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2023

Analytic Threads - Annual Newsletter - 2023

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ANALYTIC THREADS

Annual newsletter of the Department of Computing, Mathematics and Physics

Fall
2023

Faculty News

Niklas Hellgren



Dr. Niklas Hellgren began serving as the department's chair during the summer of 2021. He was promoted to the rank of full professor in 2022.

His research resulted in several publications since the last issue of the *Analytic Threads*, several of which include co-authors from the Messiah community. Some of Dr. Hellgren's publications include:

Synthesis and characterization of TiBx ($1.2 \leq x \leq 2.8$) thin films grown by DC magnetron co-sputtering from TiB₂ and Ti targets. This 2022 article appeared in *Surface and Coatings Technology*. One of the co-authors of this article was Alex Sredenschek, a 2019 Messiah graduate.

X-ray photoelectron spectroscopy of thin films was published in 2023 as an invited review in *Nature Reviews Methods Primers*.

Development of a Vacuum Ultraviolet Detector for Dark Photon Searches was published in *Proceedings of Science* in 2021 with Messiah colleague Dr. Abaz Kryemadhi and Ryan Thurber, a 2022 Messiah graduate.

Ben Huang



Dr. Ben Huang initiated a project to incorporate WeBWork into teaching activities at Messiah.

WeBWork, an open-source online homework delivery system primarily tailored for mathematics and science, enables students to complete their assignments online and receive in-

stant feedback on the accuracy of their responses. Over the decades since its inception, WeBWork has amassed a comprehensive problem library covering a wide range of STEM subjects. Given its cost-free nature, the goal is to expand its integration into as many courses as possible, thereby reducing students' course material expenses while enhancing their learning experiences.

Currently, Dr. Huang has successfully established and is overseeing an Amazon cloud server for running the software. He is also conducting experiments with its implementation in the MATH103 Supplemental Calculus course. In the future, he plans to collaborate with the ITS department to develop a method for seamlessly integrating WeBWork with our Learning Management System, Canvas.

Abaz Kryemadhi



Senior physics major Will Griffith and physics professor Dr. Abaz Kryemadhi installed and collected data from three

magnetic sensors at the Camp Tuckahoe Boy Scout Camp in Dillsburg (@tuckahoe.bsa) July 19-23. This work is part of SNIPE-HUNT collaboration, involving several universities, in order to search for a very light form of Dark Matter called Hidden Photon. The forest location at the camp was necessary to minimize interference caused by human-made noises, but it required frequent hikes in 90 degree weather to check on the sensors! Will even camped out so he could check on the sensors more frequently! Dr. Kryemadhi was promoted to the rank of full professor in 2021.



Senior physics major Will Griffith and physics professor Abaz Kryemadhi on a "SNIPE-HUNT"

Cynthia Lehman



Professor Cynthia Lehman began serving as assistant chair for the department in the fall of 2021. Her primary responsibilities include student recruiting and over-



Professor Lehman enjoys dinner with Senior Haley Wagman and Junior Jillian Stoltzfus prior to a lecture by NASA astronaut, Dr. Mae Jemison

Faculty news, continued on page 2

Faculty News cont'd

Continued from page 1

seeing the department's presence on social media. In the fall of 2022, Professor Lehman began advising all of the Mathematics with teaching certification majors in our department. She also serves as a TEP supervisor for some of the MATT majors in their Field Experience placements.

Amanda Lohss



Dr. Amanda Lohss was promoted to the rank of associate professor on August 1, 2022. She also conducted mathematical research with a team of students - Noah Andrews, Abigail Herrlin, Skyler Hiltbeitel, Charles Humpert, and Ammanuel Tamrat. These students worked on open problems in Combinatorics and proved some interesting results related to the maximal number of symbols in staircase tableaux. A subset of the group presented their results at the Mathematical Association of America's EPaDel Conference in the spring. A paper on their results is being prepared for submission to an academic journal. Dr. Lohss and her husband, Shane, welcomed their second child, Matthew Robert, into their family on March 28, 2022.



Dr. Lohss with husband Shane and children McKenzie and Matthew

David Owen



During the past year, Dr. David Owen had many opportunities to connect with faculty and staff across campus, building

relationships and renewing motivation and gratitude for his work at Messiah. In the fall, he observed classes taught by colleagues in the music and business departments; in the spring he went with a group from Messiah to the annual Lancaster Learns conference and later participated with faculty from many departments in a workshop at Messiah led by David I. Smith, discussing his book, "On Christian Teaching."

