I. COURSE INFORMATION

Meeting time & place: MW 2-3:15
Instructor: Marcia Venzon
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Office: CI 353
E-mail: Marcia.venzon@tamucc.edu
Office hours: TR: 9:50-11 in CS 107; 3:15-4:00 in CS 353; MW: 1:45-3:30 in CCH 206

II. COURSE DESCRIPTION

The conceptual framework for understanding and applying properties, models and operations related to various number systems in problem solving settings.

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. 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.

The course will cover chapters 1-6 in the textbook.

III. PREREQUISITES for the COURSE

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

IV. TEXTS and OTHER SUPPLIES REQUIRED

Required:

- *Mathematical Reasoning for Elementary Teachers*, Long, DeTemple & Millman, 5th edition. Also required is MyLabs Plus student access code
- Website for homework is www.tamucc.mylabsplus.com
- Scientific calculator or graphing calculator
- TEKS ([http://www.tea.state.tx.us/rules/tac/chapter111/index.html](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, 7th edition

**V. STUDENT LEARNING OUTCOMES**

A student will:

**Sequences & problem solving**
- Identify patterns, predict next term, find and apply formulas for arithmetic, geometric, Fibonacci, “see-and-say”, exponential ($n^n$), and power sequences ($2^n$)
- Use inductive reasoning to identify, extend, and create patterns using concrete models, figures, numbers and algebraic expressions
- Investigate subsets of the natural numbers (evens, odds, powers of two, Fibonacci numbers, perfect squares)
- Illustrate concepts of functions using concrete models, tables, graphs & symbolic expressions
- Develop and use iteration and recursion to model and solve problems

**Number systems**
- Compare and contrast numeration systems
- 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 binary operations on whole numbers
- Recognize and analyze standard and non-standard algorithms for binary operations on whole numbers
- Analyze error patterns of students working with standard algorithms for binary operations on whole numbers
- Recognize and analyze non-traditional algorithms for operations on whole numbers
- 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 whole number
- Determine the prime factorization of any given whole number
- Find GCF/LCM for a given set of whole numbers

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

Rational numbers
• Demonstrate an understanding of equivalency among different representations of 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)
• Evaluate, 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 and 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 GRADE ASSIGNMENT

Will vary by instructor, one possible example is:

| Classwork/Homework | 25% | A | > 90% |
| Quiizzes           | 30% | B | 80% - 89% |
| Attendance/presentation | 20% | C | 70% - 79% |
| Final Exam        | 25% | D | 60% - 69% |
|                    |     | F | < 60% |

VIII. TENTATIVE COURSE SCHEDULE

<table>
<thead>
<tr>
<th>WEEK</th>
<th>TOPIC</th>
<th>CONTENT</th>
<th>SECTION(S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction</td>
<td>Pre-assessment, NCTM, problem solving</td>
<td>1.1 – 1.5</td>
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<tr>
<td>2</td>
<td>Patterns</td>
<td>Fibonacci numbers</td>
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<tr>
<td>3</td>
<td>Sequences</td>
<td>Tower of Hanoi</td>
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<tr>
<td>4</td>
<td>Real number system</td>
<td>Subsets of the real number system</td>
<td>2.3 – 2.4</td>
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<tr>
<td>5</td>
<td>Base ten system</td>
<td>Regrouping, face/place values, expanded form</td>
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<tr>
<td>6</td>
<td>Other number systems</td>
<td>Place value, face value, expanded form</td>
<td>3.1 – 3.2</td>
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<td></td>
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<td>5.4</td>
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<tr>
<td>7</td>
<td>Class presentations</td>
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### IX. CLASS POLICIES

Classwork: Students are expected to be fully involved in class. Absences will affect your grade. Attendance will be recorded and counts 10% of your grade. To be qualified to make up work, students need to email Mrs. Venzon within 24 hours of a missed class. Some classwork cannot be made up. Students need to be respectful of their peers and not distract others during class time.

**Family Math Night**, *Our family math night is scheduled for_________*

*Attendance is mandatory.*

Important Dates:
1. Last day to drop a class is Friday, November 4th.
2. The last day of class is Tuesday, December 6th.
3. Holidays: Monday, Sept 5, Labor Day; November 24-25, Thanksgiving

**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.

**Notice to Students with Disabilities.** Texas A&M University-Corpus Christi complies with the Americans with Disabilities Act in making reasonable accommodations for qualified students with disabilities. If you suspect that you 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. If you need disability accommodations in this class, please see me as soon as possible.
Grade Appeal Process. As stated in University Rule 13.02.99.C2, Student Grade Appeals, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Rule 13.02.99.C2, Student Grade Appeals, and University Procedure 13.02.99.C1.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules Web site at http://www.tamucc.edu/provost/university_rules/index.html. For assistance and/or guidance in the grade appeal process, students may contact the Office of Student Affairs.

X. REFERENCES


SBEC Technology Standards for Beginning Teachers http://www.sbec.state.tx.us/SBECOnline/standtest/standards/techapps_allbegtch.pdf


Texas Essential Knowledge and Skills for Technology Applications http://www.tea.state.tx.us/rules/tac/chapter126/index.html