

Syllabus for Math 111 — Math for Elementary Teachers I (3)

Course Description: This course is required for students wishing to enter the College of Education for a Bachelor's in Elementary Education, and enrollment is limited to prospective elementary teachers. Content covered includes:

- Properties of sets, counting, and cardinality.
- Place value (base ten and other bases).
- Number systems including natural numbers, and finite number systems.
- Number and operations: representing and solving problems involving different operations, understanding and applying properties of operations and relationships between them, etc.
- Operations and algebraic thinking.
- Elementary number theory (primes, divisors, greatest common factor, least common multiple, etc.)

The course will help you to understand elementary mathematics more deeply, gain facility with creating and using mathematical notation, develop a habit of looking for reasons and creating mathematical explanations, and become more comfortable exploring unfamiliar mathematical situations.

Student Learning Outcomes: The primary goal of this course is to help you learn to think like a mathematician in some very specific ways. You will:

- **Make sense of problems and persevere in solving them.** You will develop and demonstrate this skill by working on difficult problems, making incremental progress, and revising solutions to problems as you learn more.
- **Reason abstractly and quantitatively.** You will demonstrate this skill by learning to represent situations using mathematical notation (abstraction) as well as creating and testing examples (making situations more concrete).
- **Construct viable arguments and critique the reasoning of others.** You will be expected to create both written and verbal explanations for your solutions to problems. The most important questions in this class are “*Why?*” and “*How do you know you’re right?*” Practice asking these questions of yourself, of your professor, and of your fellow students.
- **Model with mathematics.** You will demonstrate this skill by inventing mathematical notation and drawings to represent physical situations and solve problems.
- **Use appropriate tools strategically.** You will be expected to use computers, calculators, measuring devices, and other mathematical tools when they are helpful.
- **Attend to precision.** You will write and express mathematical ideas clearly, using mathematical terms properly, providing clear definitions and descriptions of your ideas, and distinguishing between similar ideas (for example “factor” versus “multiple”.)
- **Look for and make use of mathematical structure.** You will find, describe, and most importantly explain patterns that come up in various situations including problems, tables of numbers, and algebraic expressions.

- **Look for and express regularity in repeated reasoning.** You will demonstrate this skill by recognizing (and expressing) when calculations or ideas are repeated, and how that can be used to draw mathematical conclusions (for example why a decimal must repeat) or develop shortcuts to calculations.

Throughout the course, you will **learn how to learn** mathematics on your own by reading, working on problems, and making sense of new ideas on your own and in collaboration with other students in the class.

Course Format: This class will probably be different from other math courses you have taken. During class, you will work on problems (either alone or with other students). You will be expected to explain your ideas, both in small groups and to the whole class. You will figure out what's true and what's false, and you will work on how to convince yourself (and others) of your ideas. The questions you will be asked require creativity and careful reasoning. Do not rush through the homework questions. Spend time thinking about them, trying examples, and carefully writing your responses.

Materials: To be selected by instructor.