

The Mathematical Association of America
New Jersey Section

Spring Meeting

held in conjunction with the

Mathematics Association of
Two – Year Colleges of New Jersey

and the

Garden State Undergraduate
Mathematics Conference

Saturday, April 2, 2022



Schedule

8:30 – 9:00	<p>Networking</p> <hr/> <p>GSUMC: Math Competition Login</p>
9:00 – 9:15	<p>Welcome. <i>Amanda Beecher, Chair of MAA-NJ.</i></p> <p>MAA Congress Report. <i>Karen Clark, The College of New Jersey</i></p> <hr/> <p>GSUMC: Math Competition (9:00-10:05)</p>
9:15 – 10:05	<p><u>Stirling’s Formula: A Monthly Habit.</u> <i>Michael Pearson, Mathematical Association of America.</i> Presider: Tuan Le, Camden County College.</p> <hr/> <p>GSUMC: Math Competition (9:00-10:05)</p>
10:05 – 10:45	<p>Networking</p> <hr/> <p>MATYCNJ: Business Meeting</p> <hr/> <p>GSUMC: Poster Session</p>
10:45 – 10:50	Break
10:50 – 11:40	<p><u>Panel: Developing Data Science programs in NJ</u></p> <hr/> <p><u>Paper Session: General Contributions</u></p> <hr/> <p>GSUMC: Student Presentations</p>
11:40 – 11:50	Break
11:50 – 12:40	<p><u>Projective and Non-Abelian SET.</u> <i>Catherine Hsu, Swarthmore College.</i> Presider: Sheila Tabanli, Rutgers University.</p>
12:40 – 1:00	<p>Student Awards (if completed)</p> <p><u>Award For Distinguished College or University Teaching</u></p> <p><u>Recognition of NJ-NExT Fellows</u></p> <p>Closing Remarks. <i>Amanda Beecher, Chair of MAA-NJ.</i></p>

[MAA Code of Conduct: In Support of a Welcoming and Inclusive Community](#)

Abstracts and Biographies of Plenary Speakers

Stirling's Formula: A Monthly Habit

Michael Pearson

Mathematical Association of America

Abstract: Stirling's formula provides a remarkably accurate asymptotic estimate for the growth of the factorial $n!$ for large values of n . James Stirling provided a proof in 1730. Perhaps because of the simplicity of the formula and the ease of observing the basic form of the estimate, it's been attracting mathematicians ever since. In fact, it seems that there has been an average of at least three proofs per decade published in the American Mathematical Monthly over the last 70 years, as well as various other notes and articles that build on or expand Stirling's work. We'll take a discursive look at a few of these notes, with a bit of history of some of the contributors.

Michael Pearson received a bachelor's degree from the University of Mississippi in 1980, a master's degree from Mississippi State University in 1982 and a Ph.D. (Harmonic Analysis) from The University of Texas at Austin in 1989. Prior to joining the MAA (in 2002), he served on the faculty at Florida International University (1989-1992) and Mississippi State University (1992-2002).



As Executive Director, Michael provides leadership to advance the mission of the MAA to further the understanding of mathematics and its impact on our world. As a long-time member of the MAA, he is delighted to have the opportunity to work closely with colleagues who share the sense of community and common purpose that he sees as the fundamental strength of the Association.

During his tenure as Executive Director, Michael has overseen significant restructuring of MAA governance and publications management. Recent MAA efforts include the [2015 Committee on the Undergraduate Program Curriculum Guidelines](#), the [MAA Instructional Practices Guide](#) (2017), and reports from national projects on efforts to [improve student success in introductory mathematics courses](#). The ongoing NSF-funded [Preparation for Industrial Careers in Mathematical Sciences](#) program has engaged thousands of students at more than 200 colleges and universities with business, industry, and government partners to tackle real-world problems, many of which depend on data science. Efforts are underway to expand such programs to accelerate the engagement of mathematics faculty and

departments efforts to modernize the undergraduate mathematics program with focused attention towards broadening participation at all levels.

Projective and Non-Abelian SET

Catherine Hsu

Swarthmore College

Abstract: Mathematicians love SET. On the surface, this classic game is a contest of pattern recognition, but it also presents an interesting way to visualize the geometry of a torus over a finite field. In this talk, we will discuss some of the mathematics connected to SET and then explore several new versions of the game, including one arising from projective geometry and one arising from non-abelian groups. In particular, we will see how these non-abelian variations on SET can give intuitive visualizations of abstract group structures.

