

# ANALYTIC THREADS

Annual newsletter of the Department of Mathematics, Physics and Statistics

Fall  
2017

## Faculty News



### Matthew Farrar

Congratulations to Drs. Emily (engineering) and Matthew Farrar on the birth of their second

child. Finnian Jude Farrar was born November 22, 2016.

In November 2016, Farrar (with K. Kolkman and J. Fetcho of Cornell University) presented the poster “Structural and Functional Correlates of Variation in Neuronal Numbers in the Locus Coeruleus of Zebrafish Imaged with Multiphoton and High-speed Light Sheet Microscopy” at the Society for Neuroscience’s 46th annual meeting in San Diego in California.

He also delivered the keynote address at the American Association of Physics Teachers – Central Pennsylvania Section meeting at the University of Scranton in April 2017. His presentation was titled, “Seeing Anew: How Advances in Microscopy Are Changing the Life Sciences.”

Farrar has taken on the project management role for the Diagnostics of Viral Disease Collaboratory project, a project targeted toward determining viral loads in developing countries with endemic HIV infections.



### Niklas Hellgren

Dr. Niklas Hellgren (with R. Haasch, S. Schmidt, L. Hultman and I. Petrov) published a paper in

Carbon (November 2016) titled “Interpretation of X-ray Photoelectron Spectra of Carbon-nitride Compounds: New Insights from in Situ XPS.”

In March 2017, Hellgren gave an invited presentation in the Lehigh University Center for Advanced Materials and Nanotechnology Seminar Series. His talk was titled “Inside Intel – The Materials Science of Advance Microprocessors.”



Top: Participants in the Physics Club and Engineering Department took a field trip to the NASA Goddard Space Flight Center. They are pictured in front of a 1:5 model of the Hubble Space Telescope  
Bottom: Harry Hawbecker and participants attended the Physics Demo Show April 17, 2017.

Faculty news, continued on page 2



### Abaz Kryemadhi

Congratulations to Dr. Abaz Kryemadhi, who was approved for a scholar chair for the 2017-2018

and 2018-2019 academic years! This includes a research stipend. This is the first such chair to be held in the MPS Department, or any of its predecessors.

Kryemadhi spent his fall 2016 sabbatical at the University of Tirana in Albania (his alma mater), where he placed a cosmic ray array which runs in tandem with an identical one at Messiah College. The goal was to search for rare astrophysical events, such as a break of early universe domain walls or high energy cosmic rays and dark matter. In addition to the research goals, he also mentored two junior faculty members and a master's student working on a thesis with the goal of developing experimental particle physics in Albania. Development of experimental particle physics is a requirement for Albania in order to join the Conseil Européen pour la Recherche Nucléaire (CERN), or European Council for Nuclear Research, which has the largest particle accelerator in the world.

In September 2016, while at the University, Kryemadhi presented "Development of Compact Particle Detectors" at the Second International Workshop on Recent Large Hadron Collider (LHC) Results and Related Topics. This workshop was sponsored by the French and Italian Embassies in Albania.

He also traveled to Siena, Italy, in October 2016 to attend the 14th Topical Seminar on Innovative Particle and Radiation Detectors, where he presented "Performance of LYSO and CeBr3 Crystals Readout by SiPM Arrays as Compact Detectors for Space Based Applications". This conference was limited to 150 experts worldwide in innovative particle detectors.

Kryemadhi (with Messiah undergraduate physics and engineering students L. Barner, A. Grove, J. Mohler, C. Sisson and A. Roth) published a paper in Journal of Instrumentation (February 2017) titled "Performance of LYSO and CeBr3 Crystals Readout by Silicon Photomultiplier Arrays as Compact Detectors for Space Based Applications."

Kryemadhi and students Lindsey Barner '17, Alexander Roth '17, Jacob Mohler '18 and Andrew Grove '18 spent spring break 2017 working at the Fermi National Accelerator Laboratory in Batavia, Illinois. They performed testing on a new

dark matter detection prototype they had developed as part of a NASA-funded project. A NASA grant (\$5,652) was received this year to fund students and travel to Fermi. The Department of Energy, which supports Fermi, provided an in-kind contribution to allow use of the accelerator facility at no charge (estimated at \$70,000).

The 2016-2017 academic year marked the second year of Kryemadhi's 2016-2018 Templeton Foundation Grant. He is working with Robin Collins (philosophy) to further the discoverability livability hypothesis drawing from particle physics.

