MESSIAH UNIVERSITY

ANALYTIC THREADS

Annual newsletter of the Department of Mathematics, Physics and Statistics

Fall 2020

Due to new institution and department names, this Analytic Threads is the last annual newsletter of the Department of Mathematics, Physics, and Statistics (MPS) at Messiah University. It is sent annually to alumni and is also available electronically at https://www.messiah.edu/info/23562/news
Since Messiah became a virtual campus on March 25, numerous activities that would have been reported in this newsletter were cancelled. You may assume that missing items are not included for this reason.

Faculty News

Marlin Eby

On August 24, 2019, Dr. Marlin Eby and his wife Julie welcomed a son into their family when Casey Patrizio married their daughter Dr. Rachel in Fort Collins, CO.

Dr. Eby and daughter Rachel

Dr. Niklas Hellgren

had significant publication success in 2019-2020.

- With coauthors J. Thörnberg, I. Zhirkov, M.A. Sortica, I. Petrov, J.E. Greene, L. Hultman, and J. Rosen, he published *High-Power Impulse Magnetron Sputter Deposition of TiBx Thin Films: Effects of Pressure and Growth Temperature* in Vacuum (2019).
- With coauthors H. Harikrishna, S.T. Huxtable, I. Ben Shir, S. Kababya, A. Schmidt, D. Dutta, M. Liu, D. Gidley, W.A. Lanford, C. Ege, E. Mays, J. Bielefeld, and S. King, he published *Thermal Conductivity-Structure-Processing Relationships for Amorphous Nano-porous Organo-Silicate Thin Films* in Journal of Porous Materials (2020).
- With coauthor, J.R. Shallenberger, he published *Zinc Selenide Analyzed by XPS* in Surface Science Spectra (2020).
- With coauthors M.A. Steves ('17), J.R. Shallenberger, S.K. O'Boyle ('19), E. Mellott ('20), and A.R. Noble, he published *Effect of Etching on the Oxidation of Zinc Selenide Surfaces Characterized by X-ray Photoelectron Spectroscopy* in Applied Surface Science (2020).

The Nobel Prize in Physics 2019 was discussed by Dr. Kryemadhi

Abaz Kryemadhi

Three students participated in undergraduate research with Dr. Abaz Kryemadhi: Nathan Chan ('20) and Brandon Weindorf ('21) in *Development of Python Interface for CERN Data Acquisition Board DRS4* and Brandon Weindorf ('21) and Aeowyn Kendall ('20) in *Development of Prototype Cerenkov Detector for High Energy Cosmic Rays*.

Dr. Kryemadhi presented *Development of a Water Cherenkov Detector Prototype with Wavelength Shifters and Silicon Photomultiplier Readout* at the 36th International Cosmic Ray Conference in Madison, WI in July 2019.

Dr. Kryemadhi, along with B. Weindorf ('21), A. Kendall ('20), T. Luu ('19), and H. Hawbecker, published *Development of a Water Cherenkov Detector Prototype with Wavelength Shifters and Silicon Photomultiplier Readout* in Proceedings of Science (July 2019).

He participated in a workshop with a small group of physicists at CERN Geneva, Switzerland in January 2020. The workshop focused on new detectors and new techniques in high energy particles and dark matter.

Dr. Kryemadhi, along with Dr. Matthew Farrar, was awarded a NASA PA Space Grant Consortium for *Construction of a*

Faculty news, continued on page 2

Faculty News

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Detector Prototype for High Energy Gamma Rays. The grant amount for this year was $7,711 which funded the project including fellowships of $500 each for three students working on the project: Aeowyn Kendall ('20), Brandon Weindorf ('21) and Alan Mokris ('22).

Messiah's 10th Annual Nobel Prize Seminar was held in December 2019. The Nobel Prize in Physics 2019 was discussed by Dr. Kryemadhi. *The Nobel Prize in Physics 2019 was awarded "for contributions to our understanding of the evolution of the universe and Earth's place in the cosmos" with one half to James Peebles "for theoretical discoveries in physical cosmology", the other half jointly to Michel Mayor and Didier Queloz "for the discovery of an exoplanet orbiting a solar-type star."* https://www.nobelprize.org/prizes/physics/2019/summary/

Amanda Lohss

Drs. Mandy and Shane Lohss welcomed McKenzie Jade on September 20 – one day before her daddy's birthday. She weighed in at 7 pounds - 10 ounces.

