MATH 3308: Survey of Basic Mathematical Theory I

Sul Ross State University ~ Rio Grande College

Summer I, 2015

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Course Description   MTH 3308 is intended as a survey of basic mathematical theory for future elementary teachers.

Course Objectives   Students will explore the foundations of basic arithmetic; work with various numeration systems, with a focus on arithmetic techniques for the Indo-Arabic (base ten) system; use models to illustrate the integers and their basic properties; explore fractions and their uses; be introduced to the rational and real number systems; and use ratios, proportions, and percents to solve applied problems.

TEKS   Information on the Texas Essential Knowledge and Skills can be found on the TEA website: http://www.tea.state.tx.us

Class Time   Tuesday and Thursday, 1:00 – 4:45 p.m.

Class Location   Del Rio 107; Eagle Pass B112; Uvalde B114c

Required Text   Long, DeTemple, & Millman, *Mathematical Reasoning for Elementary Teachers*, Seventh Edition, ISBN 0321900995

Office Hours   Monday – Thursday, 10:00 a.m. – 12:00 p.m., unless specified otherwise

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Course Policies

Attendance Policy

Attendance is mandatory. Roll will be called during every class. You may be dropped from the course if you accumulate more than nine absences, in accordance with University policy. One class period amounts to four absences. Arriving in class late or leaving early may be counted as a partial absence. It is your responsibility to notify me if you will be absent for any reason.

This is a summer class, and very fast-paced. If you miss as much as a single class (which amounts to a week and a half in the long semester) then you're already significantly behind. Hit the ground running and keep up from the very beginning, and you'll do fine.

You will be held responsible for all material covered in class or the assigned text. If you have to miss a class, it is your responsibility to obtain all notes, assignments, and announcements from someone else in the class. Make-up exams will be given only in the event of an emergency, in which case written justification and/or documentation must be provided and approved.

Communication

I will post course documents, assignments, and announcements on the Blackboard system. You will also occasionally turn in assignments through Blackboard. You should make sure you know how to access and use it; in particular, you need to make sure that you are checking the e-mail address listed there.

E-mail is the best way to contact me. You are also welcome to stop by my office if you wish to speak about the content or your progress in the course.

I am here to help you. Ask questions in class, call me, e-mail me, or come to my office. If you don't communicate with me, then I can't help you. Don't wait until it's too late.

Homework

Homework will be assigned for each section that we cover in the text. Although the homework will not be collected and graded for correctness, you should regard it as the most essential component of the course. It is very important that you complete each homework assignment before the next class period. This will allow you to make the most of our time together. **If you have a question, ask about it.** If you don't understand the homework, you are not ready to take the exam.

In order to achieve success in this course, you must work all the homework assignments in a timely manner!!! The amount of work for any college class is generally calculated as 3 hours of outside work for each hour in the classroom. **That means you should expect to spend as much as 20 hours each week on outside work in this course.** If you don't have this kind of time, do not take a summer class.

We will always have time to discuss the homework in class, and we may also work on problems together in groups. You should come to class prepared: make sure to have your textbook and suitable writing materials with you.

Toward the end of the semester (June 30) you will turn in a homework folder or notebook. This should contain every assigned homework **in order**, with **all the work shown**. Solutions with just the answers will not receive credit. These will be graded for completeness only.

Grading Policy

Your grades will be weighted as follows:

Homework	15%
Midterm Exam	35%
Final Exam	50%

A student who averages at least 90% will receive an A; at least 80% will receive at least a B; at least 70% will receive at least a C; at least 60% will receive at least a D.

The midterm exam is tentatively scheduled for June 18; this is subject to change. Make-up tests and exams will be given only in the event of an emergency, in which case written justification and/or documentation must be provided and approved.

The final exam is scheduled for Tuesday, July 7. It will be comprehensive.

Subject Outline

Below is a tentative outline of the subjects we will cover in this course. We will adhere to the textbook fairly closely. Next to each topic section is the corresponding section from the textbook.

I. Sets and whole numbers

1. Sets (§2.1): *basic concepts – notation – set operations and relations*

2. The whole numbers (§2.2): *the history and psychology of counting – one-to-one correspondence – counting and cardinality – the less-than relation*

3. Addition and subtraction of whole numbers (§2.3): *addition of whole numbers – models for addition – properties of addition – subtraction of whole numbers – models for subtraction*

4. Multiplication and division of whole numbers (§2.4): *multiplication of whole numbers – models for multiplication – properties of multiplication – division of whole numbers – models for division – division with remainders*

5. Divisibility (§4.1): *divisors and multiples – odd and even – prime numbers – factor trees – prime power representations – applications – two questions about primes – the Sieve of Eratosthenes*

6. Greatest common divisors (§4.3): *the greatest common divisor – the listing method – the prime factorization method – the Euclidean algorithm – the least common multiple – methods*

II. Numeration and computation

1. Numeration systems (§3.1): *primitive systems – the Egyptian system – the Roman system – the Babylonian system – the Mayan system – the Indo-Arabic system*

2. Algorithms for adding and subtracting whole numbers (§3.2): *addition with representations and manipulatives – subtraction with representations and manipulatives*

3. Algorithms for multiplying and dividing whole numbers (§3.3): *multiplication with representations and manipulatives – the lattice method – multiplication in nondecimal systems – division with representations and manipulatives*

4. Nondecimal positional systems (§3.4): *positional systems and manipulatives – arithmetic in nondecimal positional systems*

5. Tests for divisibility (§4.2): *tests for 2, 5, and 10 – tests for 4 and 8 – tests for 3 and 9 – test for 11 – combining tests*

III. Integers

1. Representations of integers (§5.1): *the integers – what we want in a representation –*

colored counters – mail-time (money) stories – number-line representations

   2. Addition and subtraction of integers (§5.2): *addition with representations and manipulatives – properties of addition – subtraction with representations and manipulatives – ordering the integers*

   3. Multiplication and division of integers (§5.3): *multiplication with representations and manipulatives – properties of multiplication – division of integers*

IV. Rational numbers and real numbers

   1. Fractions (§6.1): *basic concepts – representations and manipulatives – equivalent fractions – fractions in simplest form – common denominators – ordering*

   2. Addition and subtraction of fractions (§6.2): *addition of fractions – addition with manipulatives – proper fractions and mixed numbers – subtraction of fractions – subtraction with manipulatives*

   3. Multiplication and division of fractions (§6.3): *multiplication of fractions – multiplication as an operator – the area model – division of fractions – division with pictures – the invert-and-multiply rule*

   4. Rational numbers (§§6.1,4): *the rational number system – properties of arithmetic – the density property – applications*

   5. Decimals and real numbers (§§7.1 – 2): *the decimal system – powers of ten – terminating decimals and fractions – repeating decimals and fractions – irrational numbers and real numbers – the number line – arithmetic with decimals*

   6. Ratios, proportions, and percents (§§7.3 – 4): *ratios – proportions – proportional reasoning – percents*

Schedule

This schedule is tentative only. The section numbers refer to the above outline.

Unit I	June 2 – 9
Unit II	June 9 – 16
Midterm Exam	June 18
Unit III	June 28 – 25
Unit IV	June 25 – July 2
Final Exam	July 7