

Summer 2015 Research and Internships



Saharsh Dass (Senior Biology [Biomedical]; mathematics minor and member of the Seabird Ecology Team) was one of the recipients of a full scholarship to Boston University's Summer 2015 Institute for Training in Biostatistics, sponsored by the National Heart, Lung, and Blood Institute (NHLBI). The program modules on which the students worked covered biostatistics, epidemiology, clinical trials, statistical genetics, and training in SAS. A major component of the program was analysis in SAS of data collected from the Framingham Heart Study, and the SAS analysis included generating descriptive statistics, analysis of variance, chi-square tests, and multiple linear and logistic regression analyses.



Keddy Emmanuel (2015 BSE Engineering [Mechanical]; Mathematical Studies) spent his summer at an internship at the Donald C. Cook Nuclear plant outside of Bridgman, MI, serving as a program engineer responsible for managing maintenance and paperwork for the motor-operated valve group. His job was to analyze the raw data of the position of every valve over the 2003-2014 period and then to use this data to make an estimation of how many open-close cycles each valve had been through since its installation in the 1970s.



During a summer 2015 REU, **Robbie Polski** (senior BSE Engineering [Mechanical]/Mathematical Studies, Physics Studies, PME) worked at the University of Michigan with a group that researches semiconductor growth through molecular beam epitaxy (MBE) and characterization. As the most useful materials in electronics, optoelectronics, sensors, solar energy, and a host of other applications, semiconductors have properties that are largely dependent on crystalline structure and the types of materials used, along with their purities and impurities. MBE deposits evaporated semiconductor material onto the surface of a crystal—with the same lattice orientation as the underlying crystal—at rates that allow researchers to control the atomic layer-by-layer growth. The research group works with layering III-V (3-electron and 5-electron compounds) semiconductors and with building nanostructures on the surface. Robbie worked with the growth of Indium nanoparticles formed on silicon, which could potentially have applications in quantum dot fabrication and UV plasmonics (controlling optical and electronic properties by setting up resonance structures for electrons, essentially) for solar cells and other optoelectronics.



Timothy Robertson (junior BS Mathematics) began working with Dr. Kang this summer to investigate mathematical conditions that would guarantee the existence and uniqueness of positive solutions to a general elliptic mathematical model. Timothy will present the results at the Joint Mathematics Meetings in January 2016, generalizing the existence and uniqueness of positive steady state solutions to a Lotka-Volterra competition model with homogeneous boundary conditions for two species of animals competing in the same environment. His work should result in the publication of two articles next year.



Ada Alvarez (2015 BBA Management/Mathematical Studies, PME) is taking her MBA at the Andrews University School of Business Administration. This summer she married Irving Gonzalez.



Brandon Baptist (2015 Mathematics Education [Sec. Cert.], PME) is teaching all the mathematics courses at Wisconsin Academy. He is engaged to Natalie Peralta.

Belinda Cheeseboro (2015 BS Physics/Mathematical Studies) is pursuing her doctoral studies in Physics and Astronomy at West Virginia University in Morgantown. Belinda hopes to complete a couple of post-docs in astronomy.

Donovan Davis (2015 BA Economics/Mathematical Studies) is hoping to get either an MBA with a concentration in Finance or a Master of Science in Finance after working for a few years. After finishing class in December, he continued an internship at TKG & Associates. He has had a few interviews for internships with Fidelity Investments and with Muller & Monroe, an asset management company in Chicago.

Craig Dujon (2015 BS Mathematics) is living in Florida and planning to get back into computer programming/system administration and is learning how to run Linux from a command line and hoping to learn C or Python.

Keddy Emmanuel (2015 BSE Engineering [Mechanical]/Mathematical Studies) spent the summer working at an internship at Donald C. Cook Nuclear Power Generating Station in Bridgman, MI, before moving to the Boston office of the M+W group, a global engineering firm at which he is a member of the Life Sciences group working on Advanced Technology Facilities for bio research and the pharmaceutical industry.

