system available via the textbook publisher. Each instructor in MTH 168 and MTH 169 (Analytic Geometry and Calculus I and II) must require students to take these tests and they must count for 10% of the course grade. The tests are administered by teaching or graduate assistants in our “Math Lab,” which is a room with about twenty computers, whose browsers can be placed in lock-down mode for the skills tests. Instructors set deadlines for each of the three skills tests in a course, and students may attempt the test at most once a day until the deadline. Typically, each test is assigned to a three-week period during the semester.

## New courses

**Muhammad Islam** developed a new course, MTH 301: Matrix Theory and Applications, assisted by a grant from KEEN (Kern Entrepreneurial Engineering Network). **Alan Veliz-Cuba** also received a KEEN grant to design a course entitled Computational Modeling of Systems, where students learn about new techniques to study nonlinear systems. He taught the course for the first time in Fall 2016.

## Projects in courses

**Muhammad Usman** expects students in his MTH 219, Differential Equations, classes to form teams and work on a project. The students present these at poster sessions on campus, such as at the Stander Symposium. For more details, please visit <https://sites.google.com/a/udayton.edu/musman1/student-research/mth-219-03-keen-course>. **Aparna Higgins** continues to assign a project or a writing assignment to her students in calculus.

## Technology in classes

Many faculty members continue to use mathematical software (like Desmos, GeoGebra, Maple, Matlab, R, SAS) to demonstrate ideas in class.

## Department colloquium

The faculty and graduate students gather weekly for a department colloquium, during which we have guest speakers from other institutions, or Master's degree students presenting their MathClinics, or our own faculty members talking about their recent research, or occasionally, an undergraduate student presenting work done in an REU or other activity. The complete schedule for the colloquium talks this past academic year can be found at

<https://www.udayton.edu/artssciences/academics/mathematics/events/colloquium/index.php>

In addition, the mathematics departments of the University of Dayton and Wright State University jointly hosted a colloquium talk by **Rick Schoen** on the campus of Wright State University.

[Back to TOC](#)

## Problem of the Fortnight

The Problem of the Fortnight project was created simply so that students can have some fun thinking about problems that can be solved mathematically or logically. Anyone may attempt these problems. We received solutions from undergraduate students – only some of whom were mathematics majors, from alums, from retirees, and from people who simply stumbled upon the webpage. Details are at

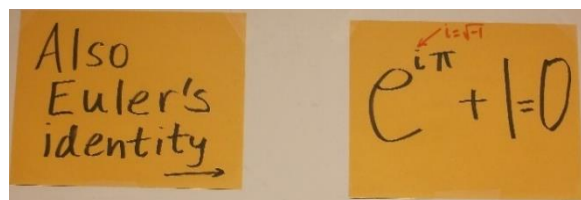
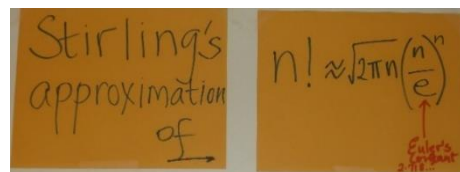
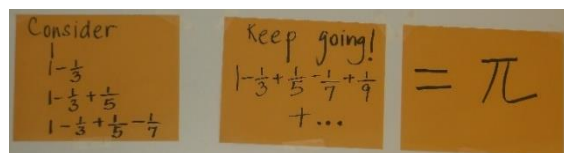
<https://sites.google.com/a/udayton.edu/ahiggins1/problem-of-the-fortnight>.

This was the first Problem of the Fortnight: **Each page of an old book is numbered. The total number of digits in all the page numbers is 1890. How many pages does the book have?**

(taken from The Stanford Mathematics Problem Book, George Polya and Jeremy Kirkpatrick, Dover Publications)

## Pi Day at UD

We do not usually plan a celebration of Pi Day (March 14, or 3.14). Much is going on at that time, what with the High School Math Contest, Honors Symposium and Spring Break. But we sometimes find an anonymously decorated wall in the hallway that houses the Department Office. Here is some of this year's message. (The art piece, "Tower of Pi" resides in a display case.)





## UNDERGRADUATE STUDENT ACTIVITIES

Our undergraduate students engaged in many extra-curricular mathematics-related activities.

### UD Math Club and Pi Mu Epsilon Chapter

The Math Club is an organization that is open to all. Pi Mu Epsilon is a national mathematics honorary society to which undergraduates are admitted based on their academic achievements in mathematics. The Ohio Zeta Chapter of Pi Mu Epsilon is at UD. Members of our Math Club and of our Pi Mu Epsilon chapter meet jointly during the year, and the two groups have some joint officers. (We will refer to this student group as “The Math Club” for convenience.)

