SMTE 3352: Fundamentals of Mathematics III

Course Syllabus for SMTE 3352.001 & SMTE 3352.002, Fall 2014

I. COURSE INFORMATION

Instructor: Sherry L Bair, PhD.
E-mail (preferred contact): sherry.bair@tamucc.edu
Office location: Center for Instruction Room 358
Office phone: 361-825-2819
Office hours: TR 1:15 – 3:15 PM & by appt.
Meeting place: Center for Sciences Room 107
Meeting times: Sect. 001 TR 11:00 AM – 12:15 PM
Sect. 002 TR 3:30-4:45 PM

II. COURSE DESCRIPTION

This course provides students with a research-based perspective on the teaching and learning of elementary mathematics.

SMTE 3352 (Catalog Description): The conceptual framework for understanding and applying properties, models, and operations related to various geometric systems in problem solving settings.

This course provides the conceptual framework for understanding and applying properties, models, and operations related to selected topics in applied geometry including real world applications and technology.

This course is designed to have students experience and learn mathematics through a process of inquiry which differs in significant ways from traditional mathematics classes. Students will work together to do mathematics, which involves solving problems, making claims and conjectures, justifying and critiquing claims and conjectures, and modifying or rejecting claims and conjectures as needed. The focus of the 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 content comparable to chapters 9-12 in the textbook.

III. PREREQUISITES for the COURSE

MATH 1314: College Algebra
SMTE 1350: Fundamentals of Math I
SMTE 1351: Fundamentals of Math II

IV. REQUIRED TEXTBOOKS and OTHER MATERIALS

- Mathematical Reasoning for Elementary Teachers, 6th ed., by Long, DeTemple & Millman, Addison Wesley. [Used as a reference only, not for assignments]
- Scientific 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 MS Office applications (e.g., MS Word, Excel)
V. STUDENT LEARNING OUTCOMES

A student will:

Geometric shapes & figures
- Identify, sort, and contrast attributes of geometric curves using appropriate mathematical language
- Use physical, visual, and numerical models to represent a given problem or mathematical procedure
- Understand shape in terms of dimension, direction, orientation, and perspective
- Analyze and solve problems involving 1-D, 2-D and 3-D objects (lines, angles, circles, polygons, polyhedrons, cylinders, cones, spheres)
- Analyze relationships between 3D figures and 2D representations (projections, cross-sections, nets)

Measurement
- Recognize the effects of error on measurement
- Develop, explain and use formulas to find length, perimeter, circumference, area, surface area and volume of basic geometric figures
- Convert measurements between standard and metric systems

Transformations
- Recognize similar figures and identify scale factor
- Use translations, rotations, reflections, dilations and contractions to illustrate similarities, congruencies and symmetries of figures
- Develop, justify & perform geometric constructions using compass, straight edge and reflection devices and technology

Non-Euclidean geometries
- Apply correct mathematical reasoning to derive valid conclusions from a set of premises
- Explore axiomatic systems leading to non-Euclidean geometries such as taxicab, spherical, hyperbolic and torus geometries

Fractals
- Use symmetry to describe and create tessellations
- Distinguish between tessellations and fractals

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, and group work investigations. 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. Course participation includes participation in at least two professional development activities outside of class.

VII. MAJOR COURSE REQUIREMENTS and ASSESSMENTS

Grades/Grading: Final course grades will be determined based on your work in four categories, with each category carrying a percentage of your total semester grade as follows:

- Dailywork, Homework & Quizzes: 15%
- Professional Development Projects (2) & Math Projects (2): 40%
- Midterm Exam: 20%
- Final Exam: 25%

Each assignment, paper, and test or quiz item will be graded in a holistic manner, based on a rubric. A general version of the rubric appears in the following paragraphs. This is a summarized version of the more analytic rubric which will be attached to all major assignments. 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) **Totally unacceptable 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.

**Daily work, homework & quizzes—** Daily work includes individual, collaborative and cooperative explorations of mathematical ideas, reflections, and discussions of the development of elementary students' reasoning. This category is judged based on each student's active engagement, thoughtful communication, and attendance. Collaboration on homework is great, but only submit your own original work. Quizzes may be announced or unannounced and will typically allow the use of any resources that we normally use during class.

**Mathematical Projects—** There will be two projects throughout the semester, related to use of Geometry and Measurement in the real world. Generally, these projects will require substantive work outside of class. The specific guidelines and grading criteria for each project will be distributed and discussed in class well before the date each is due.

**Professional Development Projects—** Two professional development activities will be required throughout the course of the semester. Students will be provided with a menu of opportunities designed to help them gain experience working with elementary students, parents, and teachers. Completion requires substantial time and effort outside of class. A complete listing of the opportunities available and the grading criteria for each will be provided to students and discussed during class well before the first assignment is due.

