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Math Department Newsletter, 2016

University of Dayton. Department of Mathematics

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CHAIRPERSON'S MESSAGE

This is my last message for the Mathematics Newsletter as Chair. My term will end on June 30, and on July 1 the Department will be in the very capable hands of Dr. Wiebke Diestelkamp. It has been a pleasure and a privilege to serve this Department as Chair. The fact that we have a very good department with excellent faculty members has made the job much easier than it otherwise could have been. I am very thankful that God has blessed us with such a faculty.

We have continued to hire. Next fall we will be joined by Dr. Andrés Lorrain-Hubach. Dr. Lorrain-Hubach studies infinite-dimensional geometry with applications in gauge theory. He comes to us from the University of Arizona where he was on an NSF Alliance post-doctoral position. We are excited to have Dr. Lorrain-Hubach join UD.

Our faculty members continue to be very active in research, as you can see by the faculty activities section of this newsletter. I am pleased to relay that Dr. Alan Veliz-Cuba won a grant from the Mathematical Biosciences Institute at the Ohio State University and will join them for the spring semester of 2017 to participate in some of the research undertaken by the institute. He is also the latest recipient of the Dr. Kenneth Schraut Faculty Research Award.

In the summer of 2017, our Department will host the 32nd Summer Conference on Topology and its Applications. This is an international conference with attendance around 250 held every summer in various locations. This summer it is in Leicester, England. Dr. Lynne Yengulalp and I are the organizers of the 32nd conference.

We say goodbye to Les Steinlage as a lecturer for our Department. He has been a stalwart for our classes for business majors. He is really irreplaceable in this capacity. He will continue to teach as an adjunct, so we are fortunate to have him around for a while longer, even if it is on a part-time basis.

Congratulations to Dr. Ruihua Liu on his promotion to Professor. We appreciate all his hard work on the Master of Financial Mathematics and his other contributions to the Department.

Finally, I want to say how much I appreciate the support that you, the alumni, have given to our Department. We thank you for your generosity, of course, but we also appreciate the way that you keep in touch and let us know what is going on. We enjoy hearing from you and visiting with you when you have the opportunity. God bless each one of you.

Joe Mashburn

THANKS!

Thank you again for your generous support. We deeply appreciate your generosity. We purposefully use these resources to support the educational mission at UD. As you read through the undergraduate and graduate activities sections, you can read about the activities you have supported this past year. You have helped support Math Events, Integration Bee, the High School Mathematics Competition, and undergraduate and graduate student travel. Thank you.

The University Development Office reports that the following people made valuable donations to the Department of Mathematics during 2015:

Dr. Stephen L. Adams (73) Mr. Stephen (83) & Mrs Cheryl Bergeon (83)
Drs. Tom (91) & Jennifer Bohman Ms. Marcia J. Boyle ('74) & Mr. David Bryan
Mr. & Mrs. David E. Brown ('65) Dr. & Mrs. Robert E. Buck, Jr. ('69)
Dr. & Mrs. Gregory Campbell (70) Mr. & Dr. Joseph Chmiel (69)
Mr. and Mrs. Kennon Copeland (75)
Dr. & Mrs. Rafe M. Donahue ('87) Dr. and Mrs. Paul Eloë (84)
Dr. Colleen Gallagher Hoover ('91) and Mr. Michael A. Hoover
Mr. and Mrs. Donald Kavalunas (65)
Ms. Kathleen M. Kern ('79) & Mr. Patrick J. MacVeigh ('79)
Mr. & Mrs. Alexander I. Koler ('64)
Mr. Anthony T. McGowan ('64) Mr. & Mrs. George G. Morrison III ('82)
Dr. Charles F. Mott (61) and Ms. Alicia Fernandez-Mott
Dr. Jane Pendergast (74) and Dr. Mark Hale
Mr. Timothy Rice & Ms. Angela Jacobs (88)
Dr. and Mrs. Thomas Santner (69, 69)
Mr. Kevin Thomas (76) Dr. Susan Miller Thompson (81)
Drs. Christopher A. Wagner ('71) & Christine M. Mitchell ('72)
Mr. & Mrs. Leslie J. Winters (55) Mr. & Mrs. Donald R. Wojciechowski ('72)

The following corporations and foundations provided matching gifts:

AON Foundation IBM Foundation
Fidelity Charitable Gift Fund Network for Good Towers Perrin Co.

Recently 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. William Cash (65) Dr. & Mrs. Richard J. Fox ('63)
Mr. Richard L. Iannarino ('71) & Mrs. Leslie Kirchmer Iannarino ('72)
Dr. C. Eugene Steuerle ('68)
Mr. James T. Wiggenghorn ('70) & Dr. Joan Kilsheimer Wiggenghorn ('70)

The following corporation provided matching gifts:

Network for Good

This past year, three students received scholarship support through the **Kenneth C. Schraut, Ph.D., Memorial Scholarship**. These students are:

Natalie Babbitt

Nicole Behler

Adam Volk

Recently, the endowed **Arnold & Rose Schoen Scholarship** was established and the following student received support this past year:

Anna Petrick

The **William and Barbara Scharf Undergraduate Mathematics Scholarship** has recently been established and we anticipate in next year's letter that we shall announce the first student recipient.

The **Schraut Research Award**, endowed through the generosity of **Marilyn (76) (Schraut)** and Frank Szorc in memory of her father, Kenneth C. Schraut, supports the research agenda of individual faculty members from the Department of Mathematics. **Alan Veliz-Cuba** is the recipient of this year's award; the resources will be available to him next year. Dr. Veliz-Cuba, an active researcher in mathematical biology, plans to use these resources to support student travel to a mathematical biology conference.