The student officers did an excellent job of organizing mathematical activities. They were:

President of the Math Club: **Katie Posey ('18)**

President of Pi Mu Epsilon Chapter: **Peter Kawiecki ('19)**

Vice-President: **Amy Pompilio ('19)**

Secretary: **Mitchell Shimon ('19)**

Treasurer: **David Gross ('18)**

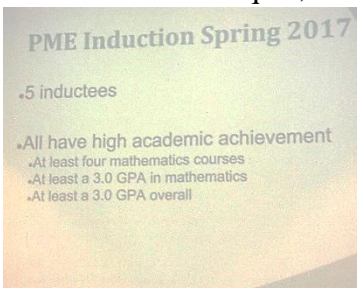
**Catherine Kublik** was the faculty advisor. In addition to purely social events like the annual picnic, the Math Club held at least three meetings each semester comprised of a short talk, and some puzzle-solving or game-playing. Of course, there was free pizza and pop at the meetings. Speakers were members of our own faculty, including **Jon Brown, Art Busch, Pete Hovey, Andres Larrain-Hubach, Muhammad Islam, Catherine Kublik** and **Joe Mashburn**. Elections for officers for 2017-2018 resulted in **Katie Posey** being re-elected President of the Math Club, **Amy Pompilio** being re-elected as Vice-President, **Peter Kawiecki** being re-elected as PME President, **Tom Weckesser ('18)** being elected as Secretary, and **David Gross** being re-elected as Treasurer.



[Back to TOC](#)

### Pi Mu Epsilon inductions

The department holds two inductions for Pi Mu Epsilon each year. The spring induction includes the traditional banquet, while the fall induction is held during a Math Club meeting. Pi Mu



Epsilon requires that inductees must have completed two courses beyond two calculus courses. Recruiting twice a year helps us invite qualified students as soon as they may meet the requirements, thus making the students aware of extra-curricular mathematics activities and opportunities. **Dan Ren** presented a talk entitled “Some Experiments in Behavioral Finance” at the spring induction ceremony.

Thirteen students were inducted into Pi Mu Epsilon this year.

## Fall 2016 inductees

**Lauren Geiser**  
**David Gross**  
**Kari Hayes**  
**Samantha Knoth**  
**Marina Mancuso**  
**Allyson Pacifico**  
**Anna Petrick**  
**Alicia Talarico**



## Spring 2017 inductees

**Daniel Fleming**  
**Natalie Merline**  
**Stephanie Miller**  
**Amelia Pompilio**  
**Nicholas Schlueter**



## High School Math Competition

On Saturday, March 11, 2017, UD held its 21st Annual High School Math Competition. This competition is a team competition, with the teams moving from station to station. Each station represents a topic (say, geometry) and a team entering that room is presented with three problems at three levels of difficulty and, consequently, three levels of points obtainable. The team must turn in the solution to at most one of those problems, and may not return to that station during the rest of the competition. The maximum number of points is 1000. The team with the most points wins. Math Club members write the problems and solutions, and department faculty check them for clarity of questions, correctness of solutions and assignation of difficulty level. Math Club officers organize the event, order the food, set up proctors and runners and graders. As always, the competition was an enormous success and the students who participated had a lot of fun.



Sixty-five students from six different high schools participated this year. The high schools represented were Alter, Bishop Fenwick, Carroll, Fairmont, Oakwood and Stebbins. The winning team was Team 7 base 6 from Oakwood with 925 points. In second place was The Debaters from Alter with 900 points. In third place was The Empty Set from Oakwood with 825 points.

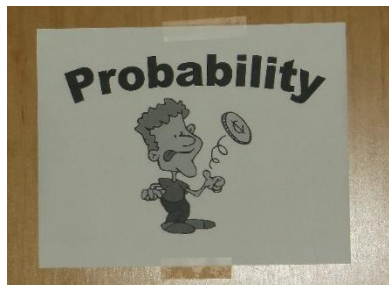
[Back to TOC](#)

While the answers are being graded and the points being tallied, one of our faculty members gives a talk to the participants. This year, **Jon Brown** gave an energizing talk exploring the

question: “Are two triangles with the same area and perimeter necessarily the same?” The students participated and thought hard about the questions raised in the talk.



Here is an example of the three levels of problems provided on one topic.



**Easy (25 Points):**

Fred buys online half the time he shops. There’s a 90% chance Fred gets a discount when he orders a TV online. There’s a probability of 0.3 that he gets a discount when he buys a TV in store. What’s the probability he gets a discount on his TV?

**Medium (50 Points):**

A bag of 15 skittles has 2 purple, 4 green, and 1 yellow. You randomly select two from the bag and eat them immediately. What is the probability that you ate one purple and one that is none of the colors mentioned? Keep your answer as a fraction.

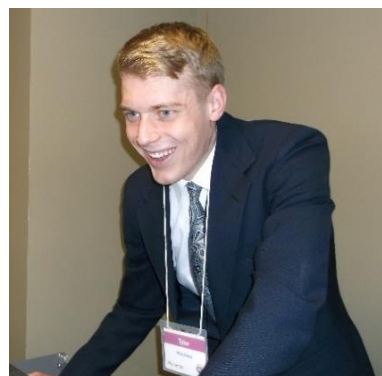
**Hard (100 Points):**

Tina randomly selects two distinct numbers from the set  $\{1, 2, 3\}$ , and Sergio randomly selects a number from the set  $\{1, 2, \dots, 10\}$ . What is the probability that Sergio’s number is larger than the sum of the two numbers Tina chose?

