SMTE 1351: Fundamentals of Math II

Section 001, Summer I 2012, CRN: 60403

I. COURSE INFORMATION

Instructor: Joe Champion, Ph.D.
E-mail: joe.champion@tamucc.edu
Webpage: http://math.tamucc.edu/~jchampion
Office location: Center for Instruction #359
Office hours: Mon - Thurs 12:30 - 1:30 p.m.; also by appointment
Office phone: 361-825-3165
Meeting place: Center for Sciences 110
Meeting time: Mon-Thurs 6/4-7/5 and Fri 7/6, 2:00-3:55 p.m.

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.

The course will cover chapters 7, 9, and 10 in the textbook.

III. PREREQUISITES for the COURSE

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

IV. TEXTBOOKS and OTHER READINGS

Required:
- Scientific calculator
- *Texas Essential Knowledge & Skills* (online)
- *Principles and Standards for School Mathematics*, NCTM, 2000 (online)

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 decimals from smallest to greatest
- Find at least two decimals between a given pair of decimals

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 than 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 six categories:

- Core Skills Mastery 10%
- Data Analysis Project 15%
- Midterm Exam 20%
- Classwork and Homework 20%
- Family Math Night 15%
- Final Exam 20%

Final course grades will be rounded to the nearest percent. Final grades ≥ 90% will result in a letter grade of A. Final grades ≥ 80% will result in at least a letter grade of B; final grades ≥ 70% will result in at least a C; final grades ≥ 60% will result in at least a D; and final grades <60% will result in an F.

**Core Skills Mastery** – show mastery of the core elementary procedures used in the course. The exam items are graded “all or nothing,” and you must correctly complete at least 70% of the items to earn any credit on the exam. The exam may be retaken once.

**Data Analysis Project** – choose a social problem to investigate; collect and analyze data related to the problem, and deliver a persuasive presentation to the class. See the project details and evaluation criteria for specifics.

**Midterm Exam** – an in-class individual exam with focus on explanations of ideas surrounding decimal computation and proportional reasoning. This exam may not be made-up if missed.

**Classwork and Homework** – includes individual, collaborative and cooperative group work, reflections, in-class discussion, readings, written assignments, worksheets, and (announced and unannounced) quizzes.

**Family Math Night** – To gain experience working with elementary students and their families, you will be creating and putting on a Family Math Night at a local elementary or middle school. This will entail substantial time and effort outside of class.

**Final Exam** – comprehensive summative evaluation of students’ individual content knowledge. This exam is scheduled by the university and may not be retaken or made-up if missed. If you have a time conflict, please see me a week before the final time to discuss options.

» The final exam is scheduled for Friday, July 6th.

VIII. COURSE OUTLINE (tentative)

<table>
<thead>
<tr>
<th>WEEK</th>
<th>DATE</th>
<th>TOPIC</th>
<th>CONTENT</th>
<th>SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6/4</td>
<td>Introduction</td>
<td>Pre-assessment; review of real numbers</td>
<td>7.1</td>
</tr>
<tr>
<td></td>
<td>6/5</td>
<td>Decimals</td>
<td>Face/place, expanded form, density</td>
<td>7.1</td>
</tr>
<tr>
<td></td>
<td>6/6</td>
<td>Decimals &amp; Fractions</td>
<td>Conversion between fractions &amp; decimal</td>
<td>7.1</td>
</tr>
<tr>
<td>WEEK</td>
<td>DATE</td>
<td>TOPIC</td>
<td>CONTENT</td>
<td>SECTION</td>
</tr>
<tr>
<td>------</td>
<td>------</td>
<td>---------------------</td>
<td>-------------------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>6/7</td>
<td>6/11</td>
<td>Modeling Decimals</td>
<td>Representations of decimals</td>
<td>7.2</td>
</tr>
<tr>
<td>2</td>
<td>6/12</td>
<td>Decimal Operations</td>
<td>Models of decimal arithmetic</td>
<td>7.2</td>
</tr>
<tr>
<td></td>
<td>6/13</td>
<td>Ratio &amp; proportion</td>
<td>Proportional reasoning</td>
<td>7.3</td>
</tr>
<tr>
<td></td>
<td>6/14</td>
<td>Ratio in Context</td>
<td>Applied proportional reasoning.</td>
<td>7.3</td>
</tr>
<tr>
<td></td>
<td>6/18</td>
<td>Percent</td>
<td>Percent, percent change; conversions</td>
<td>7.4</td>
</tr>
<tr>
<td>3</td>
<td>6/19</td>
<td>Data</td>
<td>Principles of data collection</td>
<td>13.1</td>
</tr>
<tr>
<td></td>
<td>6/20</td>
<td>Statistical graphs</td>
<td>Graphs of discrete &amp; continuous data</td>
<td>13.1</td>
</tr>
<tr>
<td></td>
<td>6/21</td>
<td>Statistical graphs</td>
<td>Constructing &amp; reading graphs</td>
<td>13.1</td>
</tr>
<tr>
<td>4</td>
<td>6/25</td>
<td>Measures</td>
<td>Measures of centrality &amp; dispersion</td>
<td>13.2</td>
</tr>
<tr>
<td></td>
<td>6/26</td>
<td>Inference</td>
<td>Normal curve, z-scores &amp; percentiles</td>
<td>13.3</td>
</tr>
<tr>
<td></td>
<td>6/27</td>
<td>Data analysis</td>
<td>Class Presentations</td>
<td>13.1-13.3</td>
</tr>
<tr>
<td></td>
<td>6/28</td>
<td>Data analysis</td>
<td>Class Presentations, Core Skills #1</td>
<td>13.1-13.3</td>
</tr>
<tr>
<td>5</td>
<td>7/2</td>
<td>Probability</td>
<td>Simple, conditional, joint probability</td>
<td>14.1</td>
</tr>
<tr>
<td></td>
<td>7/3</td>
<td>Probability</td>
<td>Tree diagrams, odds, Core Skills #2</td>
<td>14.4</td>
</tr>
<tr>
<td></td>
<td>7/5</td>
<td>Permutations</td>
<td>Combinatorial counting</td>
<td>14.2,14.3</td>
</tr>
<tr>
<td></td>
<td>7/6</td>
<td>(Comprehensive)</td>
<td>Final exam</td>
<td>7, 13, 14</td>
</tr>
</tbody>
</table>

IX. CLASS POLICIES

**Attendance/Tardiness.** Since the course duration is limited, you’re expected to attend every class session, arrive on time, and complete all in-class activities. If you need to miss part or all of a class session, please contact me before class or as soon as possible. Email is usually best.

**Late Homework.** Homework will usually be due the next class, but may be submitted later if the student requests an extension prior to the deadline. The instructor may enforce strict deadlines on some assignments by announcing a “hard deadline.” Partial credit on late submissions will be assigned at the instructor’s discretion.

**Cell Phones/Electronic Devices.** Please silence electronic devices during class and step out of class to use them. You may not use any personal electronic device during exams.

**Written Work.** Good writing skills are important in this class. Please type and proof-read your written assignments. The Writing Center is available for help with written assignments.

**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. Friday, Nov. 5th is the last day to drop a class with an automatic grade of “W” this term.

Academic integrity. 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 result in a minimum of a 0 on the assignment or test.

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 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.

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 tamucc.edu/provost/university_rules. For assistance and/or guidance in the grade appeal process, students may contact the Office of Student Affairs.

Classroom 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.

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