Abstracts of Faculty Talks
Mathematical Association of America Allegheny Mountain Section Meeting Fairmont State University Saturday, April 6th 2024

All talks are in the Engineering Technology Building (ET)

10:35 -10:50 a.m.

Bishnu Sedai, Fairmont State University, ET 303

Analog of the Fundamental Theorem of Calculus for Functions of Self-adjoint Matrices

This presentation delves into the establishment of an analog of the fundamental theorem of calculus for functions defined on self-adjoint matrices. Analogous to the scalar case, where calculus principles are usually applied to functions of real numbers, this talk explores the extension of such concepts to matrices within certain classes of functions. Central to this discussion are spectral shift functions and associated trace formulas, which offer insights into changes in the spectrum of self-adjoint matrices under perturbations.

Jay Burns, Seton Hill University, ET 306

Math and AI: A Curse or Magical Combination?!?

By now, I'm sure we've all read enough articles about the "scary curse" of AI sweeping through subjects and replacing authentic assessment and learning. Well, join us in entering a kingdom where mystical realms of mathematics meet the futuristic wonders of artificial intelligence. Forget ancient spells and complex incantations; the speaker will share personal experience in how a sprinkle of AI can bring a whole new level of enchantment to your mathematics courses. From algebraic adventures to geometric jests, we'll show how a few tweaks to your teaching methods can authentically integrate AI without losing standards; even sharing the secret potion of actual assignments and rubrics that you can use. Imagine a classroom where AI serves not as a formidable foe but as a friendly familiar, assisting in providing the kingdom's finest assessments. The goal is to leave with practical ideas of how to integrate ChatGPT and other AI tools while keeping learning at the center.

Terry Blakney, Penn State Erie, The Behrend College, ET 310

Presque Isle Downs Prognosticator: Reviewing the 2023 Horse Racing Season

Talk will review the horse racing prediction accuracy of the Presque Isle Downs Track Expert who publishes a daily tip sheet for each race. The focus will be on the type of race that is being predicted as well as general results.

10:55 -11:10 a.m.

J. Lyn Miller, Slippery Rock University, ET 303

Clue Problems: Meeting Multiple Learning Goals in a Math Course for Future Teachers

Math content courses for future elementary teachers sometimes feel like we have to meet rather separate learning goals in one shot: revisit long-forgotten childhood concepts, develop high-level cognitive tasks in Bloom's Taxonomy, and fit our institution's interpretation of "critical thinking." This talk illustrates one style of problem I use to stitch these goals together in a common package. Adapted from 4th-5th grade level tasks, problems to construct numerals meeting multiple clues at once can foster concrete learning goals about explicit content while also meeting expectations for higher and deeper reasoning. The audience will solve such a problem themselves and explore how we can structure them at a suitable level for college students.

Vicki Czarnek, University of Pittsburgh at Johnstown, ET 306

Basic Calculus Readiness

When we noticed more and more students without basic algebra and trigonometry skills placing into Calculus 1, we created a Basic Calculus Readiness program to supplement the required online placement exam. The program comprises a diagnostic, given to students on the first day of class, followed by either a recommendation to drop Calculus 1 and take a prerequisite class or a requirement to do a set of review problems and assessments for identified areas of weakness. Three semesters of data indicate that students who stay in Calculus and participate in the program do significantly better than those who don't.

Whitney Liske, Saint Vincent College, ET 310

To Linear Algebra... and Beyond!

We will discuss the idea of subspaces and bases in Linear Algebra. We will then attempt to extend these ideas to curves and surfaces defined by polynomials instead of linear equations.

11:15 -11:30 a.m.

Bismark Oduro, Pennsylvania Western University-California, ET 303
Stability analysis of a continuous re-infestation model
Chagas disease is a health problem in rural South and Central America, where an estimated 8 to 11 million people are infected. It is a vector-borne disease caused by the parasite Trypanosoma cruzi, which is transmitted to humans mainly through the bite of insect vectors from the family of triatomines, also called "kissing bugs." One of the control measures to reduce the spread of the disease is insecticide spraying of homes to prevent infestation by the vectors. However, re-infestation of homes by vectors has been shown to occur as early as four to six months after insecticide-based control interventions. This talk will introduce mathematical models of continuous spraying on the vector re-infestation. Then, we will focus on deriving results about the global stability of the equilibria by constructing Lyapunov functions for some of these models.

Yevgeniy Galperin, East Stroudsburg University of PA, ET 306
Digital Image Processing in College Math
We discuss the use of basic and advance digital image processing methods to provide meaningful context for reviewing key topics of the college mathematics curriculum, to help students gain confidence in using concepts and techniques of applied mathematics, to increase student awareness of recent developments in mathematical sciences, and to help students prepare for graduate studies.

John Thompson, West Virginia University, ET 310
MAA, Serving the Mathematics Community
For over 100 years the Mathematical Association of America has supported the mathematical community. We'll look at the overall structure of the organization and some of the programs currently available.