Course #: MATH 3308
Course Title: Proportional and Algebraic Reasoning
Credit Hrs: 3
Term: Fall 2009
Course Meetings & Location: TR 6:00 – 7:20
Prerequisite Courses: MATH 2303 with a grade of “C” or better
Course Fee: (if applicable) none
Instructor: Ghassan Kachmar
Office Location: After class
Contact Info: 7311682 Phone (text only)
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Fax #
Emergency Contact
Office Hrs: TR 7:20-7:50
Suggested: N/A
Course Objectives (Learning Outcomes): Students will
(a) conceive mathematics as a problem solving endeavor that involves sense-making and thinking;
(b) develop the habit of attending to meaning, of analyzing problem situations, and of making conjectures and providing justifications;
(c) strengthen their quantitative reasoning and algebraic reasoning;
(d) deepen their understanding of fractions, ratios, proportions, and algebra.
Course Activities/Assignments: Chapters 6 – 15 will be covered in class. Students will be asked to present a certain topic chosen by the instructor.
Course Schedule: Chapters 6 – 15
(NOTE: Final exams must be given at the scheduled time; any/all exceptions must be approved by both the department chair and the dean.)
Grading Policy: Two exams, two projects and the final, @20% each.
Make-up Policy: No make up exams, the final grade may replace the lowest score
Attendance Policy: Attendance is required. Quizes may be given throughout the semester.
Academic Integrity Policy: Any student who commits an act of scholastic dishonesty is subject to discipline. Scholastic dishonesty includes, but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts. Refer to the UTEP’s Policy at [http://academics.utep.edu/Default.aspx?tabid=23785](http://academics.utep.edu/Default.aspx?tabid=23785).

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

Military Statement: If you are a military student with the potential of being called to military service and/or training during the course of the semester, you are encouraged to contact as soon as possible.
Content Objectives

1. Quantitative Reasoning
   a. Undertake a quantitative analysis for a problem situation by identifying quantities and understanding how they are related.
   b. Discuss the incorrect ways that children solve story problems.
   c. Discuss the importance of appropriate drawings in problem situation.

2. Fractions and Operations involving Fractions
   b. Given a part of a whole and the fraction it represents, find the whole.
   c. Generate drawings to illustrate equivalent rational numbers (e.g., \(2/5 = 4/10 = 0.4 = 40\%\), \(2\frac{3}{4} = 11/4\))
   d. Be able to order a set of fractions, decimal numbers, and percents.
   e. Change terminating decimals and repeating decimals to fractions, and vice versa.
   f. Distinguish between rational numbers and irrational numbers.
   g. Understand the need for a common denominator for adding and subtracting fractions.
   h. Explain the meaning of fraction of a fraction and understand the referent unit for the multiplier, the multiplicand, and the product.
   i. Explain the meaning of dividing by a fraction (repeated-subtraction view) and understand the referent unit for the dividend, the divisor, and the quotient.
   j. Explain why the invert-and-multiply rule works.

3. Proportional Reasoning
   a. Differentiate between multiplicative reasoning and additive reasoning. Compare and contrast an additive comparison and a multiplicative comparison.
   b. Explain the difference between ratio as a multiplicative comparison and ratio as a measure.
   c. Perform a quantitative analysis to differentiate proportional situations from non-proportional situations. For a proportional situation, explain why the two ratios in a proportion are equal to one another.
   d. Solve proportional problems in ways other than cross-multiplying.
   e. Explain the definition of a proportion, of a unit ratio, and of a percent.
   f. Realize the importance of attending to the referent whole of a fraction and to the referent base of a percent.
   g. Make connections among percents, fractions, ratios, and decimals by distinguishing among different meanings of a rational number such as part-whole conception, sharing-equally division, multiplicative comparison, and value of a measure.

4. Algebraic Reasoning
   a. Appreciate the power of algebra in modeling a phenomenon by identifying the relationship between two quantities.
   b. Use an algebraic equation, a graph, a table, or a verbal description to represent a relationship between two co-varying quantities.
c. Explain the connection among the “steepness” of a straight-line graph, the slope in an equation, and the rate of change in a given context.
d. Draw a qualitative graph for a situation, and conversely write a story for a qualitative graph.
e. Write or recognize an equation for a given situation or graph.
f. Explain and illustrate what is meant by the “graph as picture” misconception.
g. Solve a problem numerically, graphically, and algebraically.
h. Distinguish between simple average and weighted average.
i. Relate algebra to generalized arithmetic; give parallel numerical and algebraic calculations, and point out how they are alike.
j. Explain what a function is and why functions are important in mathematics.
k. Find a general function rule for a given pattern and give a justification that it is 100% reliable.
l. Illustrate and identify arithmetic sequences and geometric sequences.

Chapters 1, 6, 7, 8, 9, 12, 13, 14, and 15 in the *Reconceptualizing Mathematics* text will be covered. Understanding of Chapters 2-7 is a pre-requisite.