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## Honors Student Symposium

This symposium provides an opportunity for Honors students to make a professional oral presentation of their research to an audience of peers and faculty who are not necessarily in their disciplines. Tyler Masthay and Briar Smith, undergraduates with majors in our department, presented their Honors theses at the Honors Student Symposium on Friday, 24 March 2017.



**Tyler Masthay ('17)** presented “Extending Second- and Third-order Uniqueness Implies Existence Results to Fractional Differential Equations.” **Paul Eloe** directed Tyler’s Honors thesis. **Briar Smith ('17)** was directed in her Honors thesis work by Dr. Nancy Haskell of the Department of Economics and Finance. Briar spoke on “Mothers as Career Leaders: Do Family Leave Laws Make a Difference?”

[Back to TOC](#)

## The Putnam Competition

The seventy-seventh annual **William Lowell Putnam Mathematical Competition** was held on Saturday, 3 December 2016. The competition is described as “the preeminent mathematics competition for undergraduate students in the United States and Canada” (from the webpage of the MAA, the sponsor of the competition). Participants compete as individuals, attempting six questions in each of two three-hour sessions.

This year, we introduced “Putnam Prep” sessions for the Putnam Competition. Twice a week, **Aparna Higgins** met with interested students to work through problems from previous Putnam competitions. About five students came regularly to the sessions, but many more of the twenty-five students came to the session at least once. Participation in the prep sessions was voluntary and was not restricted to those who had signed up for the competition.



Twenty-five students participated in the competition. Our department generously funded a catered lunch in the Kennedy Union. We are very proud of all these students who showed their dedication to mathematics by devoting an entire Saturday at the end of the first semester to participate in the Putnam competition. Those students

who scored above zero are marked with an asterisk (\*).

**Tamier Bao**  
**Jiaying Chen**  
**Matthew Forte**  
**David Gross**  
**William Harper**  
**Matthew Hooper**  
**Bridget Kallmeyer**  
**Changyang Liu**  
**Hang Luo**

**Sean Mahoney**  
**Tyler Masthay\***  
(Tyler was UD’s high scorer)  
**Kyle McGill**  
**Sarah Miller**  
**Michael Molchan**  
**Lauren Morgan**  
**Elizabeth Musco**  
**Wyatt Ohm**

**Anna Petrick**  
**Kathryn Posey**  
**Stephen Reynolds**  
**Michael Simpson\***  
**Alex Smith**  
**Thao Truong**  
**Zeyu Wang\***  
**Tom Weckesser**

[Back to TOC](#)

## Research Experiences, Internships, off-campus presentations, etc. by undergraduates

**Lauren Geiser** participated in an REU (Research Experiences for Undergraduates) at the Center for Quantitative Medicine at the University of Connecticut in the summer of 2017. **Marina Mancuso** participated in an engineering Undergraduate Summer Research Grant at Texas A&M in the summer of 2016, and spent the summer of 2017 in a mathematics REU at North Carolina State University in Raleigh, NC. **Tyler Masthay** was invited by the University Honors Program to participate in the Global Scholar Experience at Oxford University. He spent some part of the summer of 2016 in that program. Tyler presented “Uniqueness implies existence of solutions for three-point boundary value problems for fractional differential equations” as a contributed paper in an AMS session at the Joint Mathematics Meetings in Atlanta in January 2017, and presented





an invited paper at a special session of the AMS at its Spring Western Sectional Meeting in Pullman, WA, in April 2017. **Michael Simpson** spent part of the summer of 2017 at an engineering REU at the University of Southern California, studying active control of bio-films on water membranes.

Our students are eager for experiences that provide them with an understanding of how mathematics can be used outside academe.

**Douglas (Max) Lumsden** has an internship at PeopleKeys, Inc. of Youngstown, Ohio, which specializes in behavioral analysis assessments. This internship resulted from the Ohio Export Internship Program, which Max completed at the Ohio State University this spring. **Katie Posey** has an internship for the summer of 2017 at the Air Force Institute of Technology in Dayton, where she will work on a computational electrodynamics-aerodynamics project.

**Zeyu Wang**, a junior with a major in mathematics and a minor in biology, will spend her summer doing some data analysis.

### Actuarial Exams

Congratulations to **Kari Hayes**, **Peter Kawiecki**, **Wyatt Ohm** and **Nicholas Schleuter**, who passed the actuarial exam P in the summer of 2017!

