Concepts of Modern Mathematics I, MATH 1351

Meeting Times: 11:15-12:10 am MWF in RBN 3038

Last day to withdraw: Monday, November 4, 2024

Instructor: Nathan Smith

Office: RBN 4007

Contact: nsmith@uttyler.edu

Office Hours: Tentatively 1:30 - 2:30 MW, 9:00-10:00 F with other times available by appointment.

Text: We'll be using free online resources rather than purchasing a textbook.

Course Overview and Topics: Sets and number systems, computation, basic number theory, integers, rational numbers, real numbers, decimal representations, and proportional reasoning.

We will be looking down, as adults and prospective educators, at much of the mathematics taught from grades K-8 according to the Texas Essential Knowledge and Skills standards. Being able to "do the math" is not the only skill needed for effective instruction, you have to *understand* the math, be able to do the math in a variety of ways, and relate the various ways of solving a problem to your understanding.

Student Learning Outcomes: By the end of the course students should be able to:

1. Domonstrate a proficient conceptual understanding of arithmetic, algebraic, and proportional reasoning.

2. Use different models and algorithms for performing and describing arithmetic operations with whole numbers, integers, rational numbers, and decimal numbers.

3. Solve and explain problems involving proportional reasoning.

4. Analyze and solve problems involving topics from elementary number theory, including divisibility, primality, GCD, and LCM.

Grading:

- Test1: $\frac{1}{4}$ of your semester grade. (late September-ish)

- Test2: $\frac{1}{4}$ of your semester grade. (late November-ish)

- Comprehensive Final Exam: $\frac{1}{4}$ of your semester grade.

- Quizzes, HW, and Class assignments: $\frac{1}{4}$ of your semester grade.

Missed work: It is not expected that you will miss a test. If an emergency situation or university-sanctioned event forces your absence on the day of the test and if you have discussed the situation in advance with the instructor, your final exam grade will be used to replace your test. Because much of the learning in this class revolves around discovery learning activities undertaken during the class time, attendance is extremely important. I am not responsible enough to handle late work (getting it on the same pile as other papers from the same assignment, grading it, recording the grade, etc.).

We will have quizzes weekly, excepting possibly the weeks in which an exam is scheduled. Excepting unusual circumstances such as a university-sanctioned event, make-up quizzes will not be given. At the end of the semester when calculating your grade I not use your lowest two quiz grades when computing your average.

Student Academic Conduct: It is your responsibility to learn the material in this course for your own benefit. You should not let this discourage you from working together on your homework but in the end what you turn in should reflect your understanding, not just be copied from someone else. *During the tests, a code of honor will apply under which students are to work alone and neither give help to others nor receive help from any sources.* Students are also expected to help enforce this code. Students are encouraged to obtain a copy of *A Student Guide to Conduct and Discipline at UT Tyler*, available in the Office of Student Affairs.

Artificial Intelligence: UT Tyler is committed to exploring and using artificial intelligence (AI) tools as appropriate for the discipline and task undertaken. We encourage discussing AI tools' ethical, societal, philosophical, and disciplinary implications. All uses of AI should be acknowledged as this aligns with our commitment to honor and integrity, as noted in UT Tyler's Honor Code. Faculty and students must not use protected information, data, or copyrighted materials when using any AI tool. Additionally, users should be aware that AI tools rely on predictive models to generate content that may appear correct but is sometimes shown to be incomplete, inaccurate, taken without attribution from other sources, and/or biased. Consequently, an AI tool should not be considered a substitute for traditional approaches to research. You are ultimately responsible for the quality and content of the information you submit. Misusing AI tools that violate the guidelines specified for this course (see below) is considered a breach of academic integrity. The student will be subject to disciplinary actions as outlined in UT Tyler's Academic Integrity Policy.

For this course, you may not use AI tools to produce anything turned in for a grade.

University Policies: For University policies concerning Students' Rights and Responsibilities, Grade Replacement/Forgiveness, State-Mandated Corse Drop Policy, Disability Services, Student Absence due to Religious Observance, Student Absence for University-Sponsored Events and Activities, and the Social Security and FERPA Statement please see: *http://www.uttyler.edu/academicaffairs/files/syllabuspolicy.pdf.*

Course Outline:

1. Representations of natural numbers

   (a) exploding dots

   (b) bases other than ten - converting back and forth between base n and base 10

   (c) number line (points and arrows)

2. Addition of natural numbers

   (a) counters

   (b) exploding dots

   (c) base ten blocks

   (d) bases other than ten

   (e) number line

3. Representations of integers

   (a) two color counters, zero pairs, etc.

   (b) number line

4. Addition and subtraction of integers

   (a) subtraction with exploding dots and base ten blocks

   (b) bases other than ten

   (c) addition/subtraction with two color counters, zero pairs, etc.

   (d) addition of integers on number line

   (e) subtraction of integers on number line, take away

   (f) subtraction of integers on number line – difference/distance model

5. Representations of rational numbers, fractions and decimals

   (a) number line and rulers, improper and proper fractions

   (b) clock rep of fractions

   (c) converting between fractions and decimals

6. Addition and subtraction of rational numbers, fractions and decimals

   (a) recall methods of operation and numeracy

   (b) number line and rulers, decimals and fractions, both take away and difference/distance

(c) clocks and fractions

7. Multiplication

    (a) Area models to represent fractions and decimals
    (b) grid methods (diagonal and expanded notation)
    (c) ratio tables and double number lines
    (d) Area models for multiplication

8. Division

    (a) partitive and quotitive understandings of division
    (b) partial quotients
    (c) open area models and open double number lines
    (d) fraction division with area models and double number lines
    (e) factor trees for natural numbers, relation to division

9. Primes, gcds, lcms

    (a) Prime numbers, establishing primality
    (b) how many divisors of a number
    (c) gcd and lcm