Catherine Hsu is an Assistant Professor in the Department of Mathematics and Statistics at Swarthmore College. Her mathematical interests began as a penchant for logic puzzles and problem solving and grew into a love of abstract algebra and Galois theory while she was an undergraduate student at Rice University. Her research is now primarily in algebraic number theory, including projects related to modular forms and Apollonian circle packings. She also enjoys thinking about mathematical exposition, pedagogy, and unnecessarily complicated strategies for the card game Hanabi.



Prior to joining Swarthmore in the fall of 2020, Hsu was a Heilbronn Research Fellow at the University of Bristol as well as an AAUW American Dissertation Fellow and a Doctoral Research Fellow at the University of Oregon. As a junior researcher, she has greatly enjoyed traveling and speaking at conferences around the world and is looking forward to meeting new mathematicians as part of the MAA-AWM Lecturer program.

Panel: Developing Data Science programs in NJ

Abstract: The world has been inundated with data. Businesses and organizations across all industry sectors, both small and large, are increasingly looking for ways to leverage the era of Big Data to make strategic, marketing, sales, and other operational decisions. This shift to data-driven decision making is creating a growing workforce demand for Data Science and Analytics professionals. Several two-year and four-year colleges in New Jersey have created data analytics/science certificates and programs to meet this labor market demand. This panel discussion will revolve around developing programs, data science courses, technology, and resources and building pathways from two-year to four-year colleges. Come join the conversation about building data science capacity in NJ.

Moderator:

Meimee Persau, County College of Morris

Meimee Persau, a Professor of Mathematics at the County College of Morris, has taught Mathematics and Engineering courses at CCM for more than a decade, and has taught numerous Probability and Statistics courses. She is on the Executive Board of MATYCNJ and is the Chairperson of the Morris Area Mathematics Alliance. Prior to teaching, she used data in various industries as an electrical engineer and especially as a Quality Assurance engineer.

Panelists:

Amanda Beecher, Ramapo College of New Jersey

Amanda Beecher is an Associate Professor of Mathematics at Ramapo College of New Jersey. She earned her Ph.D. from the University at Albany, SUNY. Before arriving at Ramapo, she had a three-year post-doc at the US Military Academy, where her interests in applied mathematics were fostered. She co-chaired a task force that created the Data Science major, lead the creation of a Data Science minor, and assisted in the development of the Master's in Data Science program.

Kelly Fitzpatrick, County College of Morris

Professor Kelly Fitzpatrick, Associate Professor of Mathematics, has taught at CCM since 2010 in the Mathematics Department. Prior to that, she worked in hedge fund management and quantitative strategies for various financial firms. Fitzpatrick is a graduate from Columbia University, M.A. and B.A. in Mathematics from the State

University of New York at Geneseo. She is also the principal investigator for NSF ATE grant # 2000887, Expanding Pathways to a Data Science Career by Developing a Certification in Data Science and Analytics. CCM has developed a 16-credit certificate and three new courses in data analytics.

Tom Hagedorn, The College of New Jersey

Tom Hagedorn has been a professor at The College of New Jersey since 1996. He earned his doctorate from Harvard University in number theory and taught for three years at Wesleyan University. As chair of TCNJ's Mathematics and Statistics department, he co-led the creation of TCNJ's Data Science Specialization in Mathematics in 2019.

Susan Monroe, Brookdale Community College

Sue Monroe is an Associate Professor of Mathematics at Brookdale Community College since 2007. She holds a BA in Mathematics from Colgate University a Ph.D. in Applied Mathematics from SUNY Stonybrook. Prior to Brookdale she worked in government and industry as an Operations Research Analyst. In 2019 she co-led with Professor Hanli Huang the proposal of a data science program option at Brookdale. The option became available in Spring of 2022.