Danielle Martin (2015 BS Mathematics, PME) is working as a Network Billing Coordinator for Katz Media Group under iHeart-Media, Inc., which provides multi-platform advertising and marketing and world-class entertainment.

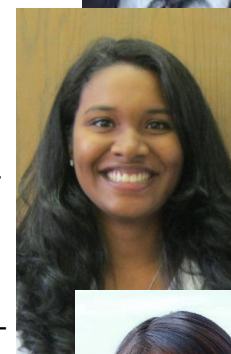
Michael McMearty (2015 BS Mathematics/BS Physics, J N Andrews Scholar, PME, Sigma Pi Sigma) was the only 2015 summer graduate. He returned to California where he helped his parents move and then began his job search. He is studying on his own and hopes eventually to become an actuary.

Bryan Pearson (2015 BS Physics/Mathematical Studies, PME, Sigma Pi Sigma) is currently living in Michigan as he contemplates the next step in his career.

Sade Samlalsingh (2015 BS Mathematics/BS Physics, PME), along with the mentor for her REU last summer, Dr. Emilio Gallicchio, has had an article on their work with fragile X syndrome published in *Computer Physics Communications*. Sade is teaching mathematics at The Bronx Middle School prior to beginning her PhD studies in mathematics in Fall 2016.

Ye Lim Seo (2015 BS Mathematics, PME) married Sunny Yuetae Kim (2014 M Div) in Korea in late June. She and her husband now live in Texas where Sunny is a pastor of the Dallas-Fort Worth Korean SDA Church. Ye Lim is taking classes for her MS in Actuarial Science at the University of Texas, Dallas, in hopes of eventually becoming an actuary.

Jeremy Thomas (2015 BS Physics/Mathematical Studies) is attending Florida State where he is pursuing his PhD in condensed matter physics.



Geometry Book Published

By Donald Rhoads

In the early 1970's Edward J. Specht (1915-2011), who was Chair of the Department of Mathematics at Andrews University from 1947 to 1972, turned his love for Euclidean geometry into the beginnings of a textbook. He was assisted in the venture by Harold T. Jones (1925-1995), who taught mathematics at Andrews for over 40 years and chaired the department after Specht left to teach at Indiana University South Bend. Specht and Jones decided to take a genuinely modern approach to Euclidean geometry, using the widely taught concepts of sets and mappings.

The Elements of Euclid of Alexandria (active c. 300-265 BCE) is considered one of the supreme accomplishments of the human intellect. Specht and Jones use Euclid's method, called the synthetic method of development: starting with undefined terms, point, line, and plane, they state 13 axioms which give these terms meaning. These axioms are close to those of Hilbert (1899), except that they use reflection mappings to define isometry and congruence. The end result is a new book, published by Birkhäuser/Springer, *Euclidean Geometry and its Subgeometries*, with four co-authors—Edward Specht, Harold Jones, Keith Calkins, and Donald Rhoads—all of whom taught at various times at Andrews over a period of some 64 years.

The first group of eight axioms defines incidence geometry. Other axioms are added one by one, each new one combining with the preceding ones to define a new geometry. For instance, Pasch geometry is the geometry resulting from the incidence axioms, a betweenness axiom, and the Plane Separation Axiom. Neutral geometry arises when a reflection axiom is added to these; Euclidean geometry results from adding a parallel axiom. Pasch and neutral geometries are subgeometries of Euclidean geometry.

Early in the project, Specht and Jones decided to make their axioms independent, meaning that no axiom, as it is added, can be derived from any combination of those previously invoked. They did so even though building a theory from independent axioms entails additional arduous work to get to key theorems.