Throughout the year Dr. Owen met with Messiah's educational and administrative technology committees, considering how to use technology in effective ways, while protecting potentially vulnerable students and institutional data. He also had the opportunity to meet monthly with a group of "faculty fellows," for food and fellowship supported by a grant from the Lilly foundation. Participants were invited to share their motivation as Christian teachers in their particular academic disciplines and in their work at Messiah.

In June Dr. Owen travelled to the AP reading in Kansas City, where he worked with high school and college teachers from around the country, grading the free response section of this year's AP Computer Science A exam. Later in the summer he attended the American Scientific Affiliation's annual meeting in Toronto, along with others from Messiah's school of Science, Engineering and Health.

Finally, Dr. Owen is now proud parent of a Messiah University student, as his oldest son began taking dual enrollment courses over the summer.

Douglas Phillippy



Dr. Doug Phillippy was on sabbatical leave during the fall of 2022. The primary focus of his sabbatical project was to write six essays relating faith and mathematics. As a result of his work, Dr. Phillippy initiated an ongoing column in *God and Nature Magazine* entitled Mathematical Theology. His publications included *Eternal Perspective and the History of Mathematics* (Fall 2022), *Overcoming Paradox: a lesson from Mathematics* (Winter 2023), and *In pursuit of the Infinite: Living in Paradox* (Spring 2023). This past May, Dr. Phillippy travelled to Oaxaca, Mexico as an advisor for the Collaboratory Bridge

team. The team built a concrete bridge connecting two parts of a mission compound that serves children and their families in an underdeveloped area in the outskirts of Oaxaca City.



Dr. Phillippy and the newly constructed bridge in Oaxaca, Mexico

Nicholas Weaver



In July 2022, Dr. Nicholas Weaver (2017 Messiah alum) successfully defended his PhD dissertation in Applied Mathematics at the University of Colorado Denver before returning to the CMP department as a Senior Lecturer of Mathematics in August 2022. Near the end of the summer, Dr. Weaver published the article *Longitudinal Reduction in Diversity of Maternal Gut Microbiota during Pregnancy is Observed in Multiple Low-Resource Settings: Results From the Women First Trial* with many coauthors. Being an early-career faculty member, Dr. Weaver participated as a MAA Project NExT Fellow for the 2022 - 2023 academic year. The fellowship allowed him to network with early-career faculty across the country and offered workshops, discussion groups, and minicourses focused on professional development. In May 2023, Dr. Weaver became an Assistant Professor of Mathematics within the department.

Scott Weaver



In June 2023, Dr. Scott Weaver participated for the 12th time as a grader of the AP Computer Science A exams in Kansas City, Missouri. In November 2022,

Retired Faculty News

Dr. Scott Weaver and CMP adjunct, Dr. Trevor Bunch submitted a joint paper to the 15th annual International Conference of Education, Research and Innovation entitled, *Introducing Project-Based Learning And Real-World Methodologies And Tools Earlier In The Software Development Curriculum*. Dr. Weaver presented the paper at the conference in Seville, Spain on November 8, 2022. He was also the chair of the session on Project-Based Learning.

Samuel Wilcock



Dr. Sam Wilcock graded AP Statistics exams in Kansas City in June. This was his 15th year grading AP Statistics. Dr. Wilcock also led two discussions on including faith in the teaching of statistics at the Joint Statistical Meetings (JSM) 2023 in August. One discussion was specifically about teaching at faith-based institutions, while the other was a panel discussion including two people who teach at faith-based institutions, and two who teach at secular universities. The panelists discussed how their faith worked itself out in their various locations. At the meetings, Dr. Wilcock was able to meet fellow Messiah alumni Drs. Brittney Bailey ('10), Paul Bernhardt ('08), David Kline ('10), and Jeff Morris ('93) for dinner.

Marlin Eby

Dr. Eby is thoroughly enjoying retirement. His eight children (and their spouses) along with eleven grandchildren keep him and his wife Julie quite busy. In April of 2020, they began taking weekly (schedule permitting) day-long drives as part of their COVID-recovery therapy. These drives allow them to spend a significant block of time together enjoying the beau-

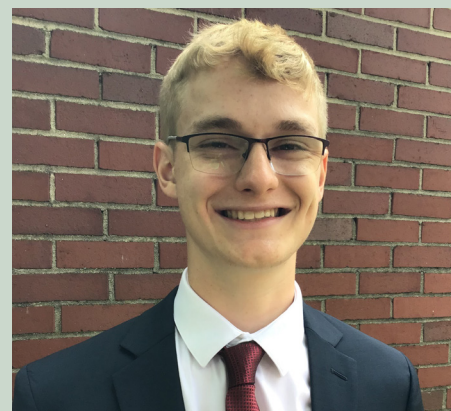
tiful and often breathtaking countryside and each other's company. Dr. Eby plans each drive and Julie becomes aware of the agenda only as it unfolds. Unplanned stops are fun and a surprise to even him. Through it all, Julie's delight is his delight.