### Undergraduate Awards

These awards are determined by the faculty of our department. The Senior Award of Excellence in Mathematics was awarded to **Tyler Masthay**. This award is given to a graduating senior based on academic excellence, undergraduate research and other scholarly activities in mathematics. The Sophomore Award of Excellence in Mathematics was given to **Peter Kawiecki**, **Amelia Pompilio** and **Noelle (Ellie) Rizzo**. This award is based on academic excellence and on participation in extra-curricular mathematics activities. The Award of Excellence in Support of Mathematics, given annually to the student of any class who is judged to have demonstrated outstanding support of mathematics activities and events, went to **Kathryn Posey**. The Department of Teacher Education awarded The Brother Joseph W. Stander, S.M., Award of Excellence to an Outstanding Student with a Concentration in Integrated Mathematics to **Sarah McGrath**.

### STANDER SYMPOSIUM

The Department of Mathematics participates energetically in the Stander Symposium, a campus-wide event that celebrates academic excellence, and provides an opportunity for students from all disciplines to showcase their intellectual and artistic accomplishments.



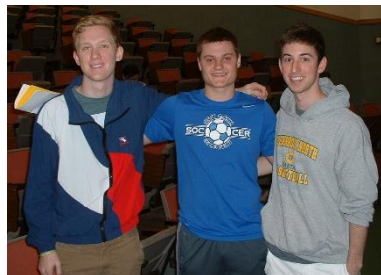


Some of our students are involved in the Celebration of Arts, some present posters, and many participate in the Integration Bee.

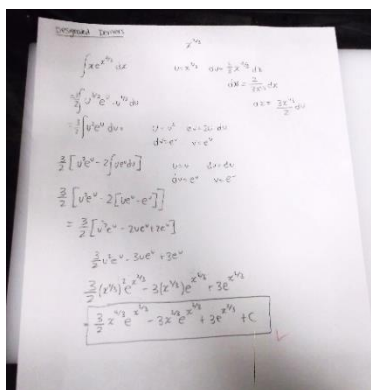
## Integration Bee



The fifteenth annual Integration Bee thrilled us again with the large number of students who registered to participate in it. About 200 students in 48 teams of at most three participants spent a pleasant two hours integrating,



after a pizza lunch, hosted by the department. Students need not be mathematics majors to compete in the Bee and may choose a family-friendly name for their team. **Art Busch** and **Maher Qumsiyeh** organized the Integration Bee again this year. Vicki Withrow, our capable and cheerful Senior Administrative Assistant, managed all the logistics for lunch and ordering the prizes.



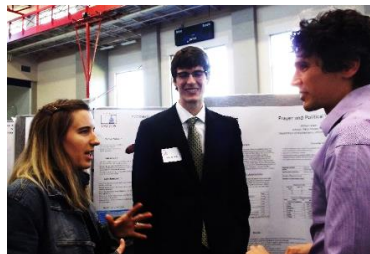
The Bee is conducted in rounds, with only about fifteen teams being given an integral at a time. If a team solves the integral correctly, it moves on to the second round. In later rounds, only the first few teams to turn in correct solutions move on to the next round.



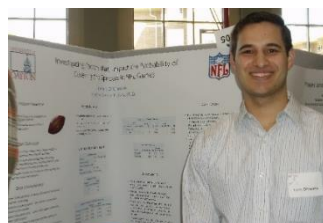
The winning team was Sensation consisting of **Yujun Sun** and **Zhisheng Huang**. Designated Drivers, consisting of **Dillon Balk**, **Jake Wessels** and **Patrick Galaska** came in second, while The Cats + C, consisting of **Josh Segalewitz**, **Amanda Peters** and **Mike Kerner**, came in third. “The integral of (1/Cabin) dCabin,” consisting of **Tom McKernan** and **Sarah Miller** won the prize for the best team name.

[Back to TOC](#)

## The Poster Sessions at the Stander Symposium



The following list contains posters of a mathematical nature presented at the 2017 Stander Symposium. These posters present work done in course, or a capstone project, or an Honors thesis, or a Math Clinic.



“Numerical Analysis of a Mathematical Model for the Formation of Alzheimer’s Disease,” by **Summer E. Jenkins**, **Christopher A. Negri**, **Amelia I. Pompilio**, advised by **Muhammad Usman**.

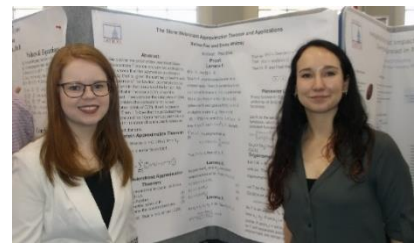
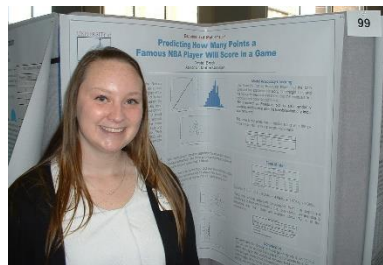
“How Mathematics Can Stop Crime,” by **William T. Shovelton**, advised by **Muhammad Usman**.

“Investigating Factors that Impact the Probability of Covering the Spread in NFL Games,” by **Larry J. D’Onofrio**, advised by **Pete Hovey**.

