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MTH 151 MATHEMATICS FOR THE LIBERAL ARTS I

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Dean's Signature: _____ Date Reviewed: ___/___/___

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VIRGINIA WESTERN COMMUNITY COLLEGE
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MTH 151

MATHEMATICS FOR THE LIBERAL ARTS I

COURSE OUTLINE

Prerequisites:

MTE 1, 2, 3, 4, and 5 or a placement recommendation for MTH 151 or equivalent.

Course Description:

Presents topics in sets, logic, numeration systems, geometric systems, and elementary computer concepts.

Semester Credits: 3 Lecture Hours: 3 Lab/Recitation Hours: 0

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Course Outcomes

At the completion of this course, the student should be able to:

1. use deductive and inductive reasoning.
2. appreciate the evolution of mathematical ideas that define the subject.
3. understand of the foundations of mathematics including (i) the concept of set (finite and infinite); (ii) symbolic logic, (iii) numeration systems (historical and contemporary); (iv) selected topics from Number Theory; and (v) the properties of mathematical systems.
4. complete applications involving computer concepts.
5. perform independent inquiry and research that enhance mathematical knowledge.
6. appreciate the aesthetic nature of mathematics.

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Required Materials:

Textbook:

Mathematical Ideas. Miller, Heeren, & Hornsby, 13th Edition, Pearson Publishing Company,
ISBN: 9780321977076

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Topical Description: (Outline chapters and sections to be covered in the book – may include timeline)

Note: Optional topics are denoted by an *.

The Art of Problem Solving

- 1.1 Solving Problems by Inductive Reasoning
 - 1.2 An Application of Inductive Reasoning: Number Patterns
 - 1.3 Strategies for Problem Solving
 - 1.4 Calculating, Estimating, and Reading Graphs*
- Extension: Using Writing to Learn About Mathematics*

The Basic Concepts of Set Theory

- 2.1 Symbols and Terminology
 - 2.2 Venn Diagrams and Subsets
 - 2.3 Set Operations and Cartesian Products
 - 2.4 Surveys and Cardinal Numbers
- Extension: Infinite Sets and Their Cardinalities

Introduction to Logic

- 3.1 Statements and Quantifiers
- 3.2 Truth Tables and Equivalent Statements
- 3.3 The Conditional and Circuits
- 3.4 The Conditional and Related Statements
- 3.5 Analyzing Arguments with Euler Diagrams
- 3.6 Analyzing Arguments with Truth Tables

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MTH 151 (cont.)

Numeration Systems

- 4.1 Historical Numeration Systems**
 - 4.2 More Historical Numeration Systems***
 - 4.3 Arithmetic in the Hindu-Arabic System**
 - 4.4 Conversion Between Number Bases**
- Extension: Modular Systems**

Number Theory

- 5.1 Prime and Composite Numbers**
- 5.2 Large Prime Numbers**
- 5.3 Selected Topics from Number Theory**
- 5.4 Greatest Common Factor and Least Common Multiple***
- 5.5 The Fibonacci Sequence and the Golden Ratio**

Real Numbers and Their Representations

- 6.1 Real Numbers, Order, and Absolute Value***
 - 6.2 Operations, Properties, and Applications of Real Numbers***
 - 6.3 Rational Numbers and Decimal Representation, pp. 246 – 250**
 - Density Property and Arithmetic Mean**
 - Decimal Form of Rational Numbers (such as $0.9999\dots = 1$)**

(Rest of section is optional.)
 - 6.4 Irrational Numbers and Decimal Representation**
 - 6.5 Applications of Decimals and Percents***
- Extension: Complex Numbers**

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