MATH EVENTS AT UD

Through generous contributions to the **Kenneth C. Schraut Memorial Lectureship** fund and to the department's restricted funds, our alumni have enabled us to host the annual *Math Events* which features the Kenneth C. Schraut Memorial Lecture. Since 2002, the Schraut Lecture has anchored *Math Events* annually.

THE 16th ANNUAL KENNETH C. SCHRAUT MEMORIAL LECTURE, 11/7/2015

Dr. Chikako Mese (91), Professor in the Department of Mathematics, Johns Hopkins University, delivered the 16th annual Kenneth C. Schraut Memorial Lecture to a diverse audience consisting of high school students, undergraduate and graduate students, and

faculty members. **Matthew DeVilbiss (16)**, president of Pi Mu Epsilon, welcomed the audience and introduced Dr. Mese.

Chikako earned a B.S. degree from UD in 1991, majoring in mathematics. She then earned a Ph.D. in mathematics from Stanford University. She actually wrote her undergraduate Honors thesis under **John Erdei**, Department of Physics; John attended the Schraut lecture adding to Chikako's day to reminisce.

Chikako delivered a broad and excellent lecture on Riemannian Geometry with the following abstract: Riemannian Geometry studies the geometry of curved spaces. It originated with the ideas of Bernhard Riemann in the 19th century extending Gaussian geometry, or the study of geometry of curves and surfaces contained in 3 dimensional Euclidean space. Riemann's revolutionary idea that curved spaces could be understood in higher dimensions altered the course of mathematics, and with it, of science and our view about our universe. In this talk, we introduce fundamental concepts in Riemannian Geometry. We discuss the notion of curvature and how it affects the geometry of a space and examine some important research in the field.

UNDERGRADUATE MATHEMATICS DAY November 7, 2015

The Schraut Memorial Lecture once again anchored Undergraduate Mathematics Day (UMD). This is now the seventh such undergraduate mathematics conference hosted at UD.

Dr. Daniel Roberts (07) delivered an invited address. Dan earned his BS at UD in 2007, majoring in mathematics and computer science. He earned a Ph.D. degree in mathematics from Auburn University and he is currently on the faculty at Illinois Wesleyan University. Dan was introduced by **Adam Volk (16)**, president of the Math Club.

Dan addressed the audience on "The Graph Theory Origin Story" with the following abstract: Many research questions in pure mathematics arise from considerations of real world problems. Part of the job of a mathematician is to ask this type of question. In this talk we will examine the surprising origins of a few questions from the field of graph theory. These examples will provide some insight into how mathematicians meaningfully guide problems from the concrete to the abstract.

University of Dayton students giving fifteen minute contributed talks were:

Samerah Al Mosa "Monotone methods for boundary value problems at resonance"

Sami Alofei "Quasilinearization for boundary value problems for ordinary differential equations"

Adam Volk "Extensions of t-designs"

Matthew Devibiss "On the Hadwiger-Nelson Problem"

AN INVITATION TO THE 27th BIENNIAL ALUMNI SEMINAR ON CAREERS IN MATHEMATICS, 11/12/2016

You are invited to participate in *Math Events 2016*, which will take place on Saturday, November 12, 2016. This year's program will consist of the 17th Annual Kenneth C. Schraut Lecture and the 27th Biennial Alumni Seminar on Careers in Mathematics. We are pleased to announce that **Dr. David Diller (90)** has graciously accepted the invitation to serve as the 17th Kenneth C. Schraut Memorial Lecturer; David has a long standing career in pharmaceuticals and undoubtedly, he will also be asked to serve as a panelist on this year's Career Panel.

Paul Eloë is organizing this year's career seminar. Currently, there is no further information. Information will start getting out in August or September. The department's web page has moved; you will be able to obtain the information at

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

In the meantime, if you have interest to serve on this year's Career Panel, please feel free to contact Paul Eloë at peloe1@udayton.edu.

RETIREMENTS

Robert Gorton: Bob Gorton joined the Department of Mathematics in August, 1969. He completed his Ph.D. at the Illinois Institute of Technology in January, 1970, based on a dissertation entitled *Trigonometry in the Finite Affine Plane*. His research interests have always lain in the interaction of geometry and algebra. Besides publishing several journal articles in this area, he also regularly reviewed papers for the Mathematical Reviews. His colleagues knew and valued him as a knowledgeable and productive mathematician. He was promoted to Associate Professor in 1974 and was granted tenure in 1975. During his time at the University of Dayton he has consistently been respected and appreciated by his students, referring to him fondly as Flash. He gave many readings courses to students, especially in Galois Theory, was innovative in his approaches to teaching, and worked with colleagues in these innovations. One example of this innovative work was his development of a self-paced course for MTH 204. This endeavor was supported by the Fund for Educational Development. Two of his readings courses, number theory and set theory, became permanent courses which run on a regular basis. He was a popular teacher among the students who enjoy studying mathematics. Bob will be missed by those of us in the Mathematics Department.

