SMTE 1350: Fundamentals of Math I  
Spring 2012

I. COURSE INFORMATION

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Office hours: Tuesday 5:30 – 6:45 or by appointment.

II. COURSE DESCRIPTION

This research-based course provides the conceptual framework for understanding and applying properties, models and operations of number systems. Related topics are studied in problem solving settings. Most students in this course have learned mathematics through a rule-based, abstract instructional program. This course is designed to emphasize in-depth basic understandings of number systems and arithmetic patterns, which are core ideas in the elementary mathematics curriculum. Communicating concepts, processes or solutions effectively, in oral and written forms, will be emphasized.

This course is intended for students seeking certification in elementary education, bilingual education, special education, and BSIS 4-8 programs. The course will cover chapters 1-6 in the textbook.

III. PREREQUISITES

MATH 1314: College Algebra or equivalent, or placement beyond College Algebra on the departmental placement test.

IV. TEXTS & OTHER SUPPLIES

Required:

- Mathematical Reasoning for Elementary Teachers, Long, DeTemple, Millman 6th edition (this will also be used for SMTE 1351 and SMTE 3352)
- Scientific calculator
- TEKS (http://www.tea.state.tx.us/rules/tac/chapter111/index.html)
- Principles and Standards for School Mathematics, NCTM, 2000 (online)

Suggested:

- Elementary and Middle School Mathematics, Van de Walle, 5th edition
- Error Patterns in Computation, Ashlock, 9th edition
V. STUDENT LEARNING OUTCOMES

A 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 manipulatives
- 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
VI. INSTRUCTIONAL METHODS & ACTIVITIES

The course will be a combination of lectures, individual, and group work. Students are expected to participate in group and whole class discussions by contributing with knowledge and thoughtful evaluation of the contribution of others. Using physical models to teach the content topics, and understanding how learning occurs through their use, will be a substantial portion of the class instructional plan.

VII. EVALUATION and ASSESSMENT

Will vary by instructor, one possible example is:

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<thead>
<tr>
<th>Component</th>
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<tbody>
<tr>
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<tr>
<td>Class Presentations</td>
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<td>Professional development</td>
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VIII. TENTATIVE COURSE SCHEDULE

See Calendar

IX. CLASS POLICIES

Attendance: Attendance is expected and is reflected in individual and group participation. Missing quizzes, presentations and exams will jeopardize your grade. If you must be absent, I expect you to communicate with me within 24 hours before or after the absence. Email is encouraged.

Homework: this category includes homework, in-class assignments, math journals, and quizzes.

Math journals: email assignments (math journals) are due before the next class period starts. It is your responsibility to ensure that I receive and can open/read email assignments. I will always acknowledge receipt of email messages and respond quickly with your score.

Fraction mastery quiz: you must pass this quiz with a 75% score to pass this course. You may not use a calculator on this quiz, but please do use your brain!

Professional development: you are required to participate in a professional development experience. You may choose between reading one of the assigned books, participating in the annual ME by the Sea mathematics education conference, or get permission from the instructor to develop your own professional development experience.
**Class presentations:** you will present a number system project and final project to the class by groups. Details can be found in the course website.

**Exam:** the final exam is **May 9th at 4:30.** It will be cumulative. A review sheet can be found on the course website.

**Students with disabilities:** the Mathematics Department complies with the Americans with Disabilities Act in making reasonable accommodations for qualified students with disabilities. If you need disability accommodations in this class, please contact the instructor as soon as possible. Please bring your accommodation letter from TAMUCC Service for Students with Disabilities Office with you. If you suspect that may have a disability (physical impairment, learning disability, psychiatric disability, etc.). Please contact the Services for Students with Disabilities Office located in Driftwood 101 at 825-5816. It is important that you contact them in a timely fashion as it may take several days to review requests and prepare accommodations.

**Academic Honesty:** university students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, forgery or plagiarism.