Dr. Eby would be happy to keep in touch at ebymarlin@yahoo.com. As a "curmudgeon par excellence," he does not have a social media presence.

Student & Alumni News

- ◆ **Noah Andrews, mathematics major '23**, won the Pennsylvania Financial Planning Competition last year and was a recipient for the CAMAR Actuarial Scholarship for the 2022-2023 academic year. He also headed up a team from Messiah that participated in the 2023 Southeastern Collegiate Hedge Fund Competition where he performed a two-group discriminant analysis to determine which Industrial Oil & Metal stocks to buy and sell. He also performed back test under various market conditions through Monte Carlo simulations using Python. Noah and his team advanced to the final competition as one of the top 5 finalists. At Messiah, Noah received an honorable mention for Student Employee of the Year due to his incredible work and dedication as a teaching assistant for the

Mathematics of Finance course. Noah graduated last spring and is currently working as an Actuarial Analyst at Highmark Inc.



2023 Messiah University graduate Noah Andrews

- ◆ **Dr. Brittney Bailey ('10)** was awarded the Early Career Undergraduate Impact Award by Mu Sigma Rho, the National Statistics Honor Society. Citation: "For dedicated and innovative approaches to support and empower students through teaching, leadership, and efforts on behalf of the profession."



Dr. Brittney Bailey (Mathematics '10) wins the Early Career Undergraduate Impact Award

In Memory

Since the last publication of this newsletter we have lost two long-time, former members of our department. Dr. Gene Chase (a former editor of this newsletter) passed away on September 14, 2020, and Dr. Bob Barrett passed away on October 20, 2020. Both were beloved colleagues and will be remembered (in part) for the many valuable contributions they made to our department and the university as well.

Their obituaries can be found below:

[Gene Chase](#)

[Bob Barrett](#)

Student & Alumni News cont'd

♦ The Distinguished Alumnus Achievement Award recognizes a lifetime of vocational achievement in a manner that embodies the mission of the University. **Dr. Jeffrey S. Morris, class of 1993**, is the 2022 Distinguished Alumnus Achievement Award recipient. Jeff currently works for the

University of Pennsylvania as a professor of biostatistics and the division director of biostatistics at the Perelman School of Medicine, as well as a professor of statistics and data science at the Wharton School of Business.

♦ Spring 23 **Kyler Chrestay (Physics '14)** came back to Messiah and gave a nice presentation about his career as a Forward Deployed Engineer at Gecko Robotics in Pittsburgh. Kyler talked about his experience working for the company and gave career and life advice to current students.



Dr. Jeffrey S. Morris (Mathematic '93) wins the 2022 Distinguished Alumnus Achievement Award



Kyler Chrestay (Physics '14), talking about his career at gecko Robotics

Department News

In the fall of 2020, the Department of Computer and Information Science and the Department of Mathematics, Physics, and Statistics combined into a new department, the Department of Computing, Mathematics, and Physics (CMP).

This new department includes 13 full-time faculty members, and 10 majors (and some associated minors): 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. The department currently has 153 students enrolled in one of these majors.

The department held its annual "Welcome Back" picnic on September 15th, 2022 At Grantham Church. In addition to the usual activities, Dr. David Bibighaus introduced

water volleyball to our department.

Inspired by the former CIS Department, the newly formed CMP Department began offering advising nights during the fall of 2021. Students gather to eat pizza and make plans for the upcoming semester.

After the fall 2021 semester, the math lab



The CMP Department prior to the start of the fall 2023 semester



Water Volleyball at the "Welcome Back" Picnic



Future teachers Jillian Stoltzfus, Thomas Durika, Hanalee Nichols, and Haley Wagman with advisor Cindy Lehman

Department News cont'd



Students enjoy pizza at “Advising” night

and lounge moved from Frey 367 to Frey 351. In addition to serving as home for the Math Lab, where daily tutoring sessions take place, the room doubles as a “hangout” space for our majors.