Lester Steinlage (65, 69): In August of 1961, Les followed in his brother **Ralph's** footsteps and enrolled at the University of Dayton, majoring in mathematics; he has been on campus ever since. His teaching career began in September 1965; he spent two years teaching mathematics and electronics at Minster High School in Minster, Ohio and then joined the faculty at Chaminade High School in Dayton in the fall of 1967. Upon completing a master's degree in mathematics at UD, he was invited by Ed Merrinan of the School of Business Administration to teach Finite Mathematics and Business Calculus. His day job continued to be high school teaching and he joined the Oakwood

High School faculty in 1972. He retired from the Oakwood School System in 1995 where he has since been inducted into Oakwood's Sam Andrews Educational Hall of Honor. Throughout, he continued serving as an adjunct faculty member in the School of Business Administration and later, the Department of Mathematics. In the fall term of 2000, Les was hired to teach full-time as a lecturer and he has been teaching full-time at UD through the spring term of 2016. In 2011, Les was deservedly awarded the College of Arts and Sciences Award for Outstanding Contribution by a Full-Time Non-Tenure Track Faculty Member. To date, the combined service time for the **Steinlage** brothers at UD is a staggering 82 years; it is still counting as Les plans to continue his teaching at the University of Dayton as an adjunct faculty member.

TRANSITION IN DEPARTMENTAL LEADERSHIP

Joe Mashburn will conclude his eight year two-term tenure as Chair of the Department of Mathematics on June 30, 2016. **Wiebke Diestelkamp** will assume the role of Chair on July 1, 2016. We take this opportunity to thank Joe for his outstanding commitment to the students and to the University, and for his quiet leadership. Joe led the searches for **Jonathan Brown, Catherine Kublik, Dan Ren, Alan Veliz-Cuba, and Andres Larrain-Hubach**, who will join us this fall. Two of these hires represent new faculty lines and so, the department continues to grow. Joe also took the initiative to add two more full-time lecturer positions and led searches for **William Harrison** and **Julie Simon**. Joe's initiatives include formalizing departmental process with departmental documents on tenure and promotion and on workload. He has also led the conversation to revise the vision of the department which comes at an opportune time due to growing student bodies at both the undergraduate and the graduate levels, significant changes in the delivery of general education at the University of Dayton, and the impact of the digital age on both the curriculum and the collective professional expertise of incoming faculty members. Joe will return to the faculty this fall with a full teaching load. He will take a well-deserved sabbatical leave of absence in the spring term of 2017. Joe, thank you very much for your valuable contributions as Chair of this department.

FACULTY UPDATE

Full Time Faculty

Atif Abueida, 2000
Jonathan Brown, 2014
Art Busch, 2006
Wiebke Diestelkamp, 1998
Shannon Driskell, 2003
Paul Eloë, 1980
William Harrison, 2009
Aparna Higgins, 1984

Peter Hovey, 2001
Muhammad Islam, 1985
Becky Krakowski, 2000
Catherine Kublik, 2013
Ruihua Liu, 2004
Joe Mashburn, 1981
Shirley Ober, 1977
Maher Qumsiyeh, 2008

Youssef Raffoul, 1999
Dan Ren, 2013
Paula Saintignon, 1983
Julie Simon, 2009
Les Steinlage, 1969
Muhammad Usman, 2007
Alan Veliz-Cuba, 2015
Lynne Yengulalp, 2009

Adjunct Faculty

Lisa Alexander, 2010	Roger Erich, 2014	John Loomis, 2007
Robert Bennington, 2013	Robert Finnegan, 1985	Scott Mitter, 2001
Michael Braginsky, 2015	Bob Flavin, 2008	Eileen Nolan, 2012
Matt Brenneman, 2012	Steve Fuchs, 2005	Donovan Ross, 2008
Steve Buerschen, 2014	Mark Hoffman, 2014	Larry Schmitt, 2011
Brett Bush, 2011	Susan Holloway, 2011	Michael Stuebner, 2014
Karen Connair, 2010	Sandra Johnson, 2014	Ed Wingham, 2011
James Cordiero, 2015	Fred Kingrey, 2013	Sam Wright, 2011
Mark de Saint-Rat, 2011	Vickey Lackey, 2012	Yine Xue, 2015
	Chris Lammlein, 2015	

Professors Emeriti

Bill Friel, 1999	Jack McCloskey, 2001	Ben Rice, 1998
Tom Gantner, 2001	Harry Mushenheim, 2006	Carroll Schleppe, 2001
Bob Gorton, 2015	Jerry Neff, 1999	Ralph Steinlage, 2001
John Kauflin, 2006	Richard Peterson, 1998	Gerry Shaughnessy 2012
		Jerry Strange, 1999

FACULTY ACTIVITIES

Jonathan Brown wrote or co-authored several articles including “The socle and semisimplicity of a Kumjian-Pask algebra,” *Communications in Algebra*, 43(7), (2015) 18, (with L. Clark and A. Sierakowski) “Purely infinite C^* -algebras associated to étale groupoids,” *Ergodic Theory and Dynamical Systems*, 35(8), (2015), 14, (with G. Goelhe and D. Williams) “Groupoid equivalence and the iterated crossed product,” *Houston Journal of Mathematics*, 41(1), (2015), 14 and (with J. Hirschberg) “The Rohklin property for endomorphisms,” *Illinois Journal of Mathematics*, 58(3), (2015), 7. This past summer, Jon lectured at the Universidade Federal de Santa Catarina in Florianópolis, Brazil and at the University of Otago in Dunedin, New Zealand. He also delivered colloquia closer to home at Miami University and the University of Cincinnati.