“Low Birthweight and How Mother’s Status Influences It,” by **Xueyan Bai**, advised by **Pete Hovey**.

“Numerical Integration,” by **Jiaying Chen**, advised by **Catherine Kublik**.

“Prayer and Political Views,” by **William J. Gross**, advised by **Pete Hovey**.



“Predicting Baseball Player’s Salaries Based on Past Performance and Other Factors,” by **Courtney A. Arand**, advised by **Maher B. Qumsiyeh**.

“Predicting How Many Points a Famous NBA Player Will Score in a Game,” by **Crystal D. Brock**, advised by **Maher B. Qumsiyeh**.

“Predicting Smoking Rates in the U.S. Using Multiple Regression,” by **Marie K. Bertolo**, advised by **Maher B. Qumsiyeh**.

“Principal Component Analysis,” by **Conor J. McCormick**, advised by **Muhammad N Islam**.



“The Stone-Weierstrass Approximation Theorem and Applications,” by **Melissa E. Fox**, **Emma Laura Whitney**, advised by **Paul W. Eloë**.

“Extending Second and Third-Order Uniqueness Implies Existence Results to Fractional Differential Equations,” by **Tyler M. Masthay**, advised by **Paul W. Eloë**.

[Back to TOC](#)

## UNDERGRADUATE DEGREES CONFERRED

UD has two commencement ceremonies each year, in December and May. We list the students who graduated during this past academic year with a major in mathematics. Three degree programs are offered: Bachelor of Arts in Mathematics, Bachelor of Science in Mathematics, Bachelor of Science in Applied Mathematical Economics. Students who major in mathematics sometimes have another major. Some students even earn dual degrees. Several graduates are designated as “[University Honors](#),” (awarded to selected students for having successfully completed a series of special honors seminars and an honors thesis), and others as “[Core Program](#),” (awarded to selected students for having successfully completed an integrated academic curriculum program in religious studies, philosophy, English, history and the social sciences). Other designations are “[Dayton Civic Scholars](#),” (awarded to selected students for having successfully completed a special social science sequence focused on a career in public service), “[Berry Summer Thesis Institute Fellows](#),” (awarded to selected students for having successfully completed the Berry Summer Thesis Institute, which provides a 12-week, on-campus program of intensive disciplinary research and scholarship opportunities, and professional development and leadership workshops, along with community service opportunities), “[Berry Thesis Fellows](#),” (awarded to selected students for having successfully completed the Berry Summer Thesis Institute and an Honors thesis). “[Global Flyers Fellows](#)” is awarded to selected students for having successfully completed a Global Flyers program as a thesis fellow in Oxford, England. “[DC Flyers Fellows](#)” is awarded to selected students interested in exploring careers in public service through 10-week internships in our nation’s capital.

**Courtney Arand** (Bachelor of Science in Applied Mathematical Economics), cum laude

**Xueyan Bai** (Bachelor of Arts in Mathematics). Xueyan will take a gap year before applying to graduate schools for financial mathematics programs in 2018.

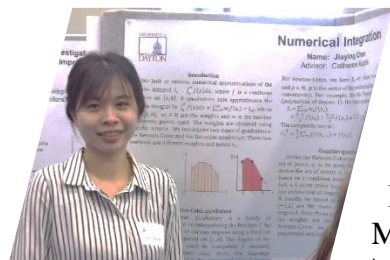


**Nicole Behler** (Bachelor of Arts in Mathematics, and a Bachelor of Science in Education in Adolescence to Young Adult Education), cum laude

**Marie Bertolo** (Bachelor of Science in Applied Mathematical Economics), cum laude

**Emily Braisted** (Bachelor of Science in Mathematics), magna cum laude

**Crystal Brock** (Bachelor of Science in Applied Mathematical Economics)



**Jiaying Chen** (Bachelor of Science in Applied Mathematical Economics)

**Suyang Chen** (Bachelor of Science in Mathematics)

**Larry (Jimmy) D’Onofrio II** (Bachelor of Science in Applied Mathematical Economics and Bachelor of Science in Business Administration in Finance and Business Economics)

**Melissa Fox** (Bachelor of Science in Mathematics)

**Megan Giardina** (Bachelor of Arts in Mathematics, and a Bachelor of Science in Education in Adolescence to Young Adult Education)

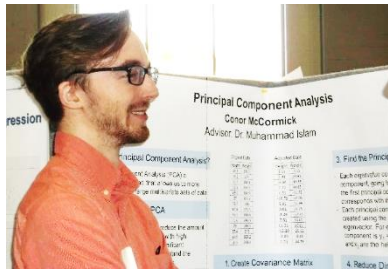
**Chenye Li** (Bachelor of Science in Mathematics)

[Back to TOC](#)

**Ying Li** (Bachelor of Science in Mathematics)

**Changyang Liu** (Bachelor of Science in Mathematics)

**Tyler Masthay** (Bachelor of Science in Mathematics, and a second major in Computer Science), summa cum laude, University Honors with Distinction, Berry Summer Institute Fellow, Berry Thesis Fellow, Global Flyers Fellow (Oxford). Tyler will start a Ph.D. program in Computational Science Engineering and Mathematics at the University of Texas, Austin, this fall.



