

MAA Metro NY 2025 Invited Speakers

April 26, 2025

MAA AWM Speaker



Emilie Purvine, PhD

**Chief Data Scientist and Mathematician
Pacific Northwest National Laboratory**

Presentation Title: Mathematics for Cyber Security

Abstract

The security of computer networks is crucial to maintain data privacy, intellectual property rights, and even to keep infrastructure functioning reliably. One might think that cyber security is the responsibility of computer scientists and network administrators. This is certainly true, but as adversaries change their tactics and become increasingly sophisticated, mathematicians are lending a hand. In this talk I will begin by introducing the landscape of computer networks, the cyber kill chain, and cyber security operations. I will present some of the main challenges facing cyber security today and show how mathematicians, like myself, are applying their skills in data modeling, anomaly detection, and machine learning to help provide situational awareness and keep computer networks resilient.

Bio

Dr. Emilie Purvine is a Chief Data Scientist and Team Lead for Complex Data Models at Pacific Northwest National Laboratory. Her academic background is in pure mathematics, with a bachelor's degree from University of Wisconsin - Madison and a PhD from Rutgers University where she studied enumerative combinatorics and discrete dynamics. Her research since joining PNNL in 2011 has focused on applications of combinatorics and computational topology together with theoretical advances needed to support the applications. Over her time at PNNL Emilie has been both principal investigator and technical staff on a number of projects in applications ranging from computational chemistry and biology to cyber security and power grid modeling. Her current research uses complex mathematical models to develop cyber analytics, study machine learning models for interpretability, and enhance digital biosecurity.

Emilie also greatly values the ability to make mentoring a focus of her work. She loves to give presentations to students at all levels to provide an example of what a mathematician can do outside of academia. Interns and postgraduates (2-3 year temporary employees including post bachelors, post masters, and postdoc) are always included into her projects to promote on the job learning.

Outside of her core work activities Emilie has also been the chair of the MAA's Membership Committee and an associate editor of the AMS Notices. In her free time Emilie spends time with her friends and family, enjoys a good book, loves the outdoors and traveling to new destinations.



Henry Ricardo on Math Circles

Title: Math Circles—Not for Squares

Abstract: This talk will explore the history, philosophy, activities, and benefits of math circles, illuminated by the speaker's own involvement with three local math circles. The evolution of this type of mathematics organization can be compared to that of a religious group or a philosophical school of thought. My title hints at the mindset required of successful math circle mathematicians.

Bio: Dr. Ricardo retired from Medgar Evers College (CUNY) as Professor of Mathematics in 2009. He has been Secretary (2003-2009) and Governor (2008-2011) of the Metro NY Section, receiving its Award for Distinguished Achievement in 2009. He has written books on differential equations and on linear algebra. In retirement, he has continued his interest in mathematical problem solving and has seen his solutions published in various print and online journals across the world. He has also been involved in the activities of three math circles, offering enrichment to both teachers and pre-college students, especially regarding preparation for mathematical competitions.