**Midterm Exam—** The Midterm is an in-class individual exam with a focus on explanations of concepts underpinning students' understanding of figures and measurement systems. This exam may not be made-up if missed.

**Final Exam—** The final exam is comprehensive summative evaluation of an individual's knowledge of course material. The exam is scheduled by the university and may not be retaken or made-up if missed. If you have a conflict with the scheduled time, please see me at least two weeks prior to the scheduled time to discuss the situation.
VIII. COURSE OUTLINE (This schedule is tentative and subject to change. Changes will be announced in class.)

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<th>TOPIC</th>
<th>CLASS CONTENT</th>
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<td>Introduction to the course</td>
<td>Syllabus, Pre-assessment</td>
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<td>2</td>
<td>9/2</td>
<td>Types of Measure</td>
<td>Activity</td>
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<td>3</td>
<td>9/4</td>
<td>Units of Measure &amp; Customary vs. Metric Measure</td>
<td>Activity &amp; Interactive lecture</td>
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<td>9/16</td>
<td>Angle Measure</td>
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<td>9/18</td>
<td>Shapes &amp; Polygons</td>
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<td>Properties of Shapes</td>
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<td>9/25</td>
<td>Reasoning &amp; Proof in Geometry</td>
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<td>Triangles, Pythagorean Theorem &amp; Trigonometric Ratios</td>
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<td>10/2</td>
<td>Quadrilaterals</td>
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<td>Classification of Quadrilaterals</td>
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<td>Paper Folding</td>
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<td>10/14</td>
<td>Circles &amp; their relationships</td>
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<td>10/16</td>
<td>Measure &amp; Shape</td>
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<td>Area &amp; Perimeter</td>
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<td>Pick’s Theorem &amp; Areas on Geoboards</td>
<td>Activity &amp; Discussion</td>
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<td>18</td>
<td>10/28</td>
<td>Calculating Area - formulas &amp; relationships</td>
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<td>19</td>
<td>10/30</td>
<td>Polyhedra - Their Footprints, Orthographic &amp; Isometric Drawings</td>
<td>Interactive Lecture &amp; Activity</td>
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<td>Surface Area &amp; Volume</td>
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<td>Calculating surface area &amp; volume</td>
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<td>Geometric Formulas</td>
<td>Quiz</td>
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<td>11/13</td>
<td>Symmetry, Tiling &amp; Tessellations</td>
<td>Activity &amp; Discussion</td>
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<tr>
<td>24</td>
<td>11/18</td>
<td>Properties of Tiling Figures</td>
<td>Activity &amp; Discussion</td>
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DAY | DATE | TOPIC | CLASS CONTENT
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25 | 11/20 | Congruence & Similarity Transformations | Interactive Lecture
26 | 11/25 | Geometry in Art & Escher's techniques | Interactive Lecture/ Activity
27 | 12/2 | Semester Wrap-up | Discussion & Build Their Own Review

**IX. CLASS POLICIES**

**Attendance/Tardiness.** Students are expected to attend every class session, arrive on time, and complete all in-class activities. If you need to miss a class session, please talk with a classmate and see the course website to get caught-up. Feel free to email the instructor with any questions.

**Late Homework.** Daily homework will usually be due class period after it is assigned. Larger assignments, such as projects, have ample time allocated for completion, and deadlines will be specifically set in advance. Late homework is not accepted unless arrangements have been made with the instructor prior to the time the assignment is due.

**Cell Phones/Electronic Devices.** Please silence electronic devices during class. If you have an emergency situation where it may be necessary to answer a call, step out of the class to do so. You may not use any personal electronic device during a quiz or exam.

**Written Work.** Good writing skills are important in this class. Please type and proof-read your written assignments. While it is a math class, as preservice teachers you must be able to write coherently. Thus spelling and grammar are a portion of the grading criteria for projects and papers. The Writing Center is available for help with written assignments.

**In-Class Discussion.** Everyone in the class is encouraged to express personal views with an emphasis on evidence-based claims. We have diverse backgrounds and perspectives, but by maintaining a spirit of mutual respect and acknowledgement, the hope is that classroom discussion will be inviting, lively, and informative.

**Dropping a class.** I hope that you do not find it necessary to drop this class. However, events can sometimes occur that can 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 & participation WILL NOT automatically result in your being dropped from the class.

**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.

**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.

**Grade Appeals (College of Science and Engineering Version)**
As stated in University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures, 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 Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at [http://www.tamucc.edu/provost/university_rules/index.html](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](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, the Office of the College of Science and Engineering Dean, or the Office of the Provost.

**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 Corpus Christi Hall 116.

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.

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