

Last Reviewed by: Elaine Robinson (F09)

Date Approved: August
Date Revised: Spring 2011
New Rubrics: Fall 2001

COURSE SYLLABUS

Syllabus for: MATH 1410 Number Concepts for Elementary Education

Former Semester and Title: MAT 1230 Mathematics for Elementary Education

Former Quarter Course(s): MAT 123 Mathematics for Elementary Education

Catalog

Description: This course is a conceptual approach to the study of the properties of number sets within the real number system. Topics include tools for problem solving, sets, functions, logic, numeration systems, properties of and operations with whole numbers, integers, rational numbers and real numbers. This course may be used in only the Interdisciplinary Studies area of emphasis (Early Childhood Education and Elementary Education emphases) to meet the general education mathematics requirement.

Credit Hours: 3 sem hrs **Contact Hours:** 3 hrs/wk **Lab Hours:** 0

Prerequisite(s): Documented eligibility for collegiate mathematics; one high school credit each in algebra I, algebra II, and geometry.

Required Text(s): (1) A Problem Solving Approach to Mathematics for Elementary School Teachers, 10th ed., Billstein, 2010, Addison-Wesley

Title	Author(s)	Edition/Date	Publisher
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Required Supplies/Material(s):

Recommended Supplementary Material(s): Scientific calculator which works in fraction form; Student Solutions Manual

Student Group for Whom Course is Required/Intended:

This course is required in the Interdisciplinary Studies Area of Emphasis in the University Parallel Major for students pursuing licensure in Early Childhood Education, Pre-Kindergarten - 3 Emphasis, in Elementary Education, K - 4 Emphasis, or in Elementary Education, 5 - 8 Emphasis and planning transfer to Middle Tennessee State University. This course is an optional course in the Interdisciplinary Studies Area of Emphasis in the University Parallel Major for students pursuing licensure in Elementary Education, K - 8 Emphasis or Elementary Education, 1 - 8 Emphasis and planning transfer to Tennessee Technological University.

GOALS

The goals of MATH 1410 are:

- 1) to give the student who is choosing to become a teacher in the elementary grades a comprehensive review of the basic laws and relationships of fundamental elementary school mathematics;
- 2) to promote the development of teaching strategies appropriate to grade level and required mathematical development; and
- 3) to promote an understanding and appreciation for the National Council of Teachers of Mathematics "Curriculum and Evaluations Standards for School Mathematics" for grades K-4 and grades 5-8.

OBJECTIVES

Through the study of MATH 1410, the student should acquire the ability to:

- 1) explain, illustrate, and use Polya's 4-step problem solving process: understand the problem, devise a plan, carry out the plan, look back;
- 2) explain, illustrate, and apply the following strategies: make a drawing, guess and check, make a table, use a model, work backward, use a variable, make an organized list, and eliminate possibilities;
- 3) apply concepts of patterns to problem solving: Fibonacci numbers, Pascal's triangle, arithmetic sequence, geometric sequence, triangular numbers, and finite differences;
- 4) use algorithms for solving equations and inequalities in problem solving;
- 5) use concepts of set theory in problem solving: disjoint sets, subsets, equal sets, one-to-one correspondence, finite sets, infinite sets, intersection of sets, union of sets, complement of a set, and Venn diagrams;
- 6) use concepts of functions and graphs in problem solving;
- 7) apply concepts of deductive reasoning to problem solving;
- 8) represent numeric values using symbolisms of a variety of numeration systems: Egyptian, Roman, Mayan, and Hindu-Arabic;
- 9) illustrate and apply models for numeration and place value in bases two through twelve;
- 10) apply models for addition and subtraction algorithms;
- 11) apply techniques for mental calculations: compatible numbers, substitutions, equal differences, and add-up method;
- 12) apply techniques for estimation of sums and differences: rounding, compatible numbers, and front-end estimation;
- 13) apply models for multiplication algorithms;

OBJECTIVES, continued

- 14) apply techniques of mental multiplication: compatible numbers, substitutions, and equal products;
- 15) apply techniques for estimation of products: rounding, compatible numbers, and front-end estimation;
- 16) apply models for division algorithms;
- 17) apply the technique of equal quotients for mental division;
- 18) apply techniques for estimation of quotients: rounding, compatible numbers, and front-end estimation;
- 19) apply concepts of exponents;
- 20) apply concepts of number theory to problem solving: factors, multiples, divisibility, prime and composite numbers;
- 21) apply concepts of greatest common divisor (factor) and least common multiple in problem solving;
- 22) apply models for operations with integers;
- 23) apply models for concepts of fractions: part-to-whole, division, and ratio;
- 24) apply concepts of fraction relationships: equality, common denominators, inequality, density, mixed numbers, and improper fractions;
- 25) apply algorithms for operations with fractions: addition, subtraction, multiplication, and division;
- 26) apply concepts for mental calculations with fractions: compatible numbers, substitutions, equal differences, add-up, and equal quotients;
- 27) apply concepts for estimation with fractions: rounding and compatible numbers;
- 28) use concepts of fractions in problem solving;
- 29) apply models for decimal concepts: decimal squares and number line;
- 30) apply concepts of decimal relationships: equality and inequality;
- 31) apply concepts of rational numbers: decimal form, density, and estimation;
- 32) apply algorithms for operations with decimals: addition, subtraction, multiplication, and division;
- 33) convert repeating decimals to rational numbers;
- 34) apply concepts for mental computation with decimals: substitutions and add-up, equal quotients, and compatible numbers;
- 35) apply concepts for estimation with decimals: rounding, front-end estimation, and compatible numbers; and
- 36) use concepts of ratio, percent and scientific notation in problem solving.