Wiebke Diestelkamp co-authored an article published in the *Journal of Applied Biomechanics* (Taylor, M.R., Sutton, E.E., Diestelkamp, W.S., and Bigelow, K.E. “Subtle differences during posturography testing can influence postural sway results: The effects of talking, time prior to data acquisition, and visual fixation.” *J Appl Biomech*; 31(5):324-329, Oct 2015). She continued work as a statistical consultant on the continuing NSF grant “Roles and regulation of aqua/glyceroporins in a freeze tolerant amphibian” (PIs Dan Goldstein, Wright State University, and Carissa Krane, University of Dayton). After serving more than six years as an Equity Advisor for the College of Arts & Sciences, her service in this capacity ended at the end of 2015. Wiebke remains active in the MAA. She was appointed to the MAA Committee on Sections, and she is serving as a mentor for a new faculty in mathematics through the MAA’s Early Career Mentoring Network. Wiebke is also serving on the Association for Women in Mathematics (AWM) Selection Committee for the NSF-AWM Mentoring Travel Grant

Program. Wiebke is the chair-designate for the Department of Mathematics. Her term will start in July 2016.

Shannon Driskell continues her collaborations and co-authored (with R. N. Ronau, C.R. Rakes, S.B. Bush, M.L. Niess, and D.K. Pugalee) “The quality of mathematics education technology literature,” *Journal of MultiDisciplinary Evaluation*, (2015) and (with S.B. Bush, R.N. Ronau, M. L. Niess, D.K. Pugalee, C.R. Rakes, “Research in mathematics educational technology: Trends in professional development over 40 years of research,” in Bartell, T. G., Bieda, K. N., Putnam, R. T., Bradfield, K., Dominguez, H. (Eds.), East Lansing, MI/Michigan State University: Proceedings of the thirty-seventh annual meeting of the North American chapter of the international group for the psychology of mathematics education (2015). She also co-authored a book chapter (with S.B. Bush, M.L. Niess, K.K. Pugall, C.R. Rakes and R.N. Ronau) “The impact of digital technologies in mathematics pre-service teacher preparation over four decades” in *Handbook of Research on Teacher Education in the Digital Age* (M.L. Niess and H. Gillow-Wiles, Eds.), Hershey, PA: IGI Global.

Paul Eloë co-authored several articles including (with **Zi Ouyang (14)**) “Multi-term linear fractional nabla difference equations with constant coefficients,” *International Journal of Difference Equations* 10(1) (2015), 91—106, (with Jeffrey Lyons and **Jeffrey Neugebauer (06,08)**) “An ordering on Green’s functions for a family of two-point boundary value problems for fractional differential equations,” *Commun. Appl. Anal.*, 19 (2015), 453—462, (with **Alaa Almansour (15)**) “Fixed points and solutions of boundary value problems at resonance,” *Annales Polonici Mathematici*, 115 (3) (2015), 263—274 and (with F. Atici) “Linear forward fractional difference equations,” *Commun. Appl. Anal.*, 19 (2015), 31--42. He also served as guest co-editor (with Jeffrey Lyons and **Jeffrey Neugebauer (06,08)**) of Volume 19 (2015) of the journal *Communications in Applied Analysis*, which is a tribute to the many achievements of Paul’s longtime collaborator, Johnny Henderson.

Aparna Higgins spent the first part of 2015 in Ohio, and the latter part of 2015 on sabbatical in California. Aparna gave invited mathematical addresses at the EPADEL (Eastern Pennsylvania and Delaware) Section of the MAA on Pi Day (on “Sequences of Polygons”), at a Pi Mu Epsilon meeting at Santa Clara University, CA, in November (on “Demonic Graphs and Undergraduate Research”), and at the departmental seminar at her sabbatical institution, California Lutheran University (on “Sequences of Polygons”). She also presented her Project NExT course on directing undergraduate research during MathFest in Washington, DC. Her most exciting speaking adventure in the fall was an invited address to BAMA (Bay Area Mathematical Adventures), a Math Circle held at San Jose State University, on pebbling and military strategy. The audience comprised of pre-college students (many of whom were as young as the 7th grade!) and their parents, with the students eagerly jumping out of their seats to answer Aparna’s questions. At UD, and along with **Lynne Yengulalp**, Aparna conducted intensive (and very enjoyable) weekly review sessions for the GRE Mathematics Subject Test for three rising seniors who took the test in the fall. Aparna and Bill Higgins are sharing a teaching position at California Lutheran University (CLU), a small liberal arts college in southern California.

Each is teaching one semester so that the other semester can be dedicated entirely to scholarly activities. Aparna has enjoyed her new colleagues very much, learning much from them in terms of teaching styles, and mentoring and nurturing mathematics majors. In addition to learning about a new topic in graph theory and working on a research problem with a group of faculty, Aparna was an active participant in the Thousand Oaks Mathematics Teachers' Circle, helped with the Putnam Competition preparation seminar each week, and made extended visits to two calculus courses that were being conducted via inquiry-based learning. Aparna and her husband were in charge of organizing the departmental (monthly) seminar for the undergraduates interested in mathematics. Aparna was a member of the MAA Invited Addresses Committee for MathFest 2016, and hosted a discussion table on matters of interest to members of the Association for Women in Mathematics at the fall meeting of the SoCal-Nevada Section of the MAA. An interview of Aparna by Ken Ross, former President and Secretary of the MAA, appeared in the Dec2015/Jan2016 issue of FOCUS, the newsletter of the MAA. The interview had been conducted as part of the work of the history subcommittee of the MAA centennial committee. The interview can be found online, pages 18-21, at http://www.maa.org/sites/default/files/pdf/MAAFocus/FOCUS_December2015_January2016.pdf

