

University of West Georgia

Course Syllabus

Advanced Perspective on Secondary Mathematics (MATH 6743)

(Prerequisite MATH 3243-Advanced Calculus, and MATH 3413-Survey of Modern Algebra or equivalent)
Fall 2019

Instructor: M. Yazdani, Ph.D.

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Conference Hours:

Tuesday

9:12 –12:00

Thursday

9:15 –12:00

By appointment only

Text:

1. Usiskin, Z., Peressini, A., Marchisotto, E., and Stanley, D., (2003), Mathematics for High School Teachers: An Advanced Perspective, Prentice Hall, Upper Saddle River, New Jersey. ISBN: 0-13-04941-5.

STUDENT LEARNING OUTCOMES

After completion of the course, the student will –

- Analyze the origins, representations, and applications of mathematical concepts.
- Analyze solutions of mathematical problems to determine:
 - Alternative means of solving and / or representing the solution
 - Ways of extending and / or generalizing the problem
- Explain the construction of the real and complex number systems and various ways of representing real and complex numbers.
- Describe of the origins and meaning of notation used to represent functions.
- Describe the various ways of representing and defining of functions.
- Analyze common mathematical problems and real-world models using functions.
- Make mathematically precise notions of equivalence and equality.
- Use the theory of functions in solving equations and inequalities.
- Construct and analyze proofs using mathematical inductions.
- Recognize and prove various logical equivalences to mathematical induction.
- Apply and prove the Division Algorithm and Euclidean Algorithm.
- Extend the Division and Euclidean Algorithm to polynomials.
- Develop and apply algebraic properties of modular arithmetic systems.
- Relate integer congruence to real-world applications.
- Prove and apply the Chinese Remainder Theorem.
- Relate properties of the real and complex number systems to general ordered fields.

In the context of the above expectations, a student will --

Mathematical processes

- Make conjectures and use deductive methods to evaluate the validity of conjectures
- Recognize that a mathematical problem can be solved in a variety of ways, evaluate the appropriateness of various strategies, and select an appropriate strategy for a given problem
- Evaluate the reasonableness of a solution to a given problem
- Use physical and numerical models to represent a given problem or mathematical procedure
- Recognize that assumptions are made when solving problems and identify and evaluate those assumptions
- Explore problems using verbal, graphical, numerical, physical, and algebraic representations

Mathematical Perspectives

- Appreciate the contributions that different cultures have made to the field of mathematics and the impact mathematics has on society and culture
- Understand and apply how mathematics progresses from concrete to representation to abstract generalizations

Communication

- Communicate mathematical ideas and concepts in age-appropriate oral, written and visual forms for a class presentation
- Use mathematical processes to reason mathematically, solve mathematical problems, make mathematical connections within and outside of mathematics, and communicate mathematically
- Reflect on personal learning, change of attitude and beliefs, and growth in understanding through mathematical journaling
- Translate mathematical statements among developmentally appropriate language, standard English, mathematical language, and symbolic mathematics

Technology

- Use appropriate technology such as calculators, computer software, and the Internet to explore, research, solve, and compare mathematical situations and problems

Professional Development

- Be familiar with the National Council of Teachers of Mathematics and the Principles and Standards for School Mathematics, the NCTM website, and NCTM journals

Course Schedule (Tentative):

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|-----------|---|
| 1 | Features of an Advanced Perspective <ol style="list-style-type: none"> 1. Concept Analysis 2. Problem Analysis 3. Problems Involving Real Functions |
| 2 | Real and complex numbers |
| 3 | Functions <ol style="list-style-type: none"> 1. History and Definitions 2. Properties of Real Functions 3. Problems Involving Real Functions |
| 4 | Equations <ol style="list-style-type: none"> 1. The Concept of Equation 2. Algebraic Structure and Solving Equations 3. The Solving Process |
| 5 | Integers and Polynomials <ol style="list-style-type: none"> 1. Natural Numbers, Induction, Recursion 2. Divisibility Properties of the Integers 3. Divisibility Properties of Polynomials |
| 6 | Number System Structures <ol style="list-style-type: none"> 1. System of Modular Arithmetic 2. Number Fields |
| 7 | Congruence <ol style="list-style-type: none"> 1. Euclid Congruent 2. The Congruence Transformation 3. Symmetry |
| 8 | Distance and Similarity |
| 9 | Trigonometry <ol style="list-style-type: none"> 1. Angle Measure 2. Trigonometric Functions |
| 10 | Area and Volume <ol style="list-style-type: none"> 1. Area and Volume 2. Relationship among Area, Volume, and Dimension 3. Van Hiele's Level of Understanding Geometry |

INSTRUCTIONAL METHODS AND ACTIVITIES

This course is 95-99% Online.

Evaluation and grade Assignment:

Rubric for Portfolio: TBA

Weekly Questions	30%
Portfolio	30%
Mid-Term Exam (Proctored)	20%
Final Exam(proctored)	20%

Final grade will be determined by point accumulation as follows:

A	90% - 100%
B	80% - 89.99%
C	70% - 79.99%
D	60% - 69.99%
F	0% - 59.99%

Class Policies:

Conferences: Conferences can be beneficial and are encouraged. All conferences should occur during the instructor's office hours, by appointment only. The instructor is very concerned about the student's achievement and well-being and encourages anyone having difficulties with the course to come by the office for extra help.

Academic Honesty: The Online Tests are meant to be completed alone, without the help of any other person. Any serious form of academic dishonesty will be reported to the University. Definitions of academic dishonesty are defined in the student handbook: www.westga.edu/handbook

Note: If you have a documented disability, which will make it difficult for you to carry out the course work as I have outlined and / or if you need special accommodation or assistance due to disability, please contact me as soon as possible.

Important days:

Midterm exam: Friday September 27 at 3:30 PM, Boyd Building, Carrollton Campus

Last day to drop with a grade of W is October 9

Final Exam: Friday December 6 at 3:30 PM Boyd Building, Carrollton Campus