In 1976 **Keith Calkins** (1981 BS Mathematics; 1982 MS Computer Information Science; 1991 MS Mathematics and Physics; 2002 MAT Secondary Education, 1996 MS & 2005 PhD Physics [Notre Dame]) became a student of Jones. In 1989 Calkins took a course in geometry in which Specht's new manuscript was the text. "I enjoyed it immensely and produced a list of errors for it," says Calkins, who taught mathematics to gifted high school students at Andrews until 2011. About 2002, Specht approached **Donald Rhoads** (1958 BA Mathematics), who was then Chair, to find someone to keyboard his voluminous handwritten notes into LaTeX, the standard publication language of mathematics. Rhoads quickly decided that Calkins was the natural person for this, since he was already an expert in LaTeX. Calkins says: "Little did I know at the time how rough the manuscript was. . . . Many theorems had been inserted with funny numbers. I opted to renumber everything, generally keeping all the numbering changes in my head as I typed. As we got deeper into the book, it was clear Ed was actively writing chapters, and several times either in my classroom or at his house in South Bend, we had extensive discussions regarding what was going on. My goal generally was to spend four hours every Friday on geometry." The task ended up taking Calkins four years.

After Rhoads retired in 2006, Specht asked him to finish a chapter on the Jordan Curve Theorem. Says Rhoads, "It turned into some 75 pages; then Specht made me a co-author, and I decided that if my name was to be on this, I should see what was in it." This was the beginning of years of reading and revising. "I came into the project intending to be a high-powered stenographer—one who knew the difference between a good and a bad proof," Rhoads says. "But it turned into a lot more than that." The book, too, turned into something more than a textbook, though the right teacher, with the right class, could use it as such. "Being retired, I had time to be the penman for the final set of revisions—whereas Keith was still working full time. But I could not have carried it off without his constant interaction." Oddly enough, the original chapter for which Specht enlisted Rhoads' help does not appear in the book but will appear online as a supplement.

In December 2014 Calkins and Rhoads signed a contract with Birkhäuser/Springer to publish the finished work. Jones' daughter **Meredith Jones Gray** (1976 BA French; 1977 MA English; Chair of the Department of English at Andrews), and Fred Specht, Specht's son, signed on behalf of the original authors. The scheduled publication date is November 2015.

Edward John Specht
Harold Trainer Jones
Keith G. Calkins
Donald H. Rhoads

Euclidean Geometry and its Subgeometries

Birkhäuser



Photos: (top to bottom)
Edward J. Specht, 2001;
Harold T. Jones 1961;
Keith G. Calkins 2011;
Donald H. Rhoads,
2004

Faculty Research

Talks (names in italics are student coauthors)

S. M. Henson. "Effects of climate change on animal behavior." Distinguished Research Lecture. La Sierra University, Riverside, CA, May 27, 2015.

S. M. Henson. "Effects of climate change on animal behavior." Plenary speaker, with J. L. Hayward, Phi Kappa Phi lecture. Andrews University, Berrien Springs, MI, April 1, 2015.

S. M. Henson. "Environmental change and life history strategies: Cannibalism and reproductive synchrony III." American Mathematical Society, Spring Southeastern Sectional Meeting, special session on New Developments in Population Dynamics and Epidemiology, Huntsville, Alabama, March 27, 2015.

S. M. Henson. "Effects of climate change on animal behavior." Plenary speaker, with J. L. Hayward, Michigan Academy of Science, Arts & Letters Conference, Andrews University, Berrien Springs, MI, March 13, 2015.

R. E. Jensen, R. Cushman, J. L. Hayward, **S. M. Henson**, & P. A. Zippi. "Late Pleistocene stratigraphy and sedimentology of Protection Island, Washington." 2014 Geological Society of America Annual Meeting. Vancouver, British Columbia. October 19-22, 2014.

A. Reichert, J. L. Hayward, & **S. M. Henson**. "The behavior of Glaucous-winged gull egg cannibals." 2014 Joint Meeting of the American Ornithologists' Union, Cooper Ornithological Society, and Society of Canadian Ornithologists. Estes Park, Colorado. September 25, 2014.