Abstracts of Contributed Papers

General Contributions

Organizer: Kathy Turrisi, Centenary University

Presider: Dawn Nelson, Saint Peter's University

10:50 – 11:00: Undergrad Research and Zombies

Grace Cook, Bloomfield College

Abstract: In the fall of 2017, I started a research project on the mathematics required to survive on an apocalyptic/post-apocalyptic Earth as a way to fill in the extra time each week for our work study tutors. We scoured the CDC, FEMA, and WHO websites as well as Reddit and prepper/survivalist websites to find any mention of mathematics. In addition, we examined pop culture resources such as novels, mangas, movies, television shows, and video games for mathematical survivalist tips. Our raw data was entered into Dedoose and qualitatively coded. In this presentation, I will discuss both the logistics of running an atypical undergrad research project and share our findings. As a novel way to present our results, we are in the process of creating a comic that tells the story of a group of mathematics students who are struggling to find their way after a zombie apocalypse. While this project started out as a fun way to include more students in research, we have begun to ponder the implications for mathematics in real world circumstances such as war zones, the aftermath of hurricanes, and during a pandemic.

11:02 – 11:12: What Is The Next Possible Term In Some Seemingly Popular Integer Sequences?

Jay L. Schiffman, Rowan University (Retired)

Abstract: Determining the next term in an integer sequence is a routine that is open-ended serves to generate multiple (in fact, infinitely) many possible solutions. This talk will discuss five integer sequences and seek multiple solutions with audience participation encouraged. At a time when all faculty and mathematicians in general are yearning for engagement from all, such an activity aids in fulfilling this mission. For participants

viewing the abstracts prior to our virtual meeting, I present for you the following five integer sequences where in each case the initial four terms are furnished. Enjoy and have fun!

Five Popular Integer Sequences:

- 1) 1, 3, 4, 7, ...
- 2) 1, 16, 81, 256, ...
- 3) 1, 3, 6, 10, ...
- 4) 3, 4, 5, 12, ...
- 5) 1, 2, 2, 3, ...

11:14 – 11:24: An Introduction to an Extension of Distance Domination

Alicia Muth, Stevens Institute of Technology (Doctoral Candidate)

Abstract: The component order neighbor connectivity of a graph, a measure of the vulnerability of a network, is the number of vertices that need to fail and consequently fail their adjacent neighbors to produce a component of order less than some given threshold. The instance where the threshold value is one coincides with domination and has been widely studied. One variation of domination is Distance Domination. This parameter indicates a failed vertex to also fail their neighbors within a fixed distance away. The goal of this paper is to explore distance domination and determine which properties carry over to higher threshold values and which do not.

11:26 – 11:36: Nurturing Metacognitive Skills in a First Year Calculus Course

Sheila Tabanli, Rutgers University

Abstract: There is a large body of research on the importance of teaching students explicitly about the ways of learning effectively. One way to incorporate the metacognitive skill of self-assessing how well the learning and studying are happening, the author designed low-stakes assessments as warm-up activities in her f2f Calculus-I classes. The author recently developed a new non-Math course that is targeted to improve students' mathematical learning and studying skills based on neuroscience and cognitive psychology. One of the topics covered in this non-Math course is to learn about frameworks to categorize types of learning and the cognitive complexity of activities. Fink's Taxonomy of Significant Learning has categories of "Learning how to Learn" and "Human dimension". The in-class activities designed in the Math course are inspired from

this specific topic with the goal of incorporating metacognitive skills in her Math classes. The presentation will include the class activities to nurture metacognitive skills in a first year Calculus course inspired from the cognitive psychology principles of learning effectively. We hope to inspire more faculty to incorporate evidence-based strategies into their teaching practices.

**New Jersey Section Award
For Distinguished
College or University Teaching of Mathematics
Dr. Grace Cook**

The New Jersey Section of the Mathematical Association of America is pleased to present its 2022 sectional award for Distinguished College or University Teaching of Mathematics to Dr. Grace Cook of Bloomfield College.



Dr. Cook is an Associate Professor of Mathematics at Bloomfield College, where she has helped teach, coordinate, develop and support the mathematics program since 2013. She has proven to be a highly effective mathematics educator. She holds a Master of Science in Applied Mathematics degree from Stevens Institute of Technology and a Doctor of Philosophy in Education from Walden University. Moreover, she holds a NJ Department of Education Teacher of Mathematics Highly Qualified Teacher certification.