**Conor McCormick** (Bachelor of Science in Mathematics). Conor has a major in mathematics and a minor in computer science. He works at UDRI doing computer programming.

**Molly McCormick** (Bachelor of Arts in Mathematics, and a Bachelor of Science in Education in Adolescence to Young Adult Education), magna cum laude

**Sarah McGrath** (Bachelor of Arts in Mathematics, and Bachelor of Science in Education in Adolescence to Young Adult Education), magna cum laude, Core Program, University Honors

**Benjamin Rogness** (Bachelor of Science in Applied Mathematical Economics)

**Briar Smith** (Bachelor of Science in Applied Mathematical Economics), summa cum laude, Dayton Civic Scholar, University Honors with Distinction, DC Flyers Fellow

**Kathleen Weston** (Bachelor of Science in Applied Mathematical Economics)

**Emma Whitney** (Bachelor of Science in Mathematics, and a second major in Physics)

**Austin Wilden** (Bachelor of Science in Mathematics)

## **MASTER'S DEGREES CONFERRED:**

Our department had many graduate students complete their degrees this year. UD has two commencement ceremonies each year, in December and May. (August graduates are invited to participate in the December ceremonies.) Our department offers three Master's degree programs: Master of Financial Mathematics (MFM), Master of Science in Applied Mathematics (MAS),



and Master of Mathematics Education (MME). We list the students who graduated during this past academic year with a Master's degree from our department, along with the title and advisor of their Mathematics Clinic, if we know these.

[Back to TOC](#)

**Alaa Alharbi** (August 2016) earned the MFM degree. She worked with **Paul Eloe** and wrote a mathematics clinic project report entitled "Comparison theorems and free boundary value problems for ordinary differential equations."

**Meshail Alharbi** (August 2016) earned the MAS degree. She worked with **Atif Abueida** (and **Maram Almazmumi**) and wrote a mathematics clinic project report entitled "Almost 2-perfect maximum packing and minimum covering of complete graphs with 6-cycles."

**Maram Almazmumi** (December 2016) earned the MAS degree. She worked with **Atif Abueida** (and **Meshail Alharbi**) and wrote a mathematics clinic project report entitled "Almost 2-perfect maximum packing and minimum covering of complete graphs with 6-cycles."

**Ieman Algowal** (August 2016) earned the MAS degree. She worked with **Youssef Raffoul** and wrote a math clinic project entitled "Lyapunov functionals and stability in nonlinear infinite delay Volterra discrete systems."

**Walaa Alharbi** (December 2016) earned the MFM degree. She worked with **Muhammad Usman** and wrote a mathematics clinic project report entitled "A numerical study of an option pricing model using radial basis functions collocation method."

**Kareem Alanazi** (December 2016) earned the MAS degree. He worked with **Paul Eloe** (and **Meshal Alshammari**) and wrote a mathematics clinic project report entitled "Quasilinearization and boundary value problems at resonance."

**Meshal Alshammari** (December 2016) earned the MAS degree. He worked with **Paul Eloe** (and **Kareem Alanazi**) and wrote a mathematics clinic project report entitled "Quasilinearization and boundary value problems at resonance."

**Badriah Alrashidi** (December 2016) earned the MAS degree. She worked with **Atif Abueida** and wrote a mathematics clinic project report entitled "Packings of various complete graphs with isomorphic copies of the 4-cycle with a pendant edge."

**Hang Gu** (December 2016) earned the MFM degree. He worked with **Ruihua Liu** and wrote a mathematics clinic project report entitled "Selling stock with long/short term taxes."

**Ahlam Abid** (May 2017) earned the MAS degree. She worked with **Paul Eloe** and wrote a mathematics clinic project report entitled "Existence of a positive solution of a boundary value problem."



**Dalton Seth Gannon** (May 2017) earned the MAS degree. He worked with **Maher Qumsiyeh** and wrote a mathematics clinic project report entitled “Bootstrapping general ARIMA models.” Seth will start a Ph.D. program at the University of Louisville this fall.

**Nicholas Harner** (May 2017) earned the MAS degree. He worked with **Joe Mashburn** and wrote a mathematics clinic project report entitled “Some implications of neighborhood homogeneity.”

**Cheng Ye** (May 2017) earned the MFM degree. He worked with **Ruihua Liu** and wrote a mathematics clinic project report entitled “An optimal investment problem using regime-switching model with stochastic interest.”

**Rodrigue Nguimfack** (May 2017) earned the MFM degree. He worked with **Ruihua Liu** and wrote a mathematics clinic project report entitled “Optimal investment and consumption in regime-switching jump diffusion models.”

**Thanadol Sukjittayakarn** (May 2017) earned the MFM degree. He worked with **Ruihua Liu** and wrote a mathematics clinic project report entitled “Reduction of truncation error for a finite difference scheme for the Black Scholes equation.” Thanadol is employed as a Business Analyst Intern with Anderson/Rich Consulting, LLC, in Dayton, Ohio.



