

MATH 2008

Foundations of Numbers and Operations

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Office hours: 10:50-12:00 and 1:50-3:00 (T, Th)-Carrollton Campus
11:30-1:00 (F)-Newnan Campus

Textbook:

Billstein, R., Libeskind, S., & Lott, J. (2012). *A Problem solving approach to mathematics for elementary school teachers*, 11th Edition. Pearson Addison-Wesley: Boston, MA.

Course Materials: The course syllabus and materials are posted in the Courseden (<https://westga.view.usg.edu>). A hard copy of the syllabus and the first week materials will be provided. All other remaining materials will be posted on the Courseden and it is students' responsibility to bring the printed copies of those materials to the class. Students who do not have access to printers should see me for further help.

Overview of the Course: This course is designed to help prospective P-8 teachers develop mathematical understanding of elementary and mid-grade level mathematics through collaboration and problem solving. From this course, you will have opportunities to reconstruct elementary number concepts through problem solving and use those concepts to solve realistic mathematics problems. Although there will be some lecturing at times, there will be ample opportunities for you to reconstruct mathematical ideas by communicating and sharing your mathematical ideas with your classmates.

Goals and Objectives of the Course include, but not limited to,

1. Apply and adapt a variety of appropriate strategies to solve problems.
 - 1.1 Identify how a sequence (in both numeric forms and in diagrams) grows and find the general term of sequence using the pattern in the sequence. Explain how Gauss method works and generalize the method to find the sum of terms in a sequence with a pattern.

2. Construct numeric systems for various bases and explain the role of place values and zero in the systems. Be able to convert back and forth numbers in base 10 to numbers in base other than 10.
3. Identify and explain various strategies and algorithms for number operations (addition, subtraction, multiplication, and division) and use those in calculation.
4. Be able to model operations using various representations (visual and verbal) and explain how multiple representations are connected.
5. Explain how mathematical properties, such as the distributive, commutative, and associative properties, are embedded in various strategies in operations and use the properties efficiently in problem solving.
6. Define and find multiples and factors including the greatest common divisor (GCD) and the least common multiple (LCM). Be able to explain how prime factorizations of numbers are associated with the GCD and LCM.
7. State the divisibility rules and explain why those rules work. Apply the rules to determine if numbers are divisible by certain numbers and to list numbers that satisfy the rules.
8. Explain and compute integer operations using various models.

Attendance: You must be **punctual** and **always** attend class. There could be unforeseen emergencies that do come up. However, anyone missing classes **FIVE times or more** during semester **will not** receive credit for the course. **Students may not enter the classroom once the class starts and will be marked absent.**

Use of Calculator and Other Electronics: Calculator is the only electronic device students can use in the classroom. **Calculator as a phone accessory is NOT allowed.** In fact, in no circumstance are students allowed to use any types of electronics other than calculators. Students who do not abide this rule will be escorted to outside of the classroom, marked absent, and won't be allowed to return for the day.

Grading: Your final grade in the course will be based on your performance on quizzes, a mid-term exam, and a final exam.

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|------------|--------|
| Quiz | 30 pts |
| Midterm | 30 pts |
| Final Exam | 40 pts |

100 pts

* Quiz will be given every other Thursday, starting from Week 2. Students will be allowed to drop one lowest score. **(No makeup quiz in any case.)**

* The midterm exam will be on Thursday of Week 7. The final exam will be on the final exam week. (Check the date and time in the UWG academic calendar.) No make-up exam is permitted except for medical emergencies that can be documented.

* Students are expected to do homework in a timely manner. However, homework will be neither collected nor graded.

* Final Course Grade:

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|---|----------|
| A | 90-100 |
| B | 80-89.99 |
| C | 70-79.99 |
| D | 60-69.99 |
| F | Below 60 |

Overall Philosophy: You are required to provide detailed explanations of the mathematics on all group investigations, homework, quizzes, and exams. This course emphasizes the conceptual framework of mathematics and is designed to avoid the "turn the crank" style of computation that is typical of many mathematics courses. Just getting an answer is not enough. You are expected to explain your ideas. If you are stuck, work with classmates, bring questions to class meetings, or come and see me during my office hours. It is crucial that you explain what you are thinking. It is possible to receive a poor score for a correct answer if you do not explain your ideas. On the other hand, a clear exposition with a minor computational error can receive a good score.

What I expect from you as learners:

1. Attend every class. Since much of our class time will be spent to construct mathematical ideas through group work, it will be hard for you to catch up if you miss class.
2. Respect other students' ideas and be ready to justify your reasoning.
3. Keep up with homework. You will deepen your understanding of mathematical concepts by working on extra problems on your own. It will also provide a good opportunity to locate where your misunderstandings are.
4. Be an advocate of your own learning. Seek assistance for help. Come and see me during my office hours if you have any questions. You can also go to Mathlab for assistance.

Common Language Link: <http://tinyurl.com/UWGSyllabusPolicies>

Tentative Schedule

| Week | Topics | Materials |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|
| 1 & 2 | <ul style="list-style-type: none"> • Problem Solving Using Patterns • Sets: Equivalent Sets, Cardinal Numbers | Exploration 1: Textbook-Ch. 1.1 & 1.2 |
| 3 & 4 | <ul style="list-style-type: none"> • Logic • Sets: Subsets, Set Operations | Exploration 2: Textbook-Ch. 1.3, 2.2, & 2.3 |
| 5 & 6 | <ul style="list-style-type: none"> • Numbers with Various Bases • Properties of