SMTE 1351: Fundamentals of Math II

Section 001, summer 2014, CRN: 20270

I. COURSE INFORMATION

Instructor: Sherry L. Bair, PhD
Email: Sherry.Bair@tamucc.edu
Office location: Center for Instruction 360
Office phone: 361-825-2189
Student hours: Tues, Wed, Thurs 12:30-2pm; also by appointment
Meeting time & place: MTWR, 2-3:55pm, CS 107

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

This research-based course provides the conceptual framework for increased understanding and application of rational numbers, probability, and statistics. 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.

III. PREREQUISITES for the COURSE

- MATH 1314: College Algebra or equivalent
- SMTE 1350: Fundamentals of Math I

IV. TEXTBOOKS and OTHER READINGS

Required:
- Scientific or graphing calculator
- Texas Essential Knowledge & Skills (free online)
- Principles and Standards for School Mathematics, NCTM, 2000 (free trial online)
- Regular access to high speed internet and office applications (e.g., MS Word, Excel)

V. STUDENT LEARNING OUTCOMES
A student will –

Rational & irrational numbers
- Define and distinguish between rational and irrational numbers
- Recognize that situations that have no solution in the rational number system have solutions in the real number system

Decimals
- Demonstrate a sense of quantity, relationship, and equivalency for fractions, decimals and percents
- Identify face/place values and expanded form for decimal numbers
- Determine when zero is a significant/insignificant digit
- Model decimals using decimal grids (area models)
- Model binary operations on decimals using decimal grids (area models)
- Analyze common error patterns for operations on decimals
- Explain and justify traditional algorithms for binary operations on decimals
- Convert between fraction, decimal, and percent form for rational numbers
- Appropriately round decimals to a given place value
- Order a set of rational numbers from smallest to greatest
- Find at least two rational numbers between a given pair of rational numbers

**Percent**
- Convert between fraction, decimal, and percent form for rational numbers
- Calculate and explain percent change (percent increase and percent decrease)
- Model percent using decimal grids
- Recognize, interpret, and evaluation appropriateness of percents less than 1% and greater 100%

**Ratio & proportion**
- Model and solve proportional problems using concrete, numeric, tabular, graphic and algebraic methods

**Exponents & roots**
- Simplify roots and approximate roots using a calculator
- Apply operations and properties of exponents and roots for rational numbers

**Probability**
- Describe and compute the outcome of simple and compound events
- Explore concepts of probability through data collections, experiments & simulations
- Create, use and interpret tree diagrams for simple, conditional and joint probabilities
- Compute odds and convert to/from probabilities
- Compute permutations and combinations for real-world scenarios

**Statistical graphs**
- Investigate and answer questions by collecting, organizing and displaying data from real-world situations
- Support arguments, make predictions and draw conclusions using summary statistics and graphs to analyze and interpret one-variable data
- Communicate the results of a statistical investigation using appropriate language
- Design, conduct, analyze and interpret surveys and statistical experiments
- Create and interpret graphs (pie graph, pictograph, bar graph, histogram, line plot, line graph, map chart, frequency polygon, stem & leaf plot, scatterplot) to communicate mathematical information
- Approximate the line of regression on a scatterplot and explain the trend Show awareness of quality graphs and possible abuses of statistical graphs

**Statistical measures**
- Describe and compute measures of centrality (mean, median, mode) and measures of dispersion (range, IQR, variance, standard deviation)

**Normal curve**
- Use the graph of the normal distribution to make inferences about a population
- Compute and interpret z-scores and percentiles for a given data set
- Compare two data sets using z-scores
In the context of the above expectations, a student will --

- **Mathematical Processes**
  - 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

- **Mathematical Perspectives**
  - 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, create and compare mathematical situations and representations

- **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 work, 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. MAJOR COURSE REQUIREMENTS and ASSESSMENTS**
The final course grade will be a weighted average of scores in four categories:

- **Computational and Core Skills** - 15%
- **Daily Work** - 15%
- **Professional Development Project** - 15%
- **Two tests** (15% each)
- **Final Exam** (25%).

