THE UNIVERSITY OF TEXAS AT EL PASO
COLLEGE OF SCIENCE
DEPARTMENT OF MATHEMATICAL SCIENCES

Course #: MATH 2303 CRN 13166
Course Title: Number Concepts
Credit Hrs: 3
Term: Fall 2009
Course Meetings & Location: TTH 12:00 – 1:20 pm, EDUC 311
Prerequisite Courses: MATH 0311 or an adequate score on a placement exam
Course Fee: (if applicable) None
Instructor: Tuesday J. Johnson
Office Location: CRBL 404
Contact Info: Phone # 747 – 8908
E-mail address: tjohnson3@utep.edu

Office Hrs: MW 1:30 – 2:45 pm, TTh 10:30 – 11:45 am
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) deepen their understanding of whole numbers, fractions, signed numbers, arithmetic operations, factors and multiples.
Course Activities/Assignments: You will have two types of assignments for this course. The first will be teacher focused and will consist of explanations orally and in writing as if you were teaching a particular topic. Each section of the text will be introduced with a problem. It will be your task to spend the first 5 minutes of class writing an explanation as directed for that day. These will be turned in with your student focused work. Also, each student will be required to present on the board at least three times throughout the semester. Your student focused work will be work you need to do as a current student. Assignments and deadlines will be given during class. You are encouraged to work together on student focused work; however, you must turn in your own work. That is, no two students think and write the same. If you and a group member have exactly the same work submitted I will doubt the authenticity. You are not allowed the use of a calculator in this class. Also, incomplete homework assignments will result in a grade of a 0. It is much better than to try and not succeed that to never try at all.

Assessment of Course Objectives: You will have two midterm exams that will be completed individually with no books, no notes, no computer, and no calculator. This is an examination of how you are able to understand and synthesize the material from class individually. Exam questions will not be identical to homework questions. If you have an A average after all grading is complete after the Thanksgiving break, you will not need to take the final exam. Otherwise, it will be a comprehensive final exam on Tuesday, December 8th 1:00 pm – 3:45 pm.

Course Schedule: A chapter by chapter schedule will be distributed during class.

Grading Policy: Your grade will be computed as follows:

- Homework 50%
- Midterms 30% (15% each)
- Final Exam 20%

Make-up Policy: Make up work will not be allowed without proper documentation of the emergency. If you know you will be missing a class it is in your best interest to let me know before the absence.

Attendance Policy: It is my sincere hope that you will not be learning any new mathematics in this course, instead you will be learning it in a more understandable manner and learn the “why” of mathematics. For this reason it is very important that you attend every class day.

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.
Civility Statement: If a student’s cell phone or pager rings (buzzes, beeps, plays a song or sings) during class time, or if anyone uses their phone in the classroom during class time, that person will receive a score of 0 for their next graded work. Please make it easy and turn off your cell phone.

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 in the military and there is a chance that you will be called away during the semester, please inform me of this before the end of the first week of classes.

Content Objectives:

a. Understanding of whole numbers and arithmetic operations
   i. Explain the place value system and its strengths
   ii. Explain how the placement of digits determines the value of a number in any base (e.g. what does 321.4 mean in base 5?)
   iii. Understand the role of the unit, one, in reading and understanding decimal numbers.
   iv. Distinguish among different ways of thinking about addition and subtraction (e.g., additive combination, comparison subtraction, missing-addend subtraction, take-away subtraction)
   v. Distinguish among different ways of thinking about multiplication (e.g., repeated-addition, fractional part of a quantity, array, fundamental counting principle view)
   vi. Distinguish among different ways of thinking about division (e.g., repeated-subtraction, sharing-equally, missing-factor view)
   vii. Identify the operations and the view of that operation that fits a problem situation.
   viii. Write story problems that correctly illustrate any specified view of an operation.
   ix. Provide reasons why some views of operations are more difficult than others.
   x. Study students’ work and explain how the students are reasoning.
   xi. Explain why using “key words” is not a good strategy for answering story problems.
   xii. Explain why “multiplication makes bigger” and “division makes smaller” are not always true.
   xiii. Explain the standard algorithm for multi-digit addition and multi-digit subtraction using regrouping and place-value understanding.
   xiv. Explain the standard algorithm for multi-digit multiplication using partial products and place-value understanding.
   xv. Explain the standard algorithm for division of whole numbers using a series of algorithms and place-value understanding.
   xvi. Recognize the role of place value in the algorithms.

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

c. Understanding of signed numbers
   i. Add, subtract, multiply, and divide signed numbers.
   ii. Understand absolute value, apply it, and explain its usefulness in the context of working with signed numbers.
   iii. Explain why certain operations on negative numbers are difficult to teach.

d. Understanding of factors and multiples
   i. Understand the meaning of terms like even, odd, factor, multiple, prime, and composite numbers.
   ii. Use the Sieve of Eratosthenes to find prime numbers.
   iii. Explain the unique factorization theorem and its usefulness.
   iv. Explain the divisibility tests for 2, 3, 4, 5, 6, 9, and 10.
   v. Find the greatest common factor and the least common multiple for a set of numbers.

Chapters 2, 3, 4, 6, 7, 10, and 11 in the Reconceptualizing Mathematics text will be covered. Number sense and mental computation (Chapter 5) will be emphasized throughout the course.