She has taught throughout the mathematics curriculum and is often cited as being extremely effective for non-mathematics majors in the general education courses. Her colleagues and students repeatedly described her ability to teach to the whole student rather than just teaching mathematics or academic skills, which leads to far greater outcomes than just test scores. She brings a positivity and enthusiasm to all that she does, including her teaching, which can be felt by all who know her. This is routinely expressed by her colleagues and students. Students typically wrote about Dr. Cook's positive characteristics, for example "The way she was enthusiastic about the class and helped us with anything we needed." One of her colleagues describes Dr. Cook as:

"She is intelligent, thoughtful, creative, enthusiastic, dedicated, organized, reliable, cheerful, and incredibly hard working. She is always giving with her

time, and knows exactly how to motivate those around her. The words no or I can't do not exist in her vocabulary. She knows precisely when a student needs to be nurtured, and even more importantly she knows how to empower her students to be successful: Grace is one of the best educators I have ever met, but more importantly, she is one of the best individuals I have ever met.”

Dr. Cook contributes to the curricular development at Bloomfield College within and beyond the mathematics curriculum. She is the mathematics coordinator and the coordinator of First-Year Mathematics. In these roles, she must adapt the curriculum to the needs of the students. A colleague describes Dr. Cook’s contributions to student development through the curriculum as:

“In the time she has been at Bloomfield, she has been the definition of a team player. She is energetic, committed, and willing to work with other departments to further our common educational goals. She has done a wonderful job with the freshman level program. She has made changes as the program evolves to meet student needs. Grace has coordinated our summer program for freshmen. This unique program provides an introduction to college work and gives students an opportunity to meet the needs of the first mathematics course prior to the beginning of their freshman year.”

Additionally, the Education Department asked her to help improve pass rates for the Praxis exams, which have a large mathematics portion. She helped develop content to be added to the education program to help students succeed. Consequently, a colleague noted that “student pass rates for this portion of the exam have greatly improved.” She also teaches Educational Technology for the department.

Dr. Cook also established a peer-tutoring program at Bloomfield College. She recruits upper-level students to be peer-tutors to help first-year students through their mathematics courses. The upper-level students are selected, because they have demonstrated success in mathematics. So, the tutors are not just mathematics majors. It was noted that “This program has been successful, not only for the first-year students who are helped, but also for the tutors themselves.” Overseeing this program provides an additional opportunity for Dr. Cook to help educate the whole person while supporting the specific academic needs of first-year students.

Dr. Cook shares her teaching practices (successes and not-as-successful attempts) with the mathematics community, particularly at the MAA-NJ Section meetings and MAA MathFest. Her talks at the Section meetings include *Working with Work Study: Research Adventures in a Liberal Arts Setting*, *A Graphical Forest*, *Assessing Outside of the Box in Discrete Math*, and *Undergrad Research and Zombies*. She also contributes to table discussions, including those that impact NJ such as *Retaining Students in Mathematics*,

The Common Core and its Implications for Higher Ed Mathematics, The State of Teacher Preparation in New Jersey, and The Future of the Section. In other venues, she has given talks and posters on *Adventures in Online Teaching with First Year Students, Careers in Mathematics, Online Math with OER, Surviving the Apocalypse with a Compass and Straightedge, and Hits and Misses While Preparing Students for Calculus and Physics.* She is known throughout the Section as an effective online educator and helped organize several contributed paper sessions about online teaching to support her NJ Section colleagues during the pandemic, as many of us transitioned to teaching virtually.

Dr. Cook also serves as the Social Media Coordinator for the Section, where she shares her energy, enthusiasm, and positivity as the “face” of the Section. You should follow the Section on Facebook, Instagram, and/or Twitter to see more of her work.

Dr. Debra Curtis (Professor Emerita of Mathematics), Dr. Brandon D. Fralix (Professor of English), Dr. James Murphy (Professor of Biology), and Kevin Kline (Adjunct Professor of Mathematics), Bloomfield College, nominated Dr. Grace Cook for this Distinguished Teaching Award.

Response from Dr. Cook

I can't begin to express my gratitude to my colleagues at Bloomfield who nominated me for this award and for the selection committee for choosing me. I'd like to send a big thanks to Debra Curtis, Kevin Kline, Jim Murphy, and Brandon Fralix for their belief and support of me and what I do at Bloomfield. We are small but mighty over here in the math department, and our number one priority is the students. They are truly amazing, and I'm honored to be able to work with them every day.

I'd like to thank some key individuals who were very influential in my decision to study mathematics and to pursue a career in teaching:

- Mr. Hicks, my 8th grade Algebra teacher, who showed me how amazing mathematics could be.
- Dr. Milos Dostal, my advisor at Stevens, who was an incredible mentor.
- Dr. Cheryl Keen, my guiding light at Walden during my extremely long PhD journey.
- My parents and step-parents for always supporting my education path no matter where it lead.