Drs. Shane and Mandy Lohss with McKenzie

Douglas Phillippy

Dr. Doug Phillippy published *A Glimpse of God through Mathematics* as the lead article in God and Nature (Fall 2019).

Congratulations to Dr. Phillippy for his outstanding performance in the Harrisburg Marathon on November 10 finishing third in his age class! This was his 8th marathon and his time qualified him for the 2021 Boston Marathon.

Samuel Wilcock

In June 2020, Dr. Sam Wilcock was a twelfth-time participant in the Statistics AP Reading held virtually this year due to COVID-19. He joined these departmental alumni in that endeavor: Doug Tyson ('92), Leigh (Leisenring) Nataro ('92), and Erica (English) Chauvet ('01).

MPS Hike (November 4)

MPS Hike (November 4)

Retired Faculty News

Lamarr Widmer

Dr. Lamarr Widmer enjoyed being back in the classroom for one class each semester: *Algebraic Structures* (Fall) and *Linear Algebra* (Spring). Outside of the classroom, he continued volunteering at the food pantry of New Hope Ministries.

Collaboratory News

Beginning July 1, 2020, the Collaboratory for Strategic Partnerships and Applied Research was restructured into the Department of Engineering. It is now an engineering-focused yet interdisciplinary service organization pursuing the mission of increasing hope and transforming lives through real-world application of professional disciplines, Christian discipleship, and partnership with marginalized communities.

MPS Hike (November 4)

Student News

Honors

- **Brooke Firestone ('20)** was named Forward of the Year and earned All-American and Academic All-American honors in women's soccer. She led her team to its sixth NCAA Division III national championship.

- **Reece Horne ('21)** was awarded the 2020-2021 Ernest L. Boyer, Sr. Teacher Scholarship.

- **Aeowyn Kendall ('20)** and **Brandon Weindorf ('21)** were inducted into the Sigma Pi Sigma Physics Honors Society.

Summer 2020 Activities: MPS Discipline-Related

- **Sarah Hartman ('22)** had a Supply Chain Team Internship (in-person initially then virtual) at Clark Associates in Lancaster, PA.

- **Sarah Kelchner ('22)** had an internship (virtual initially then in-person) on a team in the Space Exploration Sector at Johns Hopkins Applied Physics Laboratory in Laurel, MD.

- **Aeowyn Kendall ('20)** worked on the project (virtual), A Mathematical Model of Score Probabilities, at Messiah University under the direction of Dr. Doug Phillippy.

- **Aeowyn Kendall ('20)** worked on the project (virtual), Fine-Tuning for Scientific Discovery, at Messiah University under the direction of Dr. Robin Collins.

- **Ian Parzyszek ('21)** was accepted into a Summer Institute for Research Education in Biostatistics (SIBS) REU (Research Experiences for Undergraduates) (in person) at North Carolina State University and Duke University. However, it was cancelled due to COVID-19.

Class of 2020: Employment and Education Placements (to date)

- **Daniel Diethrich** (Mathematics and Music with Commercial concentration: NAVSUP (Naval Supply Systems Command) in Mechanicsburg, PA – Operations Research Analyst

- **Sean Donaldson** (Physics with Secondary Teaching Certification): Big Spring School District in Newville, PA - Chemistry & Physics Teacher

- **Olivia Essig** (Mathematics with Secondary Teaching Certification): Steel City Academy in Gary, IN – High School Mathematics Teacher

- **Caroline Everett** (Mathematics): Cigna in Bloomfield, CT – IT Systems Analyst

- **Brooke Firestone** (Mathematics with Secondary Teaching Certification): Dover Middle School in Dover, PA – 7th Grade Mathematics Teacher

- **Aeowyn Kendall** (Physics): / Earth Sciences (MS) at University of New Hampshire.

- **Gavin Reich** (Mathematics; Education and Computer Science minors): Dell Boomi in Chesterbrook, PA – Platform Consultant

- **Alex Scheib** (Mathematics with Secondary Teaching Certification): Central Dauphin High School in Harrisburg, PA – Mathematics Teacher

- **Brendan Turner** (Mathematics): Data Science (MS) – Grand Canyon University

MPS Back-to-School Kickoff (September 21)

Program News

Mathematics

Beginning with 2020-2021, MATH 195 (*First Year Mathematics Seminar*) and MATH 494 (*Senior Mathematics Seminar*) will be replaced by these three courses.