Muhammad Islam published two articles: Asymptotically stable solutions of a system of nonlinear differential equations, in *Dynamics of Continuous, Discrete, and Impulsive Systems, Series A: Mathematical Analysis*, 22 (2015) 303-312, and Bounded, asymptotically stable, and L^1 solutions of Caputo fractional differential equations, in *Opuscula Mathematica*, 35 (2015) 181-190. Also, Islam co-authored an editorial entitled "Qualitative Theory of Functional Differential and Integral Equations," published in *Abstract and Applied Analysis*, Vol. 2015, Article ID 515162. This past year, he delivered several invited lectures, "Asymptotic periodic solutions of Volterra integral equations" at the AMS Sectional meeting, University of Memphis, TN, "Periodic solutions of Volterra type equations on non-periodic time scales" at the 7th International Conference on Dynamical Systems and Applications, Morehouse College, Atlanta, GA, "Asymptotically stable solutions in Differential Equations" at The 9th International Conference on Differential Equations and Dynamical Systems, Texas A&M University Commerce, Dallas, TX, "Lipschitz condition, uniqueness, and stability of differential equations" at Eastern Kentucky University, Kentucky, KY, "On Qualitative Analysis of Functional Equations" at Izmir Economic University, Turkey. Islam spent a part of his sabbatical leave in Izmir, Turkey, and collaborated with Professor Murat Adivar of Izmir Economic University.

Catherine Kublik obtained a University of Dayton Research Council Seed Grant for the summer 2015 for the project "Improvement of an implicit boundary integral algorithm for interfaces with singularities." She lectured at the Third Annual Women in Mathematics Symposium at Dominican University in March 2015, and she delivered an invited mini-symposium talk at the SIAM conference on the Analysis of Partial Differential Equations in Scottsdale, AZ in December 2015. Catherine, recipient of the Schraut Research award for 2015, invited Richard Vasques, of the University of California, Berkeley, to campus to collaborate and visit with faculty and students.

Ruihua Liu continues his research and published (with M. Yousuf and A. Khaliq) “Pricing American options under multi-state regime switching with an efficient L-stable method,” *International Journal of Computer Mathematics*, 92(12), 2015, 2530-2550 and “Optimal stopping of switching diffusions with state dependent switching rates,” *Stochastics: An International Journal of Probability and Stochastic Processes*, www.tandfonline.com/loi/gssr20 (2015), 20 pages. This past summer, Ruihua lectured in the school of mathematical science at Beijing Normal University and in the Business School and the College of Computer and Control Engineering at Nankai University.

Youssef Raffoul continues his busy research agenda with publications including (with **Shahah Almutairi (14)** and M. Almutairi) “Exponential stability and instability in multiple delays difference equations,” *Khayyam J. Mathematics*, 1(2), (2015), 14, (with G. Eid) “Qualitative analysis of stochastic systems of nonlinear functional differential equations,” *Functional Differential Equations*, 22(1-2), (2015), 25-40, (with G. Eid and B. Ghalayani) “Lyapunov functionals and stability in nonlinear finite delay,” *International Journal of Difference Equations*, 10(1), (2015), 77-90, “Periodic solutions of almost linear Volterra integro-dynamic equation on periodic time scales,” *Canadian Mathematical Bulletin*, 58, (2015), 174-181, (with M. Unal) “Boundedness, Periodic Solutions and Stability in Neutral Functional Delay Equations With Application To Bernoulli Type Differential Equations,” *Communications in Applied Analysis*, 9, (2015), 149–162, and (with M. Unal) “Stability in Delay Dynamic Equations by Fixed Point Theory: Linear Case,” *International Journal of Mathematica and Computations*, 26(4), (2015), 13. Last summer, Youssef lectured at Notre Dame University in Beirut, Lebanon.

Muhammad Usman won the SOCHE (Southwestern Ohio Council for Higher Education) Faculty Excellence Award. He delivered several invited talks in 2015 including a colloquium presentation at Wright State University, an invited lecture at an International Symposium on Biomathematics and ecology: Education and Research (BEER 2015) at Illinois State University and an invited lecture at a Special Session of the American mathematical Society in Memphis. Usman delivered a national workshop on computational methods in engineering and finance, sponsored by the Government of Pakistan at the University of Gujrat, Pakistan.

Alan Veliz-Cuba co-authored (with B. Aguilar and R. Laubenbacher) “Dimension reduction of large sparse AND-NOT network models,” *Electronic Notes in Theoretical Computer Science*, 316 (2015), 83-95, (with A. Hirning, A. Atanas, F. Hussain, F. Vancia, K. Josic, and M. Bennett), “Measuring intrinsic and extrinsic noise in a synthetic gene oscillator,” *PLOS Computational Biology*, 11 (2015), 1-23, and (with H. Shouval, K. Josic, and Z. Kilpatrick) “Networks that learn the precise timing of event sequences,” *Journal of Computational Neuroscience*, 39 (3) (2015), 235-254. He also co-authored a book chapter (with D. Murrugarra) “Steady State Analysis of Boolean Models: A Dimension Reduction Approach,” in Robeva, R. (Ed.), *Algebraic and Discrete Mathematical Methods for Modern Biology*. Cambridge, Massachusetts. His research was mentioned in the expository article, “Mathematical Biology is Good for Mathematics” by Michael C. Reed, *Notices of the AMS*. 62(10) (2015): 1172-1176, where the author

argues that the recent work of mathematicians in biologically motivated problems is producing new questions for core mathematics. Alan brings to the department his experience working with undergraduate students in REU programs and he has begun his work here with undergraduate students, **Lauren Geiser** and **Zeyu Wang**.