Dr. Ben Huang interacts with students in the newly renovated CMP lounge



Students Callen Heise and Xie Lin Yong ponder Geometry in the CMP Lounge

The inaugural Adjunct Faculty Award for Teaching Excellence in 2022 was given to Dr. Trevor Bunch, with the award motivation: Trevor is not our average adjunct that teaches some labs or a 100-level class. Instead, he has for several years been teaching CIS 411 (Systems Analysis and Design) as well as the computer science writing-intensive capstone sequence CIS 471 and 472 (Application Development I and II). With 20+ years of private-sector IT consulting under his belt, he is uniquely qualified to teach these classes, where he helps students prepare for the step from undergraduate studies to the work force.



Adjunct Professor Dr. Trevor Bunch

Dr. Doug Phillippy, professor of mathematics, received the 2023 Dr. Robert and Marilyn Smith Awards for Outstanding Teaching, awarded to Messiah faculty members who have demonstrated a commitment to their students and the content they teach.



Dr. Doug Phillippy receives the 2023 Dr. Robert and Marilyn Smith Awards for Outstanding Teaching at the commencement ceremony.

FUTURE EVENT

The School of Science, Engineering and Health

will hold its

21st Annual Symposium

on

Friday, May 3,
2024.

If you live within driving
distance of the University,
we encourage you to attend

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.

Presentations and posters
from last year’s symposium

can be found at the

[Symposium](#) home page.

Program News

CIS

A new programming course, **CIS 281 Programming for user Interaction**, was added to the curriculum. This course will use JavaScript to introduce students to a functional programming paradigm, as opposed to the procedural paradigm used in CIS 181 (Programming I) or the object-oriented paradigm used in CIS 284 (Programming II). This course will expose students to programming challenges related to concurrency and asynchronous programming, as these are encountered in designing a responsive interface for user interaction. It will be required for the CIS-Computer Science, Software Development, Web Development and Digital Media concentrations, and will be optional for the other CIS concentrations.

Cybersecurity

Cybersecurity Education has been busy the past couple of years, graduating its first cohort in 2022. Student recruiting has gone well and the program has begun to establish a presence on campus. The program has either contributed to or led several events on and off campus. Here are some highlights:

- The program welcomed 40 guests to a Lunch and Learn in the Cyber Center on November 20, 2022. The event gathered cybersecurity industry experts, local businesses, and Messiah cybersecurity students and faculty for a shared meal and a time of connection, along with a lively panel discussion on cyber-related topics.



Students attend a talk sponsored by the newly formed local chapter of Women in Cybersecurity

- In the Fall of 2022, the program's female students launched a student chapter of Women in Cybersecurity (WiCyS). They hosted a lunch for female CIS,

Cybersecurity, and Business students in February of 2023, with special guest Christina Martin, Cybersecurity and IT specialist at Highmark Health and Messiah alum.



Our department's Cyber Defense Competition team

- In the Spring of 2023, six of our cybersecurity students competed in the Mid-Atlantic Collegiate Cyber Defense Competition (MACCDC), placing 6th out of 7 teams. They are already working hard to prepare for the 2024 competition.



Second annual Cyber Camp welcomes 26 students

- Our inaugural Cyber Camp took place in June 2022 with 20 high school students coming on campus for 5 days of being introduced to the world of cybersecurity. Cyber Camp 2023 gave us 26 students who enjoyed learning cyber concepts and making new friends.
- In June 2023, after a year and a half of gathering documentation and passing the initial stage of the submission process, we completed our application to become an NSA Center of Academic Excellence.

We hope to hear back soon of our official acceptance.

- We launched a [blog](#) and a [YouTube](#) channel!
- In June 2023, we welcomed Lynn K. Bigelow as Director of Cybersecurity Education. Lynn comes to Messiah with 10 years of experience as Director of Finance and IT at a fintech company, as well as 10 years of experience in developing an endpoint protection product at a cybersecurity company. Additionally, he served as a School Director for 12 years in a school district in southeastern PA. Lynn is also the parent of three Messiah alumni.

Mathematics

In the summer of 2022 we started offering an online “**Calculus Readiness Boot Camp**” to help incoming students brush up on their algebra and trigonometry skills before taking the calculus proficiency test at the start of the semester. In addition, we launched a new course, **MATH 105 Precalculus for the Sciences**, both as a summer online course and a face-to-face course in the fall semester, as an extra support for those who need to take calculus but didn't get the right preparation in high school.

A new course, **MATH 422 Mathematics Research**, has been created. Students can take 1, 2 or 3 credits of research, led by a faculty mentor, per semester. Up to 3 credits can count toward MATH electives, and any additional credits will count as general elective credits. Several students have already taken advantage of this new course by doing research with Dr. Lohss.



