

# Advanced Perspectives on Secondary Mathematics

Dr. Andrew Hoffman

STEM Teach IV Huntington University Summer 2021

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**Facilitator:** Dr. Andrew Hoffman, Phone: (260) 359-4208, Email: ajhoffman@huntington.edu

**Date and Time:** July 20th and July 21st, 8:30 AM to 11:30 AM each day

**Location:** Delivered virtually through Zoom

**Required Materials:** It is advised you use a computer to access the workshop, but a mobile device can work, too.

## **Brief Description:**

This workshop uses ideas from advanced mathematics, specifically real analysis and abstract algebra, to uncover new perspectives on secondary mathematics topics. The first day of the workshop will focus on ideas from real analysis, the second on ideas from abstract algebra. The workshop will consist of half-dozen modules that each consider a specific secondary topic and give teachers time to explore a related task from an abstract context.

## **Tentative Workshop Outline:**

The first day will focus on ideas from real analysis, which in some sense is the formalization of mathematics on continuous structures, e.g., calculus. Workshop participants will explore three modules that interleave secondary and advanced topics:

1. Complications of dealing with decimals  $\leftrightarrow$  Equality of infinite decimals
2. Accumulation of rounding error  $\leftrightarrow$  Algebraic limit theorems
3. Use of inverse trigonometric functions  $\leftrightarrow$  Existence of inverses for monotonic functions

The second day will focus on ideas from abstract algebra, which is the study of discrete structures with algebraic properties such as identity, inverse, or associativity. Workshop participants will explore three modules that interleave secondary and advanced topics:

1. Solving equations  $\leftrightarrow$  Definition of a ring
2. Factoring expressions  $\leftrightarrow$  Existence of rings that are not integral domains
3. Rational expressions  $\leftrightarrow$  Polynomial rings

**About the Instructor:**

Dr. Andrew Hoffman is a Mathematics Professor at Huntington University where he teaches a variety of mathematics courses including calculus, statistics, and advanced courses for future teachers. Before coming to Huntington, he was at Purdue University, where he earned his PhD in Mathematics Education. In addition to preparing future teachers at Purdue and Huntington, he worked with teachers in Frankfort, IN over four summers to invigorate their algebra teaching. Last summer he did a workshop on integrating the Pocess Standards into calculus teaching. His passion is deepening teachers' understanding of mathematics.