J. L. Hayward, **S. M. Henson**, & L. C. Megna. "Hot and bothered: Climate change, ovulation synchrony, and cannibalism in gulls." 2014 Joint Meeting of the American Ornithologists' Union, Cooper Ornithological Society, and Society of Canadian Ornithologists. Estes Park, Colorado. September 25, 2014.

S. M. Henson, *W. Saint Martin*, & J. L. Hayward. "Tradeoff between daily and yearly reproductive synchrony in colonial seabirds." 2014 Joint Meeting of the American Ornithologists' Union, Cooper Ornithological Society, and Society of Canadian Ornithologists. Estes Park, Colorado. September 25, 2014.

A. Sandler, L. C. Megna, **S. M. Henson**, & J. L. Hayward. "Every-other-day ovulation synchrony, high nesting density, and egg loss in a colony of Ring-billed Gulls (*Larus delawarensis*)." 2014 Joint Meeting of the American Ornithologists' Union, Cooper Ornithological Society, and Society of Canadian Ornithologists. Estes Park, Colorado. September 25, 2014.

S. M. Henson, & J. L. Hayward. "Hot and bothered: Climate change, cannibalism, and ovulation synchrony." Andrews Research Conference, Early Career Researchers in STEM, Andrews University, Berrien Springs, MI, May 8, 2014.

J. L. Hayward, **S. M. Henson**, & G. Atkins. "Egg cannibalism in marine gulls increases with sea surface temperature." Michigan Academy of Science, Arts, and Letters, Oakland University. Rochester, Michigan. February 28, 2014.

A. Sandler, G. Atkins, *M. McLarty*, *M. McCormick*, **S. M. Henson**, & J. L. Hayward. "Features of copulation and the copulation call in Glaucous-winged Gulls (*Larus glaucescens*)." Michigan Academy of Science, Arts, and Letters, Oakland University. Rochester, Michigan. February 28, 2014.

G. Atkins, **S. M. Henson**, & J. L. Hayward. "Evaluating the effect of broadcasting a model copulation song on the head-toss and mounting behavior of Glaucous-winged Gulls on Protection Island." Annual Meeting of the Michigan Academy of Science, Arts, and Letters, Oakland University. Rochester, Michigan. February 28, 2014.

J. M. Cushing, **S. M. Henson**, & J. L. Hayward. "Cannibalism can allow survival of a population endangered by decreased environmental resource availability." Special Session on Mathematics in Natural Resource Modeling, 2014 Joint Mathematics Meetings. Baltimore, Maryland. January 17, 2014.

J. H. Kang. "Equivalent mathematical conditions for survivals of species of animals for the most general population models." Michigan Academy of Science, Arts & Letters Conference, Andrews University, Berrien Springs, MI. March 13, 2015.

R. C. Moore. "Mathematics professors' evaluation of students' proofs." MAA Session on Assessment of Proof Writing throughout the Mathematics Major, Joint Mathematics Meetings. Baltimore, Maryland. January 15-18, 2014.

M. Savic, **R. C. Moore**, & M. Mills. "Mathematicians' views on transition-to-proof and advanced mathematics courses." Joint Mathematics Meetings. Baltimore, Maryland. January 15-18, 2014.

Y. M. Oh. "Riemannian submersion invariant and theta-slant submanifolds." Michigan Academy of Science, Arts & Letters Conference. Oakland University, Rochester, MI. February 28, 2014.

Y. M. Oh. "Some inequalities on Riemannian submersion and isometric immersions." Joint Mathematics Meetings. Baltimore, MD. January 16, 2014.

M. V. Prince. "Functions in adventures in mathematics, Gr. 6-10," "Fractions in Adventures in Mathematics, Gr. 3-5," and "Adventures with mathematics with TI-Nspire." MCTM State Conference, Traverse City, MI. July 29-30, 2015.

M. V. Prince. "TI-84 Plus C Silver Edition Graphing Calculator makes algebra more colorful and more memorable." Teachers Teaching with Technology (T3) International Conference, Ft. Worth, Texas. March 14, 2015.