- MATH 196 – *Mathematics Seminar* (2 credits): An introduction to and overview of the discipline of Mathematics. Readings, discussion and written work focus on building problem solving skills, vocational awareness, and the relationship between faith and Mathematics. Offered every year in the Fall semester.
- MATH 198 – *Introduction to Mathematical Proof* (2 credits): Students will learn to read, understand, and produce mathematical proofs. Readings, discussion, and written work focus on logic, techniques of proof, classical mathematical proofs, and axiomatic systems. Offered every year in the Spring semester.
- MATH 496 – *Mathematics Capstone* (2 credits): Senior capstone course emphasizing independent research, professional development, contributions of Mathematics to culture, and discipline-specific issues of Christian faith and vocation. Offered every year in the Spring semester.

Mathematics Club: A celebration of Pi Day

Mathematics Club: Welcome Back Pizza Party in September 2019

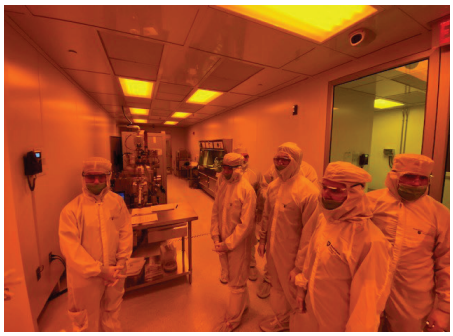
Mathematics Club: Exploring some mathematical puzzles

Physics

The Physics Club took a field trip to Penn State and toured the Breazeale Nuclear Reactor Lab and the Materials Research Institute. In addition, they had lunch with some Messiah alumni and finished the day with ice cream at the Berkey Creamery.

Beginning in Spring 2021, this new course will be offered.

- PHYS 317 – *Optics* (3 credits): The course presents a foundation for classical optics, including Maxwell's equations, plane waves, Gaussian beams, diffraction, optical transfer functions, interference, polarization, dichroism, and image formation. In addition, applications to modern optics, including nonlinear and quantum optics, will be considered. Offered odd years in the Spring semester.



Physics Club: Gowned up in the clean room of the nanofabrication facility in the Materials Research Institute

Physics Club: Outside the Nuclear Reactor Lab (no pictures allowed inside). From the left: Samantha Neal, Dr. Farrar, Sean Donaldson, Aeowyn Kendall, Brandon Weindorf, Nate Chan, and Jeff Gao.

Statistics

Revisions were made to the Statistics curriculum to allow students who have not taken a calculus course to complete a Statistics minor. In the past, a student completed a Statistics minor by beginning with STAT 291 (which has a prerequisite of a first course in calculus) then in subsequent terms STAT 292 and four upper-level STAT courses. Some course titles were also changed to better reflect the current course content.

STAT 269 and STAT 281 are one-term introductory courses for nonmajors. With the revised curriculum, a student who completes either of these two courses may skip STAT 291 and take STAT 292. With the exception of STAT 417, any STAT course that had a prerequisite of STAT 291 now has a prerequisite of STAT 291, STAT 269, or STAT 281.

These are the ten currently catalogued Statistics courses.

- STAT 269 *(Introductory Statistics)*
- STAT 281 *(Applied Statistics for Management)*
- STAT 291 *(Probability & Statistics)*
- STAT 292 *(Inferential Statistics)*
- STAT 324 *(Advanced Statistical Methods)*
- STAT 325 *(Experimental Design)*
- STAT 331 *(Nonparametric Statistical Analysis)*
- STAT 345 *(Time Series Analysis)*
- STAT 346 *(Operations Research)*
- STAT 417 *(Mathematical Statistics)*

Department News

Beginning in Fall 2020, the Department of Computer and Information Science and the Department of Mathematics, Physics, and Statistics will combine into a new department, the Department of Computing, Mathematics, and Physics (CMP).

This new department includes 13 full-time faculty members, the 10 majors (and some associated minors) of Actuarial Science (BS), Computer and Information Science (BS), Computer Science with Teaching Certification (BA), Cybersecurity (BS), Digital Media (BA), Mathematics (BA), Mathematics with Teaching Certification (BA), Physics (BA, BS), Physics with Teaching Certification (BA), and a minor in Statistics.