Lynne Yengulalp co-authored (with W. Fleissner) "From subcompact to domain representable," *Topology and its Applications*, 195 (2015), 174–195. Lynne delivered an invited semi-plenary lecture at the 30th Summer Conference on Topology and its Applications, June 23-26, 2015 in Galway, Ireland. The title of the lecture was "Strategies in topological games and completeness properties."

PHI BETA KAPPA INDUCTION

The Phi Beta Kappa Chapter of the University of Notre Dame considered **Aparna Higgins** for alumna membership in the society. She was granted this great honor based on her record of student engagement, teaching, and scholarly achievement. She was also invited to deliver the address at the Phi Beta Kappa Initiation Ceremony at the University of Notre Dame over graduation weekend in 2015. She spoke on "Liberal Arts Tools to build structure and community." She and her husband, Bill enjoyed the celebration with their younger son, Vijay, who graduated with a B.S. in mathematics from the University of Notre Dame (from which Aparna and her husband earned their Ph.D. degrees); Vijay has decided to continue graduate studies in mathematics. Aparna was delighted that her Ph.D. advisor, Prof. Abraham Goetz, attended the ceremony and her talk, and that **Jeff Diller (88)**, who is Professor in the Department of Mathematics at Notre Dame, introduced her. Jeff was a first-year student at UD the year that Aparna joined the UD faculty. She taught Jeff in a few classes and directed his Honors thesis and has stayed in touch with him over the years. They now consult with each other on many issues of undergraduate mathematics as peers and friends. At a luncheon at Notre Dame for science students graduating with Honors, Aparna and her family found themselves seated at the same table as **Sean (84) and Janet Loch Donahue (BIO)**, whose son was graduating with a degree in biology. Fond memories of UD emerged, along with cheering the accomplishments of the graduates.

ACTIVITIES OF UNDERGRADUATE STUDENTS

The **Math Club** and **Pi Mu Epsilon Chapter** of the University of Dayton were very active this year. The officers were **Adam Volk** (Math Club President), **Matthew DeVilbis** (PME President), **Megan Brown** (Vice-President), **Luke Bugada** (Secretary) and **Katie Posey** (Treasurer). **Catherine Kublik** served as the faculty advisor for Math Club and **Lynne Yengulalp** served as faculty advisor for Pi Mu Epsilon.

Elections for officers for 2016-17 resulted in **Katie Posey** being elected President of the Math Club, **Peter Kawiecki** elected as PME President, **Amelia Pompilio** elected as Vice-President, **David Gross** elected as Treasurer, and **Mitchell Shimko** as Secretary.

Math Club continues to organize the high school mathematics contest and hosted the **20th annual High School Mathematics Contest**, a tradition initiated by **Andrew Hetzel (98)**

when he served as Math Club President. This year, the competing teams came from three local schools, Alter High School, Carroll High School and Stivers High School. Keeping with tradition, **Arthur Busch** spoke to the contestants over lunch about graph coloring problems.

The annual **William Lowell Putnam Competition** was held on the first Saturday of December. The participating students were:

Matthew DeVilbiss	Danny Fleming	Kaitlyn Jones
Tyler Masthay	Kathryn Posey	Michael Simpson
Jamie Stanton	Katie Stephen	Adam Volk
Zeyu Wang		

This year, two groups of students were inducted into **Pi Mu Epsilon**, the national mathematics honorary society. In the fall term the inductees were:

Kaitlyn Burke	Matthew Forte	William Gross
Kaitlyn Jones	Kathryn Posey	Thomas Weckesser
Kathleen Weston		

And in the spring term the inductees were:

Peter Kawiecki	Kevin McElroy	Dayne Nussman
Noah Sheppard	Mitchell Shimko	

The formal induction ceremony for Pi Mu Epsilon was conducted on Thursday April 21, 2016. The ceremony was quite nice this year. It included a banquet dinner and a presentation by **Lynne Yengulalp** who spoke on “A Topological Proof to the Fundamental Theorem of Algebra.”

During the summer of 2015, **Matt DeVilbiss** enjoyed several outstanding experiences. He participated in a three week Logic Summer School at UCLA, he attended the 2015 Southern African Mathematical Sciences Association (SAMSA) Conference in Namibia and he attended the 27th European Summer School in Logic, Language and Information in Barcelona.

During the summer of 2016, **Tyler Masthay**, through the University of Dayton Honors Program, will study at the University of Oxford in Oxford’s Global Scholar Experience program.

THE STANDER SYMPOSIUM

The **Stander Symposium** is a very special event at UD. Activities related to the Symposium were spread across several days. The Integration Bee and the poster sessions were held on Wednesday April 20. Student presenters this year included:

