1. Course Number: MATH 2304-001  CRN 31775
2. Course Title: Geometry and Measurement Conceptual Mathematics from Multiple Perspectives
3. Credit Hours: 3
4. Term: Summer 1, 2014
5. Course Meetings and Location: MTWRF 2:00-4:10  Bell Hall 143
6. Prerequisites: MATH 2303 with a grade of "C" or better.
7. Course Fee: none
8. Instructor: Dr. Don W. Collins
9. Office Location: Bell Hall 305
10. Contact Info: dwcollins2@utep.edu
11. Office Hours: 10:45 - 11:25 MTWR or by appointment
12. Textbook:
   Required: Mathematics for Elementary Teachers with Activities (4th Ed)
   By Sybilla Beckmann (purchase online with a discount code)

13. Catalog Description: This course focuses on geometry and measurement for prospective elementary and middle school teachers. Topics include measurement as a process and units of measurement for quantities such as length, area, volume, angle size, and speed; conversions of units of measurement; properties and formulas for basic geometrical shapes such as polygons, circles, polyhedra and cones; transformations such as translations, rotations, reflections, and dilations to illustrate similarities, congruencies and symmetries of figures; explorations and justifications of geometric relationships and constructions using straight edge, compass, and technology. The focus is on spatial reasoning, logical reasoning, and making connections among geometric ideas and measurement, number concepts, and algebra.

14. Course Objectives: Students will
   a. Conceive doing mathematics as a problem-solving endeavor that involves sense-making and thinking.
      b. Develop the habit of
         i. Attending to the meanings of symbols/numbers
         ii. Analyzing problem situation instead of rushing into a procedure
         iii. Making conjectures and providing justifications instead of waiting to be shown what to do.
   c. Deepen their understanding of measurement
      i. Be able to describe what the process of measurement involves.
      ii. Explain what these terms mean: angle, perimeter, area, and volume.
      iii. Understand the common forms of measurement, and choose appropriate tools and units for measuring.
      iv. Apply the four key ideas of measurement to length, to angle size, to area, and to volume.
v. Recognize the “inverse” relationship between the numerical part of the measurement and the unit-size.
vi. Convert among units of measurement (both metric and English units).

vii. Understand, derive, and use formulas for circumference, area, and volume.
viii. Use a “layer” argument to justify the formula for the volume of any prism or cylinder.

ix. Use a key idea of measurement and your knowledge of formulas to give formulas for the perimeter, area, or volume of different sorts of shapes.
x. State the Pythagorean Theorem and use it to solve problems involving length, area, and volumes.

xi. Explain what a given rate means (e.g. 45 g/L)
xii. Illustrate why a rate quantity cannot be measured by thinking of the object being measured as “cut” into a number of pieces, measuring the quantity in each piece, and then adding up those measurements.

d. Deepen their understanding of geometrical shapes and transformations
i. Know the meanings and definitions of geometric terms (e.g., prism, tetrahedron, kite, polygonal region, chord, inscribed angle, bisector, isometry, equiangular, equilateral, regular, symmetry)

ii. Identify common 2-D and 3-D shapes and list their basic characteristics and properties

iii. Relate 3-D figures and their 2-D representations (nets, projections)

iv. Make conjectures about geometric shapes and then prove or disprove them (e.g., sum of angles of polygon formula)
v. Appreciate the role of a hierarchy in organizing relationships and information.

vi. Identify all the reflection symmetries and rotational symmetries of a given 2D or 3D figure

vii. Demonstrate how similar figures result from a dilation, and the role of proportional relationships in determining similarity.
viii. List the criteria for two figures to be similar

ix. State the relationships between lengths and perimeters, areas, and/or volumes of two similar figures

x. Make geometric constructions using compass and straightedge

xi. Demonstrate how rigid motions result in congruent figures

xii. Differentiate among different types of isometries, and state and apply key facts of each type.
xiii. Illustrate what the composition of two motions mean and find the resultant image of a given figure.

15. Course Activities/Assignments: TBA
Assignments turned in late will be subject to penalty
16. **TExES Competencies:**
- Competencies 16 & 18 (Generalist EC-6)
- Competencies 20 & 22 (Bilingual Generalist EC-6)
- Competencies 17, 18, 19, 20 & 24 (Generalist 4-8)
- Competencies 21, 22, 23, 24 & 28 (Bilingual Generalist 4-8)
- Competencies 8, 9, 10, 11, 15 & 16 (Mathematics 4-8)

**Important Dates:**
- Census Day – Last Day to Drop without a “W” (Feb 5)
- Last Day to Drop with a “W” (Apr 4)

17. **Grading Policy:** Two quizzes 20% each, Assignments 20%, Class Journal 20%. Final exam 20%. The usual grading scale of 90-100% = A, 80-89% = B, 70-79% = C, and so on.

18. **Make up policy:** All work for classes missed can be made up if done in a timely manner, usually within a weeks time.

19. **Attendance Policy:** It is the student’s responsibility to attend every class. If you miss a class you will miss a lot of information. If you must miss please make arrangements to get class notes from a classmate. If you try to go from one class meeting to the next without studying or doing the assignment you most likely will be completely lost during the next class. Students are expected to arrive for class on time and remain for the entire class period. It is essential to pay close attention and take legible notes. It is essential to read the textbook and work through the example exercises in the text prior to class. Failure to adhere to the above invariably ensures a less than satisfactory grade for this course.

20. **Academic Integrity Policy:**

21. **Civility Statement:** Calculators are not to be shared during quizzes and exams. Please do not use cell phones, pagers, IPods, MP3 Players, blue tooth devices or ect during class. Cell phone and pagers should be set on silent or vibrate and all call should be taken outside of class. Please do not wear Blue tooth or headsets during class. Please do not talk during class. Cell phone calculators may not be used during quizzes or exams. Active participation is expected. Team work in class will be implemented.

22. **Disability Statement:** If a student has or suspects he/she has a disability and need an accommodation, he/she should contact the Disabled Student Services Office (DSSO ) at 747-5148 or e-mail dss@utep.edu or go to room 106 Union East Building. The student is responsible for presenting the instructor with any accommodation letters and instructions.

23. **Military Statement:** If you are a military student with the potential of being called to military service and/or training during the semester, please contact the instructor by the first week of class.