SUGGESTED EVALUATION PLAN

TASK	WEIGHT	OBJECTIVES
Test: Chapter 1 & 2	100 pts	#1-3,5,8-9
Test: Chapter 3	100 pts	#10-12,13-19
Test: Chapter 4	100 pts	#4,6,7
Test: Chapter 5	100 pts	#20-22
Test: Chapter 6	100 pts	#23-27
Test: Chapter 7	100 pts	#19,29-35
Test: Chapter 8	100 pts	#23,28,36
Quizzes, homework, notebook, etc. (optional)	0-200 pts	
Final Exam: Comprehensive Chapters 1 - 8	200 pts	#1-35

FINAL GRADING PLAN
Based Upon Percentages

A = 90-100%

B = 80-89%

C = 70-79%

D = 60-69%

F = 0-59%

Additional Comments:

INSTRUCTIONAL SCHEDULE
for

MATH 1410 - Number Concepts for Elementary Education

Week	Objective Numbers	Content to be Covered	Student Assignments/ Supplementary Material(s)
I.	1,2 3 8-9	1.1 Mathematics and Problem Solving 1.2 Explorations with Patterns 2.1 Numeration Systems	Exercises/Problems 1.1 Exercises/Problems 1.2 Exercises/Problems 2.1
II.	5 5	2.2 Describing Sets 2.3 Other Set Operations and Their Properties	Exercises/Problems 2.2 Exercises/Problems 2.3
III.	1-3,5,8,9 1-3,5,8,9 10-12	Review Test Chapter 1 & 2 Test Chapter 1 & 2 3.1 Addition and Subtraction of Whole Numbers	Exercises/Problems 3.1
IV.	13-19 13-19 13,16	3.2 Algorithms for Whole-Number Addition and Subtraction 3.3 Multiplication and Division of Whole Numbers 3.4 Algorithms for Whole Number Multiplication and Division	Exercises/Problems 3.2 Exercises/Problems 3.3 Exercises/Problems 3.4
V.	10-12,13-19 10-12,13-19 4	Review Chapter 3 Test Chapter 3 4.1 Variables	Exercises/Problems 4.1
VI.	4 6,7 4,6,7	4.2 Equations 4.3 Functions Review Chapter 4	Exercises/Problems 4.2 Exercises/Problems 4.3
VII	4,6,7 22 22	Test Chapter 4 5.1 Integers and the Operations of Addition and Subtraction 5.2 Multiplication and Division of Integers	Exercises/Problems 5.1 Exercises/Problems 5.2
VIII	20 20 21 20-22	5.3 Divisibility 5.4 Prime and Composite Numbers 5.5 Greatest Common Divisor and Least Common Multiple Review Chapter 5	Exercises/Problems 5.3 Exercises/Problems 5.4 Exercises/Problems 5.5

INSTRUCTIONAL SCHEDULE
for

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Week	Objective Numbers	Content to be Covered	Student Assignments/ Supplementary Material(s)
IX	20-22	Review Chapter 5	
	20-22	Test Chapter 5	
	23-24	6.1 The Set of Rational Numbers	Exercises/Problems 6.1

X	25	6.2 Addition and Subtraction and Estimations with Rational Numbers	Exercises/Problems 6.2
	19,25-27	6.3 Multiplication & Division of Rational Numbers	Exercises/Problems 6.3
	19,25-27	Review Chapter 6	

XI	19,23-27	Test Chapter 6	
	29-31	7.1 Introduction to Decimals	Exercises/Problems 7.1
	32-35	7.2 Questions on Decimals	Exercises/Problems 7.2

XII	33	7.3 Nonterminating Decimals	Exercises/Problems 7.2
	19	7.3 Real Numbers	Exercises/Problems 7.3
	19,29-35	Review Chapter 7	

XIII	19,29-35	Test Chapter 7	
	23,28	8.1 Ratios, Proportions, and Proportional Reasoning	Exercises/Problems 8.1
	36	8.2 Percents	Exercises/Problems 8.2

XIV	23,28,36	Review Chapter 8	
	23,28,36	Test Chapter 8	
		Review for Final	

XV	1 - 36	Final Exam: Chapters 1 - 8	