- **Ahlam Abid**, (advisor, **Maher Qumsiyeh**), Predicting the Price of a Used Car
- **Andrew Albers** and **James Lenard**, (advisor, **Muhammad Usman**), Meteors Get Meatier with Mathematics
- **Amal Alsomali** and **Rabab Alzahrani**, (advisor, **Maher Qumsiyeh**), Best Model for Forecasting Future Sales of Company X
- **Thomas Benton** and **Charles Brookshire**, (advisor, **Muhammad Usman**), Let's Get Graphical: Understanding Differential equations with Random Initial Values
- **Marlys Bridgham** and **Matthew Schmidt**, (advisor, **Muhammad Usman**), It's Presence Poisons Our Bodies: A Mathematical Study of Lead in Living Tissues
- **Benjamin Buchwald** and **Daniel Mizdrak**, (advisor, **Muhammad Usman**), Math Doesn't Need Rain to Grow but Banded Vegetation in Semi-Arid Environment Do
- **Taylor Curtis** and **Conor Pausche**, (advisor, **Muhammad Usman**), Mathematical Telescope for Star Formation in the Galaxy
- **Robert Detorres** and **Vignesh Krishnaraja**, (advisor, **Muhammad Usman**), Measles Epidemic, the Next Big Thing?
- **Matthew DeVilbiss**, (advisor, **Lynne Yengulalp**), Domains and Topological Completeness
- **David Fink** and **Theodore Stitzel**, (advisor, **Muhammad Usman**), The Walking Dead: Don't Run, Use Math!
- **James Gallagher** and **Claire Shannon**, (advisor, **Muhammad Usman**), Zombie Mathpocalypse
- **Allison Gaines** and **Alexis Wingfield**, (advisor, **Muhammad Usman**), A Mathematical Model to Quit Smoking
- **Dalton Gannon** and **Kelli Renee Marquardt**, (advisor, **Maher Qumsiyeh**), University of Dayton Crime Forecasts
- **Benjamin Hansen** and **Christopher O'Brien**, (advisor, **Muhammad Usman**), Numerical Techniques to Study Transmission Dynamics of Zika Virus
- **Samuel Jacobi** and **Michael Molchan**, (advisor, **Muhammad Usman**), Nonlinear Duffing Systems May Be Chaotic, but Math Definitely Isn't
- **David Kreinar** and **Belal Yoldash**, (advisor, **Muhammad Usman**), Mathematical Models of Dumping Atomic Waste Drums
- **Thomas Krokey** and **Stephanie Townsend**, (advisor, **Muhammad Usman**), Type 1 + Type 1 = Type 2
- **Daniel Lenz** and **Dakota Waller**, (advisor, **Muhammad Usman**), Global Worming: A Mathematical Model of the Spread of Computer Worm Attacks

- **Yuhang Lin** and **Xinkai Ma**, (advisor, **Muhammad Usman**), The Model of How Persistent Viruses Resist the Immune System
- **Derek McGrew** and **Keegan McCafferty**, (advisor, **Muhammad Usman**), Mathematical Study of Ebola Outbreak in Western Africa
- **Marina Li Mancuso** (advisor, **Muhammad Usman**), A Mathematical Model for Alcoholism Epidemic
- **Owen Miller** and **Dylan Niese**, (advisor, **Muhammad Usman**), Is your Computer Sick? It Might Have a Virus. See Dr. Math.
- **Malle Schilling** and **Nathan Volk**, (advisor, **Muhammad Usman**), A Numerical Solution of a Model of Diabetes
- **Brandon Thornton**, (advisor, **Maher Qumsiyeh**), Analyzing Low Birth Rates Using Logistic Regression
- **Adam Volk** (advisor, **Atif Abueida**), Star Decompositions of the Complete Split Graph

Integration Bee continues to be a popular event during the Stander Symposium. **Arthur Busch** and **Maher Qumsiyeh** organized this year's Bee. First place went to the The Super Volk Algebros, **Adam** and **Nathan Volk**. Second place went to Por Favor, InteGreat (sic) consisting of **Gabrielle Jackson**, and **Marco Oliveras**. Again, the turnout was great with more than 100 participants.

THE HONORS STUDENTS SYMPOSIUM

In recent years, the University Honors Program has been hosting the Honors Students Symposium. This year it was held on Friday afternoon, March 4, 2016. In the Stander Symposium, the vast majority of the students present their work in the form of a poster. In the Honors Students Symposium, students present their work in the form of fifteen minute talks. This year five math majors presented their work.

Jonathan Ashbrock, Recognition algorithms and a boxity bound on a class of chordal graphs

Kelli Marquardt, Comparison of nonparametric and parametric estimations of hospital production frontiers used for hospital efficiency analysis

Tyler Masthay, Fractional analogue for an existence result for a two-point boundary value problem

Melissa Siegel, Syntheses of research on dyscalculia and the common core state standards

Adam Volk, Star decompositions of the complete split graph

AWARDS

The co-recipients of the 2016 Senior Award for Academic Excellence in Mathematics are **Matt DeVilbiss, Kelli Marquardt and Adam Volk.**

The recipient of the 2016 Award of Excellence in Support of Mathematics is **Adam Volk.** Adam has won this award two years in a row. He has served as Math Club President for two years, served as a host at two Math Events, and chaired two High School Math contests. The bar is high for future service leaders.

The recipient of the 2016 Brother Joseph W. Stander, S.M. Award of Excellence to an Outstanding Student with a Concentration in Integrated Mathematics is **Melissa Renee Wills.**

The recipient of the 2016 Sophomore Award for Excellence in Mathematics is **Katie Posey.**

PLANS OF RECENT GRADUATES

John Ashbrock will begin his graduate studies in mathematics at Vanderbilt University in the fall tem 2016.

Matt DeVilbiss will begin his graduate studies in mathematics at the University of Illinois at Chicago in the fall tem 2016. Matt earned Honorable Mention for the NSF Graduate Research Fellowship Program this year.

Kelli Marquardt will begin her graduate studies in economics at the University of Arizona.

Adam Volk will begin his graduate studies in mathematics at University of Nebraska – Lincoln in the fall tem 2016.

ACTIVITIES OF GRADUATE STUDENTS

We again had a large number of graduate students earn master’s degrees this past year. MFM refers to the financial mathematics master’s degree and MAS refers to the M.S. in applied mathematics. Below, we list the graduates by name and give the title of the research project and supervising faculty member.