Each item, except the computational and core skills exam, will be graded in a holistic manner, based on a rubric. A general version of the rubric appears below. Each item is scored on a basis of 0 to 4 points. At the end of the semester grades are calculated in a manner similar to grade point average, weighting the mean score in each category and using the following guidelines for determining semester grades: A (3.4 – 4.0), B (2.75 – 3.4), C (2.0 – 2.74), D (1.5 – 1.99), F (0 – 1.49). This scale makes a full distribution of grades from A to F plausible, with A's being reserved for truly outstanding performance and a grade of C representing the minimal acceptable performance.
• **A (4)-Outstanding performance.** Student demonstrates solid conceptual understanding and insight. All required components are clearly present. Material is well written, demonstrating coherent thoughts and reasoning as well as utilizes proper grammar, correct spelling, appropriate mathematical terminology, and notation.

• **B (3)-Good performance.** Student demonstrates good understanding and insight. All required components are present. Material is well written, demonstrating coherent thoughts and reasoning. Student uses appropriate mathematical terminology and notation, minor spelling or grammatical errors are possible.

• **C (2)-Adequate performance.** Student demonstrates adequate understanding and insight. Most required components are present. Material is written coherently, demonstrating adequate writing skills, but may contain numerous grammatical or spelling errors. Students may not use appropriate mathematical terminology, but does not misuse mathematical terminology or notation.

• **D (1)-Inadequate performance.** Student demonstrates inadequate understanding and insight. Required components are not present. Writing indicates little thought and reflection, or is of poor quality, making it difficult to read and understand. Students may have misused mathematical terms or notation.

• **F (0)-Unacceptable effort & performance.** Student demonstrates little to no understanding of the content. Work is not turned in, or most of the required components are missing. Writing indicates virtually no effort.

**Computational and Core Skills** – You will be given a pretest to show proficiency in the core elementary procedures used in the course, and daily in the elementary school classroom. Each item on this exam is scored either right or wrong, no partial credit. This exam is scored A (4), C (2) or F (0). You must correctly complete all items on the Core Skills Exam to earn an A, 85% of the items to earn a C, and anything less is failing. Anyone who does not complete the pretest with an A, will retake the test prior to the final exam, and the better of the two grades will be used in computing your final course grade. The skills on this exam are taught in grades K-6. The pretest will show you areas where you need to improve, and you are required to study these ideas on your own prior to retaking the exam, if needed.

**Daily Work** – Includes attendance; participation in individual, collaborative and cooperative group work; in-class discussion; assignments including readings, reflections, written assignments, and worksheets; plus (announced and unannounced) quizzes.

**Professional Development Project** – The intent of this project is to help you gain experiences related to teaching data and probability concepts. Assignment details and evaluation criteria will be provided within the first week of the class.

**Final Exam** – comprehensive summative evaluation of students’ individual content knowledge. This 2 hour exam is scheduled by the university and may not be retaken or made-up if missed.
• The final exam is officially scheduled for the last day of class, Thursday **July 3th, 2:00am-3:55pm.**
### VIII. COURSE OUTLINE (tentative)