He also served as president of the American Association of Physics Teachers - Central Pennsylvania Section for 2016-2017.



### Cynthia Lehman

Professor Cindy Lehman participated in the Council for Christian Colleges & Universities (CCCU)

workshop, "Best Practices for Teaching First-Generation Latino Students: A Practical Workshop," which was held in San Jose, Costa Rica, in May and June 2017.



### Douglas Phillippy

Congratulations to Dr. Doug Phillippy on his promotion to professor!

In June 2017, Phillippy presented "Finding Meaning in Calculus (and Life)" at the 21st Biennial Conference of the Association of Christians in the Mathematical Sciences (ACMS) held at Southern University in Charleston, South Carolina.

Note: For personal reasons (moving), Dr. Gene Chase (retired) did not attend this conference – the first time that he had missed an ACMS conference.

As many of you know, Phillippy is a serious runner. In October 2016, he finished first in his age group in a half-marathon in Hershey. In November 2016, he finished second in his age group in a marathon in Harrisburg.



### Samuel Wilcock

In June 2017, Dr. Sam Wilcock was a ninth-time participant in the Statistics AP Reading held in

Kansas City, Missouri. He joined several departmental alumni in that endeavor.

## Welcome



### Amanda Lohss

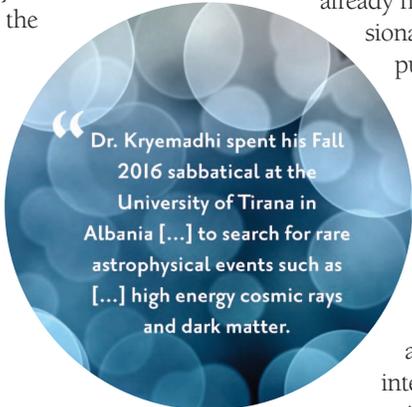
In fall 2017, Dr. Mandy Lohss will join the Department of Mathematics, Physics and Statistics

as an assistant professor of mathematics. She received her Ph.D. in mathematics (probabilistic combinatorics) from Drexel University in 2017. Previously, she earned a B.S. and M.S., both in mathematics, from York College of Pennsylvania and Drexel University, respectively.

Lohss enjoys collaboration with other mathematicians and is looking forward to working with undergraduate students, as well. She is especially anticipating being a faculty member in a Christian liberal arts college. As a young professional, she already has numerous professional presentations and publications to her credit.

She has passed the first two actuarial certification exams (P - Probability and FM – Financial Mathematics) and will play an integral role in our actuarial science major, which debuts in fall 2017.

Lohss has been accepted as a Project NExT Fellow by the Mathematical Association of America (MAA). Project NExT (new experiences in teaching) is a national and competitive professional development program for new or recent Ph.D.s in the mathematical sciences. Fellows learn together about all aspects of an academic career: improving the teaching and learning of mathematics; engaging in research and scholarship; finding exciting and interesting service opportunities; and participating in professional activities. As a fellow, she attended, and will attend, targeted professional development seminars at MAA national meetings in July 2017, January 2018 and July 2018. She lists her hobbies as running, traveling and hiking. She and her husband Shane are natives of Dover, Pennsylvania. He is currently a third-year medical student at Lake Erie College of Osteopathic Medicine. Previously, he earned his B.S. in biology and MBA, both at York College of Pennsylvania.



“Dr. Kryemadhi spent his Fall 2016 sabbatical at the University of Tirana in Albania [...] to search for rare astrophysical events such as [...] high energy cosmic rays and dark matter.”

## Belated Welcome



### Harry Hawbecker

In fall 2016, Harry Hawbecker joined the Department of Mathematics, Physics and Statistics as a physics laboratory technician and adjunct instructor of physics.

Hawbecker was born in Monterey, Mexico. He moved with his family to Laredo, Texas, when he was two years old. After college, he moved to Tallahassee, Florida, and then to Pennsylvania in July 2015.

Hawbecker earned his B.S. in physics and mathematics from Texas Christian University. Later, he did graduate work in physics at Florida State University. Prior to coming to Messiah, he worked for 13 years as an education assistant at Challenger Learning Center of Tallahassee and for two years teaching high school physics at Florida State University High School.

His hobbies are inventing and making items to demonstrate how wonderful physics and science are; woodworking; refurbishing antique items, especially old science equipment; rock hounding and collecting; and selling things he made online.