Students Noah Andrews, Abigail Herrlin, Skyler Hildebeitel, and Charles Humpert present their research at Penn State's Brandywine campus

Connection Opportunities



The Math Club celebrates Pi day

The Math Problem Solving Club had a wonderful year of fellowship and exploration of topics in mathematics beyond the classroom. Students participated in Derivative Jeopardy, explored questions in Number Theory, and learned about Fractals. The club also celebrated Pi Day with delicious pies and a Pi digit competition.

Physics

The Physics Club has not been quite as active in the last few years as it used to be pre-Covid, but it is starting to rebound. One of the most noticeable events in the last couple of years was a panel discussion on Philosophy, Science, and God, featuring several professors: Dr. Abaz Kryemadhi (Physics), Dr. Rick Schaeffer (Chemistry), Dr. Robin Collins (Philosophy), and Dr. Brian Smith (Bible & Religious Studies). The panelists discussed how their faith either helped or hurt their chosen career



The Physics Club hosts a panel discussion on Philosophy, Science, and God. From the left: Sam Neal (club president and moderator), Dr. Rick Schaeffer (Chemistry), Dr. Abaz Kryemadhi (Physics), Dr. Brian Smith (Bible & Religious Studies), and Dr. Robin Collins (Philosophy).

path. The event was organized by the Physics Club jointly with the Philosophy Club, and the discussion was led by Physics Club president Sam Neal ('23). The mask mandate was still in effect (as can be seen in the photo), and the event was live streamed due to limited seating capacity during the pandemic.

In December 2022, four physics majors, together with Dr. Kryemadhi and Dr. Hellgren, went to the American Physics Society Mid-Atlantic Section's annual meeting at Penn State University. We had an opportunity to attend a poster session and listen to many interesting presentations, including one from our very own Dr. Kryemadhi about "the gravitational effects of fine-grained streams of dark matter in the solar neighborhood and their implications for detection".



New Inductees into the Sigma Pi Sigma Physics Honors Society 2022. From the left: Ryan Thurber ('22), Nate Branson ('22), and Hanna Pavill ('23)

Three students were inducted into the Sigma Pi Sigma Physics Honors Society in the last couple of years; Ryan Thurber ('22), Nate Branson ('22), and Hanna Pavill ('23). To be inducted into this national society, students need to be a member of the Messiah University Physics Club (but do not necessarily have to be a physics major), have completed three semesters of physics classes (incl. Modern Physics), have an overall GPA ≥ 3.25 , and a physics course GPA ≥ 3.25 .

Internships: 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. Hellgren](#). Even if you live far from Messiah, we may have a student from a nearby hometown interested in a summer internship.

Career Talk: Are you an alum from the CMP department (or the former IMS, CIS or MPS departments) and thinking of visiting Messiah in the next year or so? Do you have a cool job and/or some career insights worth sharing with our current students? We would love to have you come give a presentation and give us a chance to reconnect. Time and details are flexible. If interested, please email [Dr. Hellgren](#).

Adjunct Teaching: 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. Hellgren](#) at One University Avenue, 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.

Financial Support: 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 – Office of Development, One University Avenue, Mechanicsburg, PA 17055-6804.

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DEPARTMENT OF
COMPUTING, MATHEMATICS
AND PHYSICS

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Address Service Requested

Financial Support continued from page 7

- 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.
- The Dr. Gerald D. Hess Research Fund directly supports student and faculty research, including research supplies and conference travel, for students studying biology, chemistry, and physics. To donate, go to <https://www.messiah.edu/HessFund>, and make sure to select “Hess Fund for Natural Sciences (Physics)” in the drop-down under Gift Information.
- 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.

From the Editor

I hope this edition of the newsletter finds you and your family well. It has been three years since the last edition of the newsletter was published. Much has happened during that time, more than I can possibly mention in this publication. While it has been a pleasure to re-establish this newsletter as a means to stay connected with our current and past students, it has also been a learning experience. I thank previous editors of this newsletter, Gene Chase and Marlin Eby, for providing a format that I could follow as I collected information and tried to pull it all together in this edition. As I look forward to next year's publication, I encourage you to send me updates that

you think might be worthy of including in next year's publication. While I cannot promise that everything I receive will be included in the newsletter, I can pass that information on to the department. As a department, we enjoy receiving those updates. You can also send updates that you want to be published to the [Class Notes](#) section of The Bridge, the University's magazine for alumni, parents, and friends. If you would like to update your email address with our department, please contact our administrative assistant, [Alisa Sentz](#).
Editor: [Doug Phillippy](#)