I'm also honored to see that Dr. Roger Pinkham, another of my Stevens professors, has previously won this award. I have very fond memories of his class.

Finally, I'd like to thank my husband who has to deal with me putting in long hours for grading and class preparation and making so, so , so many videos in the craft room. Without his support, I wouldn't be able to be the teacher that I am.

Members of the Selection Committee

Amanda Beecher, Ramapo College of New Jersey

Susan Marshall, Monmouth University

Dirck Uptegrove, Nokia

Paul von Dohlen, William Patterson University

The list of previous winners is available in our [archives](#).

25/50-year Members of the MAA

The section congratulates Arpi A. Lajinian, Hieu Nguyen, and Roger Walker for their 25 years of MAA membership. We congratulate Jane B. Kimmel and Victor S. Miller for their 50 years of membership.

NJ-NExT

[NJ-NExT](#) is a program like the [national NExT project](#), but is specifically targeted at faculty in the MAA-NJ Section. NJ-NExT targets new-ish faculty teaching mathematics and statistics in institutes of higher education all throughout New Jersey. The goals of our program are similar to the national goals: we aim to support new faculty in the MAA-NJ section in their teaching, and to help these faculty integrate into the profession. The program is open to full-time faculty in mathematics departments in NJ who are entering their first through fourth year of full-time teaching.

We honor our current cohort of NJ-NExT fellows[†].

Anna Cecala	County College of Morris
Matt Charnley	Rutgers University
William Cuello	Rutgers University
William Franczak	The College of New Jersey
Alejandro Ginory	Rutgers University
Matthew Jobrack	Ramapo College of New Jersey
Vandana Saini	Ocean County College
Gregory Stock	The College of New Jersey
Sheila Tabanli	Rutgers University
Osei Tweneboah	Ramapo College of New Jersey

[†] subject to completion of the program

MAA/AMS Book Sales

Visit the AMS Bookstore at <https://bookstore.ams.org/books-on-sale> during our Spring Sectional Sale and enjoy 35% off a selection of AMS/MAA Press titles.

Future MAA Meetings

[MAA-NJ](#) Saturday, October 22, 2022 at Atlantic Cape Community College.

[GSUMC](#) Spring 2023

[MathFest](#) The MAA will hold its annual MathFest in Philadelphia, PA, August 3-6, 2022.

Social Media Information

Check us out!

Email: maanjsocialmedia@gmail.com
Facebook: <https://www.facebook.com/maanewjersey>
Instagram: <https://instagram.com/maanewjersey>
Twitter: <https://twitter.com/maanewjersey>

Acknowledgments

A special thanks to Kirstin Uptegrove for her assistance on planning and running this virtual meeting.

MAA-NJ Section Officers

**Congress Representative
Chair**

Karen Clark, The College of New Jersey
Amanda Beecher, Ramapo College

Immediate Past Chair

Paul von Dohlen, William Paterson University

Secretary

Elizabeth Uptegrove, Felician University

Treasurer

Dirck Uptegrove

Vice-Chair for Fall Meetings

Ik Jae Lee, Rowan University

Vice-Chair for Spring Meetings

Linda Ritchie, Centenary University

Vice-Chair for Speakers

Jonathan Weisbrod, Rowan College at
Burlington County

Vice-Chair for Student Activities

Deepak Bal, Montclair State University

GSUMC Directors

Deepak Bal, Montclair State University; Lee
Collins, Atlantic Cape Community College

Vice-Chair for Two-Year Colleges

Tuan Le, Camden County College

Book Sale Coordinators

Dirck Uptegrove; Elizabeth Uptegrove, Felician
University

Contributed Paper Organizer

Kathy Turrisi, Centenary University

Door Prize Coordinator

Linda Ritchie, Centenary University

Liaison Coordinator

Ik Jae Lee, Rowan University

Program Editor

Dawn Nelson, Saint Peter's University

Project NJ-NExT Directors

Susan Marshall, Monmouth University; Chung
Wong, County College of Morris

Social Media Director

Grace Cook, Bloomfield College

Web Administrator

Dirck Uptegrove



Join the MAA! <https://www.maa.org/join>

Check out the [Member Benefits](#)