Fatimah Alamadi (August 2015) earned the MAS degree. She worked with **Youssef Raffoul** and wrote a math clinic project entitled “Boundedness of solutions in Volterra integro differential systems.”

Abeer Algethami (August 2015) earned the MAS degree. She worked with **Youssef Raffoul** and wrote a math clinic project entitled “Exponential stability and instability in nonlinear Volterra integro-differential equations with functional delay.”

Sami Aljhani (August 2015) earned the MAS degree. He worked with **Paul Eloe** and wrote a math clinic project entitled “A Green function for a two-term second order differential operator.”

Njwa Alkamisi (August 2015) earned the MAS degree. She worked with **Atif Abueida** and wrote a math clinic project entitled “Chaudhuri-Hocquengham codes and burst error-correcting codes.”

Naher Alsafari (August 2015) earned the MAS degree. He worked with **Paul Eloe** and wrote a math clinic project entitled “Two boundary value problems for fractional differential equations.”

Adel Alshammari (August 2015) earned the MAS degree. He worked with **Paul Eloe** and wrote a math clinic project entitled “A Green function for a two-term second order differential operator.”

Yuan Tian (August 2015) earned the MFM degree. She worked with **Dan Ren** and wrote a math clinic project entitled “Optimal consumption and investment model comparison using Monte-Carlo simulation.”

Nasiba Albatni (December 2015) earned the MAS degree. She worked with **Paul Eloe** and wrote a math clinic project entitled “Uniqueness implies existence and uniqueness conditions for boundary value problems for fourth order ordinary differential equations.”

Samerah Al Mosa (December 2015) earned the MAS degree. She worked with **Paul Eloe** and wrote a math clinic project entitled “Monotone methods for boundary value problems at resonance.”

Sami Alofei (December 2015) earned the MAS degree. He worked with **Paul Eloe** and wrote a math clinic project entitled “Quasilinearization for boundary value problems for ordinary differential equations.”

Tony Ellero (December 2015) earned the MAS degree. He worked with **Atif Abueida** and wrote a math clinic project entitled “Chaudhuri-Hocquengham codes and burst error-correcting codes.”

Sheng Kang (December 2015) earned the MFM degree. He worked with **Carl Chen** and wrote a math clinic project entitled “Comparative analysis of hedging performance of stock options: dynamic versus static.”

Brandon Thornton (May 2016) earned the MAS degree. He worked with **Maher Qumsiyeh** and wrote a math clinic project entitled “Analyzing low birth rates using logistic regression.” Brandon has accepted a position in the Department of Mathematics at Austin Community College. He will begin teaching during the Summer 2016 term.

Hanan Atetalla (May 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.” Hanan will return to her teaching position in her home country, Libya.

Jia Song (May 2016) earned the MFM degree. She worked with **Carl Chen** and wrote a math clinic project entitled “The Effect of Executive Compensation and Revenue Diversification on Bank Insolvency Risk.”

James Stewart (May 2016) earned the MAS degree. He worked with **Muhammad Usman** and wrote a math clinic project entitled “A Numerical Study of a Mathematical Model of Cell Growth in Scaffolds.” Upon graduation, James was employed by The Perduco Group, a data analytics company, in Beavercreek, Ohio.

Wenyan Lu (May 2016) earned the MFM degree. She worked with **Dan Ren** and wrote a math clinic project entitled “An Optimal Consumption and Investment Problem with CIR Model.”

ALUMNI NEWS

Harold Schoen (63, 69) has recently published a memoir, *Growing Up*. The book is a collection of Hal’s memories growing up on a farm in west central Ohio. The University of Dayton and the Department of Mathematics play their parts in the book as Hal played on the 1961—1962 NIT championship basketball team and upon earning his MS degree in mathematics at UD, Hal earned a Ph.D. from the Ohio State University and enjoyed a 31 year career in Mathematics Education at the University of Iowa.

Dawn Mumford (97) lives with her family in Beavercreek, Ohio. She has been teaching in the mathematics department at Summit Academy of Ohio.

Chris Bomba (02) lives in Columbus, Ohio where he works as an actuary for Nationwide Insurance. In September, Chris was part of a team of finance professionals, organized by **Catherine Kublik**, who visited campus and spent the day with undergraduate students interested in academic and career opportunities in business.

Charles Suer (10) earned a Ph.D. in mathematics from the University of Louisville. This past year, he has served as a faculty member at Centre College in Danville Kentucky.

Willy Balbach (10, 12) works as an Associate Underwriting Consultant for Arthur J. Gallagher & Co. in Chicago. Willy specializes in health and welfare underwriting.

Zachary Hadaway (13) left his position with a proprietary trading firm in Chicago to start a full-time Master’s program in financial mathematics at the University of Chicago.

Alaa Almansour (15) successfully published her Mathematics Clinic work (with **Paul Eloe**) in *Annales Polonici Mathematici*. The citation is Fixed points and solutions of boundary value problems at resonance, *Ann. Polon. Math.* 115 (2015), no. 3, 263—274.

Katie Campbell (15) started as an Actuarial Analyst with Aon Hewitt in Columbus, Ohio just this past February.

Patrick Chadowski (15) has taken a position as a Product Configuration Specialist for Erie Insurance in Erie Pennsylvania.

Lawrence Kondowe (15) has taken a position as a Quantitative Risk Analyst with the AES Corporation, the parent company of Dayton Power and Light.

Ryan Martin (15) has passed his second actuarial exam.