

# MATH 3308: Survey of Basic Mathematical Theory I

Sul Ross State University ~ Rio Grande College  
Fall 2014

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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** Wednesday, 6:00 – 8:45 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.

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## Course Policies

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### Attendance Policy

Attendance is mandatory. **You may be dropped from the course if you accumulate nine absences**, in accordance with University policy. One class period amounts to three 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.

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.

Unless you have special permission, you are required to attend class at the site for which you are registered. This is especially true on exam days. **Failure to take an exam at the site for which you are registered may result in a zero on the exam.**

## Communication

I will post course documents, reminders, and announcements on the Blackboard system. I may also occasionally send announcements via e-mail. You should make sure you know how to access and use these tools. E-mail is the best way to contact me.

You are 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.

## Homework

Homework will be assigned for each section that we cover in the text. Although the homework will not be collected and graded, 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 class. **That means you should expect to spend as much as 8 – 9 hours each week on outside work in this course.**

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.

## Grading Policy

Your grades will be weighted as follows:

|            |     |
|------------|-----|
| Exam 1     | 30% |
| Exam 2     | 30% |
| Final Exam | 40% |

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.

## Exams

There will be two midterm exams. The tentative dates are

|        |              |
|--------|--------------|
| Exam 1 | September 24 |
| Exam 2 | October 29   |

This schedule is subject to change. You will be notified of a change at least one week in advance. 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.

The final exam is scheduled for Wednesday, December 10, from 6:00 – 8:45 p.m. The final exam will be comprehensive.

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## Subject Outline

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*Below is a tentative outline of the subjects we will cover in this course. 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 – sets and word descriptions*
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 – the listing method – the prime factorization method – the Euclidean algorithm*

### II. Numeration and computation

1. Numeration systems (§3.1): *primitive "numeration" systems – the Egyptian system – the Roman system – the Babylonian system – the Mayan system – the Indo-Arabic system*
2. Nondecimal positional systems (§3.2): *positional systems and manipulatives – bases less than ten – bases greater than ten – the binary system*
3. Algorithms for adding and subtracting whole numbers (§3.3): *addition with representations and manipulatives – subtraction with representations and manipulatives – addition and subtraction in nondecimal systems*
4. Algorithms for multiplying and dividing whole numbers (§3.4): *multiplication with representations and manipulatives – the lattice method – multiplication in nondecimal systems – division with representations and manipulatives*
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*

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## Schedule

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

|              |                                 |
|--------------|---------------------------------|
| August 27    | §§I.1 – 2                       |
| September 3  | §§I.3 – 4                       |
| September 10 | §§I.5 – 6                       |
| September 17 | review for first midterm; §II.1 |
| September 24 | first midterm exam; §II.1       |
| October 1    | §§II.2 – 3                      |
| October 8    | §§II.3 – 4                      |
| October 15   | §§II.4 – 5                      |

|             |                                   |
|-------------|-----------------------------------|
| October 22  | review for second midterm; §III.1 |
| October 29  | second midterm exam; §III.2       |
| November 5  | §III.3, §IV.1                     |
| November 12 | §§IV.2 – 3                        |
| November 19 | §§IV.4 – 6                        |
| November 26 | Thanksgiving Break                |
| December 3  | review for final exam             |