Dr. Matthew Farrar has agreed to serve as department chair of the CMP department, with unanimous support from faculty in the respective departments. Sincere thanks to Drs. Scott Weaver and Samuel Wilcock for their leadership of the CIS and MPS departments and for their helpful perspective and support for the upcoming merger.

Use the following address format to contact a faculty member by regular mail.

Name of faculty member
One University Avenue Suite 3041
Mechanicsburg, PA 17055-6804

In Memory

Clifford Wagner

We were saddened to hear of the death of Dr. Clifford Wagner on March 1, 2020. He taught Mathematics at Messiah for one year (2000-2001). His obituary is here: https://www.rothermelfuneralhome.com/obituary/Clifford-Wagner

Dr. Gene Chase provided the following information about his professional life that was not mentioned in his obituary.

- He was a **Statistics educator.** He wrote a UMAP (Undergraduate Mathematics and Its Applications) module on Simpson's Paradox, and he delivered a talk at the 2015 ACMS (Association of Christians in the Mathematical Sciences) meeting, *10 Statisticians, 20 Slides, and 30 Centuries*.
- He was a **computer scientist.** He coauthored the book, C and UNIX: Tools for Software Design.
- He was a **mathematician.** When he taught at Messiah, he was so used to teaching large classes at Penn State – Harrisburg that he found a way to generate individual quizzes for each student by varying the numbers in the problems, but varying them in such a way that the problems still came out with nice numbers as answers.

Future Event

School of Science, Engineering, and Health Symposium 2021

Friday, April 30

The CMP Department's involvement in an event like this began as the School of Mathematics, Engineering, and Business (MEB) Scholarship Day. It then became the MEB Student Scholars' Expo. With the formation of the School of Science, Engineering, and Health, it became the School of Science, Engineering, and Health Annual Symposium. If you live within driving distance of the University, we encourage you to visit this symposium which is always held on the last Friday of the spring term and features student (mostly) and staff presentations. There is no registration fee and snack breaks are provided. For details including abstracts, check the SEH School website: https://www.messiah.edu/info/20198/school_of_science_engineering_and_health in Spring 2021.

From the Editor

Thank you so much for your prayers, kind words, and support as Julie and I travelled our COVID-19 road which began in early March. Special thanks to Dr. Wilcock who picked up my load while I was on leave and to Dr. Hare who picked up part of Dr. Wilcock's chair load.

In early summer, Julie and I were both retested and tested NEGATIVE. This means that the live virus cells (contagious) were gone and the dead virus cells (not contagious) were also gone. At that time, we were then part of the safest portion (for us and others) of the population with respect to COVID-19. We praise God for that! While the main part of our recoveries is past, we are still struggling to regain physical and emotional strength.

In June, our pastor interviewed us about our experience. The complete interview can be found here: https://www.youtube.com/watch?v=4ftd_emCXzw

To God be the glory!

Julie & Marlin Eby

Opportunities

Request for Internship Opportunities

Does your employer accept interns in Actuarial Science, Computer and Information Science, Cybersecurity, Digital Media, Mathematics, Physics, or Statistics? Our Actuarial Science majors are required to complete an internship. Also, our majors often pursue minors in Business, Economics, or Statistics and are seeking internships in their third and fourth years. Please inform the CMP Department of such opportunities by emailing Dr. Farrar (mfarrar@messiah.edu). Even if you live far from Messiah, we may have a student from a nearby hometown interested in a summer internship.

Support Opportunities

Your continuing support of Messiah University in all ways is greatly appreciated. With respect to financial support, some of you may wish to target donations to specific projects related to the Department. Of course, your gift is doubled when your employer has a matching gift program. Consider a gift to the University that is earmarked as described below. Send your tax-deductible gift – check made payable to Messiah University – to Office of Development, One University Avenue, Suite 3013, Mechanicsburg, PA 17055-6804.

- To make a donation to the Department of Computing, Mathematics, and Physics, put CMP Dept. on the memo line of your check.
- The SEH School has an enrichment fund that is used to fund student travel to out-of-state academic conferences to present their work. This fund rolls over year to year, so it is a great place for one-time gifts. Donors should specify SEH School – Enrichment Fund.
- Online contributions to the Dr. Gerald D. Hess Research Fund for the Natural Sciences can be made here: http://www.messiah.edu/HessFund. This fund allows for direct support of student and faculty research, including research supplies and conference travel, for students studying Physics.