Hawbecker lives with his wife Johanna and daughter Maya Elisabeth (12) in Camp Hill. Johanna received her B.S. in social work from Texas Christian University and MSW from Florida State University. She is the executive director of the National Association of Social Workers – Pennsylvania Chapter in Mechanicsburg.

## Thank You & Farewell



### Christine Robinson

Spring 2017 was Dr. Christine Robinson's last term at Messiah. She joined our department in fall 2014 as assistant professor of mathematics. She has moved with her family – husband Matthew and children Wesley (7) and Zola (4) – to Bonn, Germany. The Robinsons previously lived in Berlin (2012-2013) while she was writing her dissertation and he was doing dissertation research at the University of Berlin.

When she came to Messiah, her husband was completing his Ph.D. in religious studies, with a concentration in theology, from Northwestern University. He was awarded his doctorate in 2015.

His dissertation was on Friedrich Schleiermacher's idea of "free sociability" and the role of close personal relationships in the individual religious development.

In fall 2016, he accepted a three- to six-year postdoctoral position (research and teaching) on the faculty at the University of Bonn. She is currently teaching part time at the International University of Bad Honnef while looking for a full-time position. In fall 2017, she will begin an MSc program in Life Science Informatics at the University of Bonn.

We will greatly miss her. Her commitment to high standards in teaching and research inspired us. Her energetic approach to life often left some of us feeling fatigued. She was a valued colleague and took leadership of several department initiatives. She always found time to talk with colleagues and students. Her interest in students and mathematics led her to serve as the advisor of the Math Club.

Students and colleagues with their families celebrated her tenure at Messiah with an open house brunch hosted by Professor Lehman with primary coordination provided by several students.

We wish her and her family well in their future endeavors.

## Student News Honors



Congratulations to the Department's top scorer on the physics major field test, **Tyler McManiman!**



Congratulations to the Department's top scorer on the mathematics major field test, **Benjamin Kragt!**



**Megan Scala** graduated with department honors in mathematics. Her thesis was titled "Tournaments on Tournaments: Using Graph Theory to Analyze Tennis Tournaments."



**Kelly Schwiker** graduated with department honors in mathematics. Her thesis was titled "Applying Graph Theory to NCAA Basketball Tournaments."



**Emilie Smetak** graduated with department honors in mathematics. Her thesis was titled "Modeling and Forecasting Zimbabwe's Trade Exports with Time Series Analysis."



**Nicholas Weaver** graduated with department honors in mathematics. His thesis was titled "Graph Coloring Games."

## Presentations

In January 2017, **Lindsey Barner '17**, **Alexander Roth '17**, **Jacob Mohler '18**, **Andrew Grove '18**, **Caleb Sisson '19** and **Dr. Kryemadhi** presented "Development of Compact Particle Detectors for Space Based Instruments" at the April meeting of the American Physical Society in Washington, DC.



(From left to right): **Lindsey Barner ('17)**, **Alexander Roth ('17)**, **Jacob Mohler ('18)**, **Andrew Grove ('18)**, **Caleb Sisson ('19)**, and **Dr. Kryemadhi**

Student news, continued on page 4

## Summer Activities 2017: Discipline-Related

**Lindsey Barner '17** had an internship at the Johns Hopkins University Applied Physics Laboratory in Laurel, Maryland.



**Jacob LaGrand '18** had an informatics/data analytics internship at PerformCare a subsidiary of AmeriHealth Caritas in Harrisburg, Pennsylvania.



**Trieu Luu '19** had an internship at Aurora AR in San Francisco, California. He used his Messiah skills while working on optics (physics), tracking and graphics (linear algebra).



**Hallie Miller '18** had a SURF (Summer Undergraduate Research Fellowship) at the National Institute and Standards of Technology in Gaithersburg, Maryland.

## Class of 2017: Employment and Education Placements (To Date)

**Tyler McManiman** (physics with certification): Northern High School in Dillsburg, Pennsylvania – physics teacher



**Sara Melson** (mathematics with certification; computer science minor): Littlestown High School in Littlestown, Pennsylvania – mathematics teacher



**Andrew Murray** (physics with certification): Twin Tiers Christian Academy in Breesport, New York – physics teacher

**Meagan Scala** (mathematics; accounting minor): Walz Group in Lancaster, Pennsylvania – accounting/audit intern

**Kelly Schwiker** (mathematics; computer science minor): Northwestern Mutual in Scranton, Pennsylvania – college financial representative

**Emilie Smetak** (mathematics, English – writing concentration): public policy and international development (MPP) at College of William and Mary

**Nicholas Weaver** (mathematics; statistics minor, economics minor): applied mathematics (Ph.D.) – University of Colorado-Denver

## Department News

The Department of Mathematics, Physics and Statistics houses six majors: actuarial science, mathematics, mathematics with certification, physics (B.A.), physics (B.S.) and physics with certification. It also houses three minors: mathematics, physics and statistics. Full-time faculty members are Dr. Eby, Dr. M. Farrar, Dr. Hare, Dr. Hellgren, Dr. Kryemadhi, Prof. Lehman, Dr. Lohss, Dr. Phillippy, Dr. Widmer and Dr. Wilcock (chair).