**Chenwei Liu** (May 2017) earned the MFM degree. He worked with **Dan Ren** and wrote a mathematics clinic project report entitled “Optimal investment, consumption and life insurance.”

**Kaili Chen** (May 2017) earned the MFM degree. He worked with Carl Chen (Department of Economics & Finance) and wrote a mathematics clinic project report entitled “The impact of data breaches on firms’ stock price.”

**Bradley David Luthman** (December 2016) earned the MME degree.

**Dominic T. Masotti** (December 2016) earned the MME degree.

**Jordan Dawn Orr** (December 2016) earned the MME degree.

[Back to TOC](#)

## ALUMNI/AE NEWS

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### IN MEMORIAM

The Department of Mathematics regrestfully reports the deaths of two alums.

**Alexander Koler** ('64) passed away on 15 January 2017 at the age of 76. While he was a student at UD, Alex worked for the Wright Patterson Air Force Base, where he conducted analysis for

the first moon walk. He earned an MS in mathematics from the University of Miami in 1966. He worked as a research mathematician and then as Energy Manager for Republic Steel. Alex then worked with Koler Financial Group, founded by him and his wife. Alex was a prominent and well-respected financial advisor, winning several awards in the profession. Alex was involved in many community activities, and was devoted to his wife and sons and grandchildren. Alex will be missed at the Biennial Alumni Seminar, which he often attended.

**Kathleen Scott Monaghan ('68)** passed away 21 November 2016. Kathy graduated from UD with Honors. She met and married Paul J. Monaghan (Engineering, '67) in her senior year at UD. Kathy and Paul lived in the Dayton area for many years. Kathy was certified as a Montessori teacher. Then Paul and Kathy founded PaKa Enterprises, a business development, management and consulting firm which has been operating for over 47 years. Kathy and her husband also created The Yellow Springs Baking Company. Kathy also worked as a certified personal trainer. Her class-mate, Barb Wulff ('68) remembers how high-spirited Kathy was. She was dedicated to her husband, and to her children and their families.

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Thank you to those of you who wrote in response to our request for news to include in this year's newsletter. We enjoy hearing about your lives and your families and your professional activities, whether you communicate this by email, or by a visit to us. We appreciate your continuing involvement with our department and with UD, and we are grateful for your continued support. We are happy to pass on to our current students advice or opportunities for internships or employment that you may offer them. (Feel free to send news or address updates to Vicki Withrow at [vwithrow1@udayton.edu](mailto:vwithrow1@udayton.edu).)

**Sandra Siwula Odorzynski ('71)** will retire in December 2017 with 40 years of faculty service in the Economics Department at St. Norbert College, De Pere, WI. Sandy earned her PhD in economics from Purdue University in 1976, and was the first female faculty member at St. Norbert College to achieve the rank of full professor (in 1997). She has very fond memories of being a math teaching assistant at UD, serving as Math Club president during 1970-71, and being taught by awesome UD math professors (now emeriti).

**Bill Miller ('73)** is now semi-retired from owning his own computer consulting business. He says, "It has been a great journey. The preparation and training I received at UD has proven to be invaluable. Both of my daughters are graduates of UD as is my wife. We are avid Flyer Basketball Fans and look forward to cheering them on to victory for years to come. GO FLYERS!"

**Jim Cutter ('75)** retired on June 30 after 26 ½ years of employment with the CARL Corporation in Denver, Colorado, most recently as a Data Base Administrator.

**Mike Hripko ('76)** Associate Vice-President for Research, Youngstown State University, served on the Ohio Defense Forum organized by Congressman Michael Turner during October 5-6, 2016 in Columbus, Ohio.

**Paul Judd ('82)** is an Associate Professor of Actuarial Science at Drake University in Des Moines, IA. Paul was selected as the recipient of the David B. Lawrence Outstanding Undergraduate Teacher Award for 2016-17.

**Brian S. Donahue ('85)**, MD, PhD is now full professor of Anesthesiology at Vanderbilt University Medical Center in Nashville, TN. He also reports that he has earned his Amateur Radio license (Extra class), and carries the call sign KM4LHG.

**Jeff Diller ('88)** started a three-year term in 2016 as the Chair of the Department of Mathematics at the University of Notre Dame. He says, "It was a sad occasion, but I was happy to see **Aparna** and Bill Higgins in May 2017 when they came for the funeral of my colleague (and Aparna's PhD advisor), Abraham Goetz."



**Mary (nee Kaczynski) Ollier ('89)** teaches at Carroll High School and brings many of her students to participate in our High School Mathematics Competition.