<table>
<thead>
<tr>
<th>Day</th>
<th>TOPIC</th>
<th>CONTENT</th>
<th>SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction</td>
<td>Pre-assessment; review of real numbers, Face/place value, expanded form</td>
<td>7.1</td>
</tr>
<tr>
<td>2</td>
<td>Decimal numbers</td>
<td>conversion to/from fractions</td>
<td>7.1</td>
</tr>
<tr>
<td>3</td>
<td>Decimal numbers</td>
<td>Modeling decimals, decimal operations</td>
<td>7.2</td>
</tr>
<tr>
<td>4</td>
<td>Ratio &amp; proportion</td>
<td>Proportional reasoning</td>
<td>7.3</td>
</tr>
<tr>
<td>5</td>
<td>Ratio &amp; proportion</td>
<td>Proportional reasoning</td>
<td>7.3</td>
</tr>
<tr>
<td>6</td>
<td>Percent</td>
<td>Percent, percent change; conversion to/from fractions &amp; decimals</td>
<td>7.4</td>
</tr>
<tr>
<td>7</td>
<td>Rational Numbers</td>
<td>Mixed Review problems</td>
<td>7.1-4</td>
</tr>
<tr>
<td>8</td>
<td>Decimals and Proportional Reasoning Exam</td>
<td></td>
<td>Chpt. 7</td>
</tr>
<tr>
<td>9</td>
<td>Statistical graphs</td>
<td>Review Exam, Graphs of discrete &amp; continuous data</td>
<td>13.1</td>
</tr>
<tr>
<td>10</td>
<td>Statistical graphs</td>
<td>Construct, read, &amp; interpret graphs; Misleading graphs</td>
<td>13.1</td>
</tr>
<tr>
<td>11</td>
<td>Professional Development Presentations</td>
<td></td>
<td>13.1</td>
</tr>
<tr>
<td>12</td>
<td>Professional Development Presentations &amp; computational and core skills retake as needed.</td>
<td></td>
<td>13.2</td>
</tr>
<tr>
<td>13</td>
<td>Measures</td>
<td>Measures of centrality &amp; dispersion</td>
<td>13.2</td>
</tr>
<tr>
<td>14</td>
<td>Normal curve</td>
<td>Normal curve, z-scores &amp; percentiles</td>
<td>13.3</td>
</tr>
<tr>
<td>15</td>
<td>Normal curve</td>
<td>Normal curve, z-scores &amp; percentiles</td>
<td>13.3</td>
</tr>
<tr>
<td>16</td>
<td>Data analysis: Statistical Graphs and Measures Exam</td>
<td></td>
<td>Chpt. 13</td>
</tr>
<tr>
<td>17</td>
<td>Probability</td>
<td>Simple, conditional, joint probability, Combinatorial counting</td>
<td>14.1, 14.2</td>
</tr>
<tr>
<td>18</td>
<td>Permutations, Combinations</td>
<td>Combinatorial counting; Tree diagrams, odds</td>
<td>14.3, 14.4</td>
</tr>
<tr>
<td>19</td>
<td>Review</td>
<td>Comprehensive review for final.</td>
<td>Ch. 7, 13, &amp; 14</td>
</tr>
<tr>
<td>20</td>
<td>(Comprehensive)</td>
<td>Final exam</td>
<td>Ch. 7, 13, &amp; 14</td>
</tr>
</tbody>
</table>
IX. CLASSROOM, DEPARTMENTAL, COLLEGE AND UNIVERSITY POLICIES

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 a test or quiz will result in failing the course.

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.

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. This prohibition applies to all instructional forums, including classrooms, electronic classrooms, labs, discussion groups, field trips, etc.

Professional behavior in a teacher education course also means the individual should demonstrate a positive disposition for learning. As such, each individual should be actively engaged in classroom activities, and remain focused on the content of the course during class. Cell phones should be silenced and external distractions limited to emergencies. As pre-service teachers, you should behave as you would like your students to behave in your future classroom.

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 on 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 on the process, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, consult Texas A&M University-Corpus Christi University Procedure 13.02.99.C2.01 Student Grade Appeal Procedures (http://www.tamucc.edu/provost/university_rules/index.html), and the College of Science and Engineering Grade Appeals webpage (http://sci.tamucc.edu/students/GradeAppeal.html). For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school or the College of Science and Engineering Dean’s Office.

Disabilities Accommodations
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 for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please call or visit Disability Services at (361) 825-5816 in Driftwood 101. If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816.