Texas A&M University-Corpus Christi
Department of Mathematics and Statistics
SMTE 1350: Fundamentals of Math I
Summer II 2012 (7/09 – 8/09)

I. COURSE INFORMATION

Class meetings: MTWR 4:00-5:55 PM in CS-107
Instructor: Dr. Jeff Lyons
Office Phone: 361.825.3265
Office Address: CI 357
Office Hours: TR 12:00-2:00pm and by appointment
E-mail address: Jeff.Lyons@tamucc.edu
Web address: http://math.tamucc.edu/~jlyons

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 understand 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

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, 5th Edition (will
  also be used for SMTE1351 and SMTE3352).
- MyMathLab - online registration at tamucc.mylabsplus.com
- Any scientific calculator, TI-83, or elementary calculators TI –10 or TI-15 Explorer, or TI-35 (will
  be needed for future SMTE classes as well).
- TEKS (http://www.tea.state.tx.us/rules/tac/chapter111/index.html)
- Principles and Standards for School Mathematics, NCTM, 2000 (available online with 120 day
  free trial)

Suggested:
- Error Patterns in Computation, 10th edition, by Ashlock, Robert & Merrill, 2009
- Texas Edition of Elementary and Middle School Mathematics: Teaching Developmentally, Van de
  Walle, Karp, Bay-Williams, 7th edition
V. STUDENT LEARNING OUTCOMES

Sequences & problem solving
- Identify patterns, predict next term, find and apply formulas for arithmetic, geometric, Fibonacci, “see-and-say”, exponential \( n^k \), 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-standard 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 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 & 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. ASSESSMENT & EVALUATION

The methods of evaluation and criteria for grade assignments are:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
<th>Grade</th>
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</thead>
<tbody>
<tr>
<td>Work (see policies below)</td>
<td>30%</td>
<td>A &gt; 90%</td>
</tr>
<tr>
<td>Family Math Project</td>
<td>25%</td>
<td>B 80% - 89%</td>
</tr>
<tr>
<td>Class Presentation/teaching Project</td>
<td>25%</td>
<td>C 70% - 79%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>20%</td>
<td>D 60% - 69%</td>
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<td></td>
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<td>F &lt; 60%</td>
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VIII. TENTATIVE COURSE SCHEDULE

<table>
<thead>
<tr>
<th>Day</th>
<th>TOPIC</th>
<th>ACTIVITY</th>
<th>TEXT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-7/9</td>
<td>Introduction</td>
<td>Pre-assessment, NCTM, problem solving</td>
<td>No text sections</td>
</tr>
<tr>
<td>2-7/10</td>
<td>Problem solving, patterns, Sequences</td>
<td>Problem solving strategies, Fibonacci numbers, introduce Pascal’s triangle</td>
<td>1.1 – 1.4</td>
</tr>
<tr>
<td>3-7/11</td>
<td>More problem solving</td>
<td>Patterns in shapes – Pascal’s triangle, Figurate numbers (triangular), Handshakes – Gauss</td>
<td>1.5 – 1.6</td>
</tr>
<tr>
<td>4-7/12</td>
<td>Real number system</td>
<td>Sets – attributes, subsets of the real number system, properties</td>
<td>2.1 – 2.3</td>
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<tr>
<td>5-7/16</td>
<td>Base ten system</td>
<td>Regrouping, face/place values, expanded form</td>
<td></td>
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<tr>
<td>6-7/17</td>
<td>Operations &amp; properties</td>
<td>Modeling addition, subtraction, multiplication, and division</td>
<td>2.3 – 2.4</td>
</tr>
<tr>
<td>7-7/18</td>
<td>Operations &amp; properties</td>
<td>Algorithms for addition, subtraction, multiplication, and division</td>
<td>3.3 – 3.5</td>
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<td></td>
<td></td>
<td></td>
<td>6.4</td>
</tr>
<tr>
<td>8-7/19</td>
<td>Class presentations on Different Number Systems</td>
<td></td>
<td>3.1 – 3.2</td>
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<td>5.4</td>
</tr>
<tr>
<td>9-7/23</td>
<td>Prime numbers, divisibility</td>
<td>Prime/composite numbers; factors</td>
<td>4.1 – 4.2</td>
</tr>
<tr>
<td>10-7/24</td>
<td>GCF &amp; LCM</td>
<td>Factorization</td>
<td>4.3</td>
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<tr>
<td>11-7/25</td>
<td>Integers</td>
<td>Integer models, integer operations</td>
<td>5.1 – 5.3</td>
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<tr>
<td>12-7/26</td>
<td>Integers</td>
<td>2-color counters</td>
<td>5.1 – 5.3</td>
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<tr>
<td>13-7/30</td>
<td>Family Math Project w/Governors’ School HS Students – at ECDC</td>
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<tr>
<td>14-7/31</td>
<td>Rational numbers</td>
<td>Modeling rational numbers, Pattern blocks, eggs</td>
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<tr>
<td>15-8/1</td>
<td>Rational numbers</td>
<td>Fraction bars &amp; Fraction grids</td>
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<tr>
<td>16-8/2</td>
<td>Rational numbers</td>
<td>Equivalent fractions, denseness, ordering</td>
<td>6.1</td>
</tr>
<tr>
<td>17-8/6</td>
<td>Rational numbers</td>
<td>Operations on rational numbers</td>
<td>6.2 – 6.3</td>
</tr>
<tr>
<td>18-8/7</td>
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<td>CATCH-UP DAY</td>
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<tr>
<td>19-8/8</td>
<td>Final Review</td>
<td></td>
<td>Ch 1-6</td>
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<tr>
<td>20-8/9</td>
<td>Cumulative</td>
<td>Final exam</td>
<td>Ch 1-6</td>
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See actual course at math.tamu.edu/~jlyons (do not print: will be updated throughout the semester)
IX. CLASS POLICIES

- Work category consists of math journals, MyMathLab and in-class assignments, tests 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—please use standard document software. 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.
- Class presentations – you will present a number system project to the class by groups; details can be found on the course website.
- Help: The best source of help for this course is the people directly involved in this course: your peers or I, in class or during office hours.
- 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 and your group before class or as soon as possible. Email is encouraged (Jeff.Lyons@tamucc.edu) or you can call 825-3265 and leave me a message.
- The final exam will be cumulative. A review sheet can be found on the course website.
- If you have any questions please email or see me during office hours.

X. DROPPING A CLASS

I hope that you never find it necessary to drop this or any other class. However, events can sometimes occur that make dropping a course necessary or wise. Please consult with me before you decide to drop to be sure it is the best thing to do. Should dropping the course be the best course of action, you must initiate the process to drop the course by going to the Student Services Center and filling out a course drop form. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. July 27th is the last day to drop a class with an automatic grade of “W” this term.

XI. ACADEMIC INTEGRITY/PLAGIARISM

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, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) In this class, academic misconduct or complicity in an act of academic misconduct on an assignment or test will rest in an F on the assignment or test.

XII. CLASSROOM/PROFESSIONAL BEHAVIOR

Texas A&M University – Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in Article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom. The prohibition
applies to all instructional forums, including classrooms, electronic classrooms, labs, discussion groups, field trips, etc.

XIII. DISABILITY SERVICES

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Disability Services Office at (361) 825-5816 or go to the office at Driftwood 101.

XIV. GRADE APPEALS 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.C2.01, 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.

XV. SYLLABUS AMENDMENTS

The instructor may amend the syllabus at any time prior to the final exam by announcing the changes in class.