M. V. Prince. "Integrating math, science, and literature with the TI-Nspire." Math In Action, Grand Valley State University, Allendale, MI. February 21, 2015.

M. V. Prince. "Transforming an 'ordinary' activity into a STEM project--Grades 2-5." Math In Action, Grand Valley State University, Allendale, MI. February 21, 2015.

- M. V. Prince.** “Hands-on inferential statistics with TI-Nspire.” Michigan Mathematical Association of Two-Year Colleges Conference. Lake Michigan College, Benton Harbor, MI. October 4, 2014.
- M. V. Prince.** “Hands-on inferential statistics with TI-Nspire.” Michigan Council of Teachers of Mathematics 2014 State Conference. Hope College, Holland, MI. August 7, 2014.
- M. V. Prince.** “CrossCutting NGSS RotoCopters and Hovercrafts, CCSS, NGSS with TI-Nspire technology.” Teachers Teaching with Technology 2014 International Conference. Las Vegas, NV. March 7-9, 2014.
- M. V. Prince.** “My favorite TI-84 activities—Now in color!” Math In Action Conference. Grand Valley State University, Grand Rapids, MI. February 22, 2014.
- M. V. Prince.** “STEM + CCSS – SMP + NGSS – EP = Exciting MS and HS mathematics.” Math In Action Conference. Grand Valley State University, Grand Rapids, MI. February 22, 2014.
- L. Weldon.** “Remedial math journeys.” Michigan Academy of Science, Arts, and Letters. Oakland University, Rochester. February 28, 2014.

Refereed Journal Articles

- Atkins, G. J., Sandler, A. G., McLarty, M., Henson, S. M., & Hayward, J. L. (2015). Oviposition behavior in Glaucous-winged gulls (*Larus glaucescens*). *Wilson Journal of Ornithology* 127:486-493.
- Cushing, J. M., Henson, S. M., & Hayward, J. L. (2015). An evolutionary game theoretic model of cannibalism. To appear. *Natural Resource Modeling*.
- Hayward, J. L., Atkins, G. J., Reichert, A. A., & Henson, S. M. (2015). Common ravens (*Corvus corax*) prey on rhinoceros auklet (*Cerorhinca monocerata*) eggs, chicks, and possibly adults. *Wilson Journal of Ornithology* 127:336-339.
- Kang, J. H., & Tritch, W. T. H. (2015). Conditions for existence or nonexistence of positive solutions to elliptic general model. *British Journal of Mathematics & Computer Science*, 8.6: 447-457.
- Moore, R.C. (2014). What constitutes a well-written proof? In T. Fukawa-Connelly, G. Karakok, K. Keene, & M. Zandieh (Eds.), *Proceedings of the 17th Annual Conference on Research in Undergraduate Mathematics Education* (pp. 927-931), Denver, CO.
- Navia, B., Burden, C., Steely, T., Hasegawa, H., Cha, E., Henson, S. M., Stout, J., & Atkins, G. (2015). Parallel effects of temperature on the male cricket calling song, phonotaxis of the female and the auditory responses of the L3 neurone. *Physiological Entomology* 40:113–122.
- Payne, B. G., Henson, S. M., Hayward, J. L., Megna, L. C., & Velastegui Chavez, S. R. (2015). Environmental constraints on haul-out and foraging dynamics in Galápagos marine iguanas. To appear. *Journal of Coupled Systems and Multiscale Dynamics*.
- Savic, M., R. C. Moore, & M. Mills. (2014). Mathematicians’ views on transition-to-proof and advanced mathematics courses. In T. Fukawa-Connelly, G. Karakok, K. Keene, & M. Zandieh (Eds.), *Proceedings of the 17th Annual Conference on Research in Undergraduate Mathematics Education* (pp. 1009-1013), Denver, CO.
- Seo, Y. L., & Y. M. Oh. (2015). A curve satisfying $T/\kappa = S$ with constant $\kappa > 0$. *American Journal of Undergraduate Research*, 12.2: 57-62.

