University of West Georgia

Course Syllabus
Foundation of Numbers and Operations (MATH 2008)
Spring 2014

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Conference Hours (By Appointment):
Monday 11:00 – 12:30, 2:00 - 3:30
Wednesday 10:00 - 12:00
Friday 11:00 – 12:30, 2:00 - 3:30

Text:

STUDENT LEARNING OUTCOMES
After completion of the course, the student will --

Sequences & mathematical reasoning
- Identify patterns, predict next term, find and apply formulas for arithmetic, geometric, Fibonacci, "see-and-say", exponential (n^n), and power sequences (2^n)
- Model sequences concretely, symbolically and abstractly
- Develop and use iteration and recursion to model and solve problems
- Investigate interesting subsets of the natural numbers (evens, odds, powers of two, Fibonacci numbers, perfect squares)

Number systems
- Compare and contrast number systems (additive, subtractive, character, place value)
- Identify the structure and chart the relationships in the real number system
- Describe the roles of zero, face and place value in the base ten system
- Model whole numbers using Base 10 blocks
- Analyze, explain and model binary operations on whole numbers using Base 10 blocks
- Recognize and analyze standard and non-standard algorithms for binary operations on whole numbers
- Analyze error patterns of students working standard algorithms for binary operations on whole numbers
- Recognize and apply properties of real numbers

Prime & composite numbers
- Explain two or more reasons why one is not a prime number
- Develop full definitions of prime and composite numbers
- Identify prime numbers between 1-100 and how to find prime numbers greater than 100
- List all factors of a given number
- Determine the prime factorization of any given whole number
- Find GCF/LCM for a given set of whole numbers

Integers
- Model integers using 2-color chips
- Analyze, explain and model binary operations on integers using 2-color chips
- Explore historical/cultural scenarios using powers of two
- Explore powers of ten

Rational numbers
- Model fractions using Pattern blocks, Fraction bars and Fraction grids (area models)
- Model binary operations on fractions using Pattern blocks, Fraction bars and Fraction grids (area models)
- Explain and justify traditional algorithms for binary operations on fractions
- Create equivalent fractions using paper and manipulative
- Explain why rational numbers are dense on the real numbers; give an example of a number set that is not dense and explain why not
- Put a set of fractions in order from smallest to greatest
- Find at least two fractions between a given pair of fractions

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:

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<th>Week</th>
<th>Topic</th>
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<tr>
<td>1</td>
<td>Introduction, Exploration with Patterns, Algebraic Thinking</td>
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<tr>
<td>2</td>
<td>An Introduction to Logic, Problem Solving</td>
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<td>3</td>
<td>Sets, Set Operation</td>
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<tr>
<td>4</td>
<td>Addition, Subtraction, Multiplication, and Division of Whole Numbers, Problem Solving</td>
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<td>5</td>
<td>Numeration Systems</td>
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<td>6</td>
<td>Algorithms for Whole-Number Addition and Subtraction, Algorithms for Whole-Number Multiplication and Division</td>
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<td>7</td>
<td>Mental Mathematics</td>
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<td>8</td>
<td>Estimation, Problem Solving</td>
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<td>9</td>
<td>Integers and the Operation of Addition and Subtracting, Integers and the Operation of Multiplication and Division</td>
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<td>10</td>
<td>Problem Solving</td>
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<tr>
<td>11</td>
<td>The Set of Rational Numbers, Addition and Subtraction of rational Numbers, Multiplication and Division of Rational Numbers, Problem Solving</td>
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<tr>
<td>12</td>
<td>Introduction to Decimals, Operation with Decimals</td>
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<td>13</td>
<td>Non-Terminating Decimal</td>
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<td>Percent</td>
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<td>15</td>
<td>Computing Interest, Real Numbers, Problem Solving</td>
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<td>16</td>
<td>Course Review</td>
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INSTRUCTIONAL METHODS AND ACTIVITIES

Class lectures will include the following: presentation of material and concepts, problem solving techniques, manipulative, computer software, and class discussions. Quizzes will be given throughout the semester.

Note: There is no make up for daily quizzes under any circumstances. There is no make up for the tests unless the student presents a legitimate excuse.

Evaluation and grade Assignment: Final grade will be determined by point accumulation as follows:

<table>
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<tr>
<th>Quizzes</th>
<th>Test 1</th>
<th>Test 2</th>
<th>Test 3</th>
<th>Final Exam</th>
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A 90% - 100%
B 80% - 89.99%
C 70% - 79.99%
D 60% - 69.99%
F 0% - 59.99%

Class Policies:

Class Rules: You are not allowed to be late for the class more than 5 minutes; you may not leave the class early. You are to turn off your cellular phone during the class.

Attendance: Attendance is mandatory. There are only 4 unexcused or excused absences allowed per semester. If you exceed 4 absences you will fail the course. Attendance will be checked each class period and it is your responsibility to sign the attendance sheet.

Conferences: Conferences can be beneficial and are encouraged. All conferences should occur during the instructor's office hours, whenever possible. If these hours conflict with a student's schedule, then appointments should be made. 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.

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.