## MPS Department Graduates

Eleven students graduated in December 2016 and May 2017 with majors in the MPS Department. One of these was a double major with the second major in another department. Here is the breakdown by major.

**Mathematics: 6**

**Mathematics with certification: 3**

**Physics with certification: 2**

## Program News

### Actuarial Science

In fall 2017, the Department of Mathematics, Physics and Statistics will launch a new major: actuarial science (B.S.). It is a mathematics-statistics interdisciplinary major and will be somewhat unique as it will combine the requirements of the actuarial profession with many of the requirements of our mathematics major. This will allow flexibility for those actuarial science majors who change their mind and want to easily move into another major (e.g., mathematics). Generally, the actuarial science programs at other schools do not have this flexibility.

This major necessitates the creation of only two new courses: MATH 450 – Mathematics of Finance II and STAT 345 – Time Series Analysis. MATH 350 –

Mathematics of Finance I had previously been catalogued as an upper-level elective for mathematics and mathematics with certification majors. For the complete curriculum, see [messiah.edu/ascourses](http://messiah.edu/ascourses).

We are building an actuarial science resource list of Messiah Colleges graduates who are working, or have recently worked, at any level in the actuarial science field. If Dr. Eby has not already contacted you about having your name included on that list, please email him at [eby@messiah.edu](mailto:eby@messiah.edu).

If you are one of these graduates, we hope that you will be willing to be on our list of actuarial science resource persons. Sometimes, a student has a question that is best answered by a professional actuary. It is helpful for us and them if we can refer them to you and they can ask their question directly by email. We also hope that some of you, if your logistics allow, will be able to visit us sometime to meet with and speak to our students. Please do not feel any pressure from us to be involved more than you wish or are able to.

## Mathematics

One of the major 2016-2017 Math Club (Math Problem-Solving Group) activities was building an 18.75-inch (cube) Menger



Menger sponge on display in Murray Library

sponge (or Menger universal curve) using 2,784 business cards. The final product was displayed in Murray Library. (See photo.) Dr.

Robinson advised the club in the fall and Dr. Widmer advised the club in the spring.

## Physics

In November 2016, the MPS Department, together with the Biological Sciences Department and the Chemistry & Biochemistry Department, hosted the Seventh Annual Nobel Prize Seminar. Dr. Hellgren gave a presentation on the Nobel Prize in Physics for theoretical discoveries of topological phase transitions and topological phases of matter.

Also in November 2016, three students were inducted into the Sigma Pi Sigma Physics Honors Society: Lindsey Barner '17, Andrew Grove '18 and Hallie Miller '18.

In January 2017, the Physics Club, together with members of the engineering department, took a field trip to the NASA Goddard Space Flight Center in Greenbelt, Maryland.

The DEMO SHOW was a popular activity in April 2017. It was conducted by the Physics Club and Mr. Hawbecker. They offered an interactive program featuring fire and lasers dancing to music, glowing liquids and lightning bolts. About 100 people attended. After the show, children performed some hands-on experiments.

The first cohort of physics minors graduated in May 2017: Lindsey Barner, Alexander Roth and Jonathan Lord. All three were engineering majors.

## Opportunities for Adjunct Teaching at Messiah

Are you or someone you know interested in teaching mathematics or physics at Messiah College? 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. Wilcock at One College Avenue, Suite 3041, Mechanicsburg, PA 17055-6807. The MPS department often needs part-time adjunct instructors to teach general education courses, and we welcome applications from alumni and their friends and family.