If you are interested in contributing to a scholarship for students in the CMP Department, contact the Office of Development. It takes $25,000 to underwrite (seed) a scholarship.

If you are interested in contributing to an endowed scholarship chair for faculty members in the CMP Department, contact the Office of Development. It takes $2 million to underwrite an endowed scholarship chair.

Opportunities for Adjunct Teaching at Messiah University

Are you, or is someone you know, interested in teaching Computer and Information Science, Mathematics, Physics, or Statistics at Messiah University? Interested persons with at least a master's degree in a related field are encouraged to send their resume and statement of interest to Dr. Farrar at One University Avenue, Suite 3041, Mechanicsburg, PA 17055-6804. The CMP Department often needs part-time adjunct instructors to teach general education courses, and we welcome applications from alumni and their friends and family.

Computing

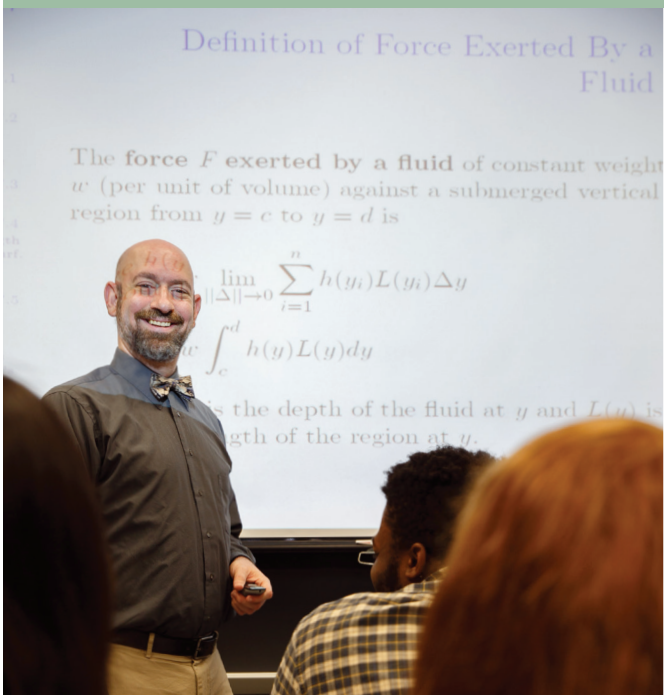
Complete a goal-oriented task.

Computing encompasses the design and development of software and hardware systems for a broad range of purposes - often structuring, processing and managing a multitude of information. All work together to aid in the pursuit of scientific studies, making intelligent systems, and creating and using different media for entertainment and communication. The most important aspect of computer science is problem solving, *an essential skill for life.*

Mathematics

Reason logically to answer challenging questions.

Go beyond the realm of mere facts and numbers as you develop creative problem-solving skills you can apply to complex problems in almost any field. With Messiah's Christian professors as your guides, experience the intricate balance of art and science and learn to maximize both your intuitive and analytical skills. You'll also grow to appreciate how your Christian faith and mathematics complement each other as you acquire the intellectual and spiritual vigor necessary to ***interpret information and solve problems.***



Physics

Probe a universe of interactions.

Study the building blocks of the universe, from quarks to galaxies, and explore the basic laws and forces of nature. Then, with a solid theoretical foundation and hands-on research experience, you may just find yourself mapping out the dark matter in the universe or discovering the optimal atomic structure for next-generation solar cells.

Study complex theories in class, then apply what you've learned through hands-on research or an internship where you'll ***solve problems and serve communities.***

MESSIAH UNIVERSITY

DEPARTMENT OF
COMPUTING, MATHEMATICS
AND PHYSICS

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Parting Thoughts

We hope that all is well with you and your families. We enjoy receiving updates and having you visit us at Messiah. However, we will generally not publish your updates. Since your circle of connections at Messiah University was bigger than the CMP department, we encourage you to send the updates that you want to be published to the Class Notes (https://www.messiah.edu/alumni/sendnews) section of The Bridge, the University's magazine for alumni, parents and friends To update your email address, please contact our Administrative Assistant, Alisa Sentz, at asentz@messiah.edu.

Editor: Dr. Marlin Eby (Eby@messiah.edu)