Seabird Ecology Team Members Excel in Exams



The Seabird Ecology Team, under the direction of **Dr. Shandelle Henson** (Mathematics) and Dr. James Hayward (Biology), has offered students the opportunity to do hands-on work in ecology by applying mathematics to science. Some of the brightest students at Andrews have been team members, and many present and former members have published papers based on their research (see the above list for some of the recent papers on which Team members have helped). The accomplishments of three current team members (senior Biology/PreMed majors **Zachary** [far left] and **Ashley Reichert** and **Sumiko Weir** [far right]) and one Mechanical Engineering/Mathematical

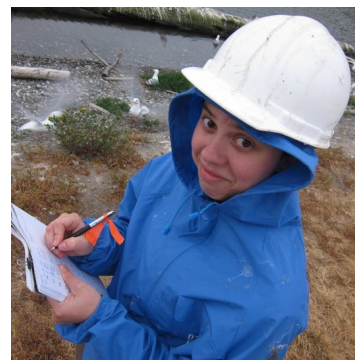
Studies/Physics Studies major (senior **Robbie Polski** [second from left], who is analyzing some data for the Team) are examples of the kind of students that the Team attracts. Sumiko and Ashley scored in the 100th percentile and Zachary in the 99th on their recent MCAT exams, and Robbie achieved 990 out of 990 on his Physics GRE. All are planning to graduate this coming spring, leaving room for more outstanding students to take their places!

Alumni News



Thomas Adams (2008 BS Mathematics Education, Phi Beta Kappa, PME, Sigma Pi Sigma) has been a mathematics and physics teacher for Lake Michigan Catholic High School in St. Joseph, MI, for the past three years, teaching AP Calculus, Physics, and Precalculus and serving as the lead coach for the Lake Michigan Robotics Team. He and his wife, Leslie, have four children: Thomas, Ben, Eric, and Peyton. This past year Tom received his MS in Education Administration from Purdue, and for the past three years he has done RET (like REU but for teachers) research for the University of Notre Dame as a visiting summer research assistant, giving talks at their poster sessions. In addition, he won "Teacher of the Year" in both 2012-13 and 2013-14. He also has a *YouTube* channel on mathematical concepts that has over 25,000 views. You can check it out at <https://www.youtube.com/user/adamsmathtube>

Danielle Burton (2008 BS English Literature/Mathematical Studies; 2013 MS Mathematics & Science, PME) is a third-year math PhD student at the University of Tennessee, Knoxville, and former Seabird Ecology Team member. She is teaching two sections of Calculus I this fall and has applied to a mentorship program, 1000girls1000futures, to mentor online a high school girl interested in STEM. She is attending four seminars: the math grad student seminar, the NIMBioS postdoc seminar, the NIMBioS invited speakers seminar, and the DE seminar. Her paper, "A Note on the Onset of Synchrony in Avian Ovulation Cycles," based on her master's research at Andrews and published in 2014 in the *Journal of Difference Equations and Applications*, is one of the top 10 most-read research articles of 2014 in all of the dynamical systems journals published by Taylor & Francis. In addition, earlier this year, Taylor & Francis chose it as the "Mathematics Article of the Week." The article is also listed as the 10th most-read article since 2011 in the *Journal of Difference Equations and Applications*. <http://explore.tandfonline.com/page/est/mathematics-statistics-most-read-2014/dynamical-systems-top-10-2014>



Daniel K. Cheung (1980 BS Mathematics/Secondary Education; 1982 MA Mathematics) has accepted the position of President of Hong Kong Adventist College, a small college in Clear Water Bay on the eastern side of Hong Kong that is affiliated with Andrews, Oakwood, and Washington Adventist Universities. After finishing his degrees at Andrews, Dan continued his education at Western Michigan, receiving his MS in Applied Statistics in 1984 and, after leaving to work for 14 years, returning to finish his PhD in Statistics in 1997. His dissertation was titled "Estimating IBNR with Robust Statistics." Although most of his working life has been that of owning a State Farm Agency in Minneapolis, Dan has worked as an adjunct professor and as a statistician and actuary for companies such as Kellogg's, The St. Paul Companies, Upjohn, and Instate Computer Services.