## Address Reminder

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

*Name of faculty member*  
One College Avenue, Suite 3041  
Mechanicsburg, PA 17055-6807



Top: D0 Particle Detector at Fermi Laboratory  
Top Left: Dr. Kryemadhi with Lindsey Barner, Jacob Mohler, Alexander Roth, and Andrew Grove inside the D0 particle detector at Fermi Laboratory. The detector is approximately three stories high  
Bottom: 2016-2017 inductees into the Sigma Pi Sigma Physics Honors Society: Hallie Miller, Lindsey Barner, and Andrew Grove

# Alumni Campus Presentations

## John Ripollone

John Ripollone '12 (microbiology and biochemistry major, 5/6 statistics minor) visited Messiah March 1 -3, 2017. He



John Ripollone lecturing in STAT 325 – Experimental Design on March 3

received his MPH in biostatistics in 2013 from the State University of New York Downstate Medical Center and is currently a Ph.D. candi-

date in epidemiology at Boston University. At the time of his visit, he was clinical data manager for the Massachusetts Veterans Epidemiology Research and Information Center, VA Boston Healthcare System in Boston.

Ripollone gave three presentations: in the Biological Sciences Seminar on March 2 (“Biology and Statistics as Critical, but Imperfect, Tools for Causal Inference in Epidemiology”), in the STAT 292 – Statistics for the Mathematical Sciences II class and STAT 325 – Experimental Design class on Friday.

## Jonathan Hartzel

Jon Hartzel '93 (mathematics major, statistics minor) visited Messiah April 21, 2017. He received his Ph.D. in statistics in 1999



Jonathan Hartzel's Statistics presentation on April 21 in Frey 143 (a room that no longer exists)

from the University of Florida and is currently executive director, biostatistics at Merck Research Laboratories in Blue Bell, Pennsylvania.

He gave a specially-scheduled presentation titled “My Life as a Biostatistician.”

# Collaboratory News

Staff and students from the MPS Department continue to be heavily involved in projects within the Collaboratory for Strategic Partnerships

and Applied Research (messiah.edu/collaboratory/).

# Future Events

## Saturday, October 21, 2017

### Homecoming “+/- 4 Continental

**Breakfast”** - All 2014, 2015, 2016 and 2017 MPS Department graduates are invited to a continental breakfast in Frey 350 from 9 to 10:30 a.m. on Homecoming Saturday. All department students will also be invited. We look forward to a beneficial time for all alumni, students and staff in attendance. In particular, our current students can learn much from our alumni. If possible, plan to be there for the entire time. Email our administrative assistant, Jean McCauslin (jmccausl@messiah.edu) by Wednesday, October 18, if you plan to attend.

## Monday, November 13, 2017

### Alumni Mathematics and Physics

**Teacher Dinner** - Each fall, our MATH 407 (Professional Issues in Secondary Mathematics Education) and PHYS 407 (Professional Issues in Secondary Physics Education) classes of current student teachers invite alumni who are secondary mathematics or physics teachers to join them for dinner. They are very interested in hearing your advice for new teachers, how to find a good job and how to be an effective and sane teacher of adolescents. The dinner will be held from 6 to 7:30 p.m in the Private Dining Room (PDR) near Lottie Nelson Dining Hall. It is free, and the conversation is friendly and helpful. If you are a secondary mathematics or physics teacher and can join us, please email our administrative assistant, Jean McCauslin (jmccausl@messiah.edu) by November 6.

## Friday May 4, 2018

### School of Science, Engineering and Health 14th Annual Symposium -

The MPS 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 College, 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 in Spring 2018 (messiah.edu/seh\_symposium).

# Request for Internship Opportunities

Does your employer hire interns in mathematics, physics, statistics or actuarial science? Our majors often pursue minors in business, economics or statistics and are seeking internships in their third and fourth years. Please inform the MPS Department of such opportunities by emailing Dr. Wilcock (swilcock@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 College 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 College that is earmarked as described below.