**Daniel D. Simon, Sr. ('91)** is retiring after 25 years as a public school educator (including the last 15 years in building/district administration) to move on to a new venture! He says, "I am the Executive Director and Founding Principal of College Achieve Greater Asbury Park Charter School, which opens in August of 2017." The school will begin with serving 250+ students in grades K, 1, 2, 5, and 6, and expand by two grade levels every year, becoming a full K-8 program in year three. In year four, they will open a high school with grade 9. They project a total K-9 enrollment of over 1,000 students. Dan adds, "I am the proud father of six, and now a grandparent too! I have been truly blessed, and it all started at UD !!!"

**Dawn Mumford (MAS '97)** has been teaching mathematics at Summit Academy Transition High School in recent years and she joined our adjunct faculty in August 2016.

**Geoff Dietz ('00)** and his wife Amber (BS, Biochemistry, '00) announce the birth of Matthias Dietz, who was born in mid-November of 2016, weighing "a whopping 9 lbs." Geoff says that the family has maxed out the seating in their Honda Pilot. He reports that, up until September 2016, the children's ages formed a pattern of 2, 4, 6, 8, 10. Geoff has been promoted to the rank of Professor (effective August 2017).

**Stephen Abrams ('03)** earned an MA in mathematics from IU – Bloomington in 2006, and an MS in Computer Science from University of Missouri-Saint Louis in 2009. He is back in his hometown of Louisville, with his wife (Elisabeth [Wieser] – also a UD graduate – BA '02, MA '03 in English) and sons, Max (7) and Jack (5). Stephen works as an applications consultant for Humana doing data and content analytics since 2012. Stephen says, "In 2016, I helped oversee the grand opening of a downtown location for our non-profit, Louisville Makes Games, aimed at furthering the video game creation industry in my hometown, Louisville, KY. I'm a board member and head of the education committee, focusing on outreach to local children. We are offering a summer curriculum with a grant from Humana Foundation."

**Matt Keck ('06)** completed an MBA at The Ohio State University, and was promoted to Director of IT Architecture at Nationwide Insurance in May 2017. He married Whitney Keck in April 2011.

[Back to TOC](#)

**David Prier ('06)** was awarded tenure at Gannon University in 2016 following promotion to the rank of Associate Professor in 2015. David and his wife, Maria, welcomed their third child on July 4th, 2016. Daniel joined Andrew (5 years) and Hannah (2 years). David is active in the Allegheny Mountain Section of the Mathematical Association of America. He continues to enjoy mentoring students in undergraduate research.

**Jeff Neugebauer ('06 and MAS '08)** was granted tenure at Eastern Kentucky University, effective August 2017.

**Elham Negahdary (MFM '10)** earned her Ph.D. from the University of Calgary in Financial Math in 2016. Elham reports that she is a Research Analyst in a commodity trading company called Castleton Commodities International. Her department trades mainly in NYMEX natural gas. She does fundamental modelling of US natural gas supply and demand, in addition to developing trading strategies. She builds tools for risk analysis of NYMEX calendar spreads and spread on spread and studies their relationships to gas storage levels. She says her edge is knowledge of the concepts and techniques in financial mathematics, as well as programming skills.

**Charlie Suer ('10)** will be teaching mathematics at Highlands Latin School in Louisville, KY. He and his wife, Erin, are excited to be moving back to Louisville.

**Craig Birkemeier (MAS '11)** teaches mathematics at Sinclair Community College in Dayton. He has earned promotion to Associate Professor (effective August 2016) and will be tenured in August 2017.

**Jialin (Jolene) Zhao (MFM '11)**, earned a Ph.D. in Management Science (Finance Concentration) in May 2017 from Illinois Institute of Technology, Chicago, Illinois. She will start a tenure-track position at St. Mary's University at San Antonio in the fall of 2017.

**Rob Deis (MFM '13)** continues to live and work as a risk analyst in Houston. He recently left his position at Kock Industries to join Vitol Inc, a global trading company.

**Zachary Hadaway ('13)** graduated from the University of Chicago in March 2017 with an MS in Financial Mathematics. He will begin working towards a PhD degree in Economics at the University of Alabama this fall.

**Sindhura Sakkara (MFM '13)** entered the new Online Masters in Computer Science program at Georgia Institute of Technology in August 2016.

**Pei Zhang (MFM '14)** recently accepted a position with Amazon and has relocated from Indiana to Seattle.

**Samerah AlMosa (MAS '15)** published her mathematics clinic work (with Paul Eloë) Upper and lower solution method for boundary value problems at resonance, Electron. J. Qual. Theory Differ. Equ, No. 40 1—13.

[Back to TOC](#)

**Aparna Higgins** edited this newsletter. She thanks all those who responded to her call for news. Thanks also go to **Vicki Withrow**, our department's Senior Administrative Assistant, whose cheerful help in gathering and checking various data helped with the compilation of the newsletter. Aparna takes all blame for errors in the newsletter – please write to her [ahiggins1@udayton.edu](mailto:ahiggins1@udayton.edu) with corrections. Please write to Vicki at [vwithrow1@udayton.edu](mailto:vwithrow1@udayton.edu) to alert us to changes in your contact information, or to alert us to alums who you believe are not on our mailing list.