He is married to Corjena, who has a PhD in nursing and teaches for the University of Minnesota, and the couple has two children, Chanda, who works for General Mills in Minneapolis, and **Hannah**, who attended Andrews in 2014-15 and is currently at Union College. One of the team which Dan will join in January when he goes to Hong Kong to begin his work there is **Frank Wai Ming Tam** (1980 BS Chemistry), who is academic dean at the college.



William Tritch (2014 BS Mathematics/BS Physics, Phi Kappa Phi, PME, Sigma Pi Sigma, Sigma Xi) is now in his second year of his PhD studies in Applied Mathematics at Texas Tech University in Lubbock. The paper that he and Dr. Kang published on their research together at Andrews, "Conditions for Existence or Nonexistence of Positive Solutions to Elliptic General Model," was published in early 2015 by the *British Journal of Mathematics & Computer Science*.

Celebration of Dr. John Gimbel



John Gimbel (1977 BS Mathematics, PME), a professor of Mathematics at the University of Alaska Fairbanks, turned 60 this year, and colleagues in Europe planned a small conference in his honor for August 3-4 this year. To advertise the event, his friends in applied math in Prague put this poster (left) together from photos that they gleaned from the Internet of him and his dog, with the backdrop being a lecture hall in downtown Prague in a 400-year-old monastery. Gimbel received his PhD from Western Michigan University in 1984 and specializes in graph theory, combinatorics, and order. He taught at Colby College for 5 years (1982-87) and at UA Fairbanks for 28 years (1987-present). For one year he was a visiting professor at the Technical University of Denmark (1986-87).

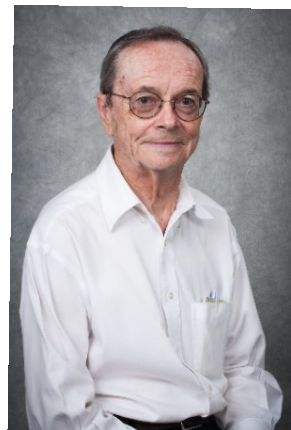
Tribute to Ray Hefferlin

Ray (Doc) Hefferlin (May 2, 1929 – March 7, 2015, BA Physics, PUC; PhD Physics, California Institute of Technology; DSc, Andrews University) was a physicist and academic who was loved by his colleagues and students. Dr. Hefferlin conducted research on periodic systems of small molecules and taught at Southern Adventist University from 1955 until his death. Some of the honors he has received include the Pegram Award from the Southeastern Section of the American Physical Society and the Professor of the Year Gold Medal Award of the Council for the Advancement and Support of Education.

Born in Paris to an American father and Swiss mother, Hefferlin moved to the United States with his father when he was seven and completed most of his education in California. Hefferlin and his wife, Inelda, were married in 1954 and have four daughters and seven grandchildren.

Hefferlin's research at Southern began as a continuation of his thesis topic, which concerned the determination of atomic oscillator strengths using optical spectroscopy, but has morphed into the construction and testing of periodic systems for diatomic and triatomic molecules and most recently into periodicity itself. In each phase, he involved many undergraduate students and collaborated with scientists from around the world.

In 1979 Hefferlin published a periodic ordering of all of the diatomic molecules that could result from combinations of the first 118 elements on the periodic table. Unlike earlier work in this area, Doc's work was multi-dimensional and allows researchers accurately to predict the characteristics of diatomic molecules.



At his funeral on March 25, **Dr. Shandelle Henson** gave a tribute celebrating Hefferlin's spiritual influence: "Doc's enormous intellectual influence on students cannot be separated from his spiritual influence. Many former students are rooted in the faith or connected to the Church who probably would not be if it weren't for Doc. Groups of students—in my day Gary Burdick, Rick Cavanaugh, Lisa Springett, Chris Hansen, and I, and others—loved to go on long Sabbath hikes with Doc. We talked about everything—science, math, literature, poetry, art, and music—but always with a spiritual reverence. Doc was the rare person who could and did share his faith in the context of the intellectual world."

In the eulogy Henson addressed several attributes of Hefferlin as a person: his credibility as a scientist, his authenticity as a human being, his humble attitude that made him a great listener, his secure faith in God, and his sense of awe and "*childlike delight* at the deep patterns he discovered in the universe." Dr. Henson says that she appreciated the fact that "he delighted in quality things of life such as music, poetry, literature, and art. He experienced God in the fragment of a hymn, a line from a poem, a certain quality of light in the mountains."

She concluded her tribute with this statement: "Doc's students *adored* him. He was our iconic and pure-hearted beacon of sanity and humanity in a troubled world."

Andrews University

Department of Mathematics

Programs

BS in Mathematics
 BS in Mathematics Education
 Mathematical Studies Major
 Mathematics Minor
 Mathematics Education Minor
 Minor in Mathematics of
 Economics and Finance
 Behavioral Neuroscience
 Mathematics Track

PME Michigan Gamma Chapter

*Emily-Jean Bankes, President
 *Richard Clark, Vice President
 *Joshua Kim, Secretary-Treasurer
 *Prof. Joon Hyuk Kang, Advisor

eigen* Mathematics & Physics Club

*Zachariah Swerdlow, Mathematics President
 *Erik Vyhmeister, Physics President
 *Jonathan Wheeler, Secretary
 *Lukasz Krzywon, Poster Secretary

Mission Statement

Through teaching, research, and service, the Department of Mathematics seeks to provide leadership in the mathematical sciences by:

*Preparing students with the mathematical understanding, problem-solving skills, and dispositions that enable them to excel in their chosen careers;

*Increasing mathematical and scientific knowledge through publication and presentation;

*Supporting the broader mathematics education community and mentoring others for generous service through a committed Christian life.

www.math.andrews.edu

Department of Mathematics
 Andrews University
 Berrien Springs, MI 49104-0350



Front row (L to R): Eui Bin You, Maurice Gaynor, Joshua Kim, Joseph Walker. **Back row (L to R):** Lukasz Krzywon, Natasha Greenley, Michael Hess II, Emily-Jean Bankes, Brian Shockey, Karel Marshall. **Not pictured:** Richard Clark.

2015 Pi Mu Epsilon Inductees

At the 2015 induction ceremony in the Whirlpool Room in Chan Shun Hall, eleven students were inducted in the Michigan Gamma Chapter of Pi Mu Epsilon. The new 2015-16 PME officers are **Emily-Jean Bankes** (junior BS Mathematics/BS Chemistry), president; **Richard Clark** (senior BS Physics/BA Music), vice-president; and **Joshua Kim** (senior BS Computing [Computer Science]/Mathematical Studies), secretary/treasurer. **Dr. Marian V. Prince**, adjunct professor of Mathematics, gave the keynote talk on “Hearing the Student T-Distribution,” involving the students in the activity with her collection of TI-Nspire calculators.

2015 Awards for Excellence in Mathematics

On April 24, 2015, the Department of Mathematics honored students at the annual Awards for Excellence in Mathematics ceremony. This year we gave out 53 awards to 48 students in 16 different courses, with sophomore BS Mathematics/BS Physics major Zachariah Swerdlow receiving the most awards—one each for his work in Discrete Mathematics, Calculus III, and Differential Equations. The named scholarship recipients (see photos below) were seniors Dillon Zimmerman, (BS Chemistry/Mathematical Studies), and Belinda Cheeseboro (see p. 2).



Dr. Kang presenting Dillon Zimmerman with the 2015 Edward J. Specht Award



Dr. Weldon presenting Belinda Cheeseboro with the 2015 Ulloth Award