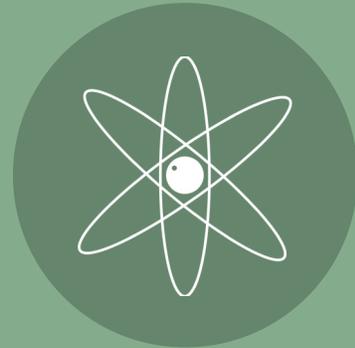
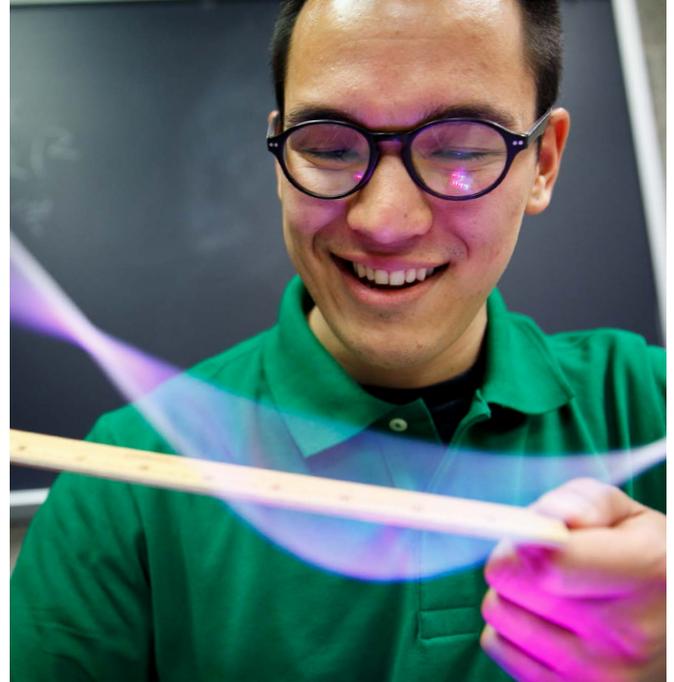
- Send your *tax-deductible gift* – check made payable to Messiah College – to Office of Development, One College Avenue, Suite 3013, Mechanicsburg, PA 17055-6807.
- To make a *donation to the Department of Mathematics, Physics and Statistics*, put MPS Dept. on the memo line of your check.
- To *support the Collaboratory Diagnostics of Viral Disease project*, put Collab. – DVD project 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.
- If you are interested in *contributing to a scholarship for students in the MPS 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 MPS Department*, contact the Office of Development. It takes \$2 million to underwrite an endowed scholarship chair.



# Mathematics

Reason logically to answer challenging questions.

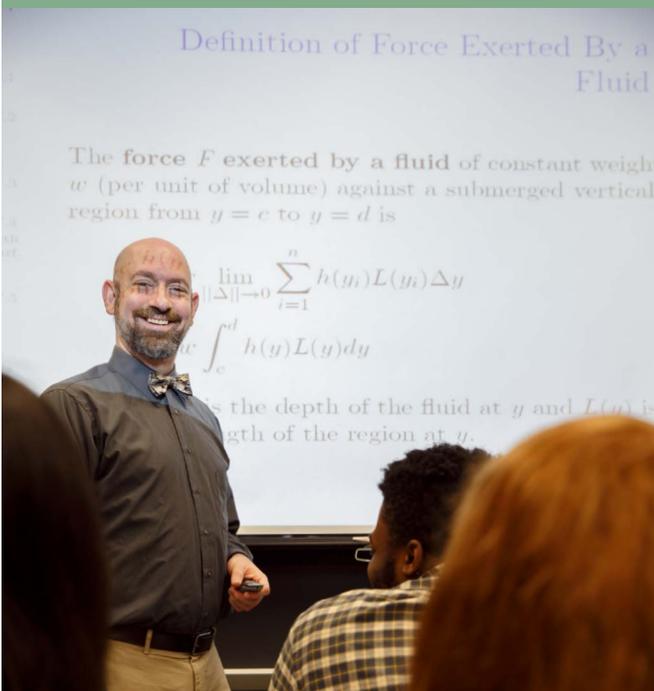
Go beyond the realm of mere facts and numbers as you develop creative problem-solving skills you can apply to complex problems in almost any field. With Messiah's Christian professors as your guides, experience the intricate balance of art and science and learn to maximize both your intuitive and analytical 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*.





DEPARTMENT OF MATHEMATICS,  
PHYSICS AND STATISTICS

One College Avenue Suite 3041  
Mechanicsburg PA 17055

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## **ANALYTIC THREADS**

*Analytic Threads* is the annual newsletter of the Department of Mathematics, Physics and Statistics (MPS) at Messiah College. It is sent annually to alumni and is also available electronically at the website [messiah.edu/MPS](http://messiah.edu/MPS).

# Parting Thoughts

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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 College was bigger than the MPS department, we encourage you to send the updates that you want to be published to the Class Notes section of *The Bridge*, the College's magazine for alumni, parents and friends ([messiah.edu/alumni/sendnews](http://messiah.edu/alumni/sendnews)).

To update your email address, please contact our administrative assistant, Jean McCauslin, at [jmccausl@messiah.edu](mailto:jmccausl@messiah.edu).

Editor: Dr. Marlin Eby ([Eby@messiah.edu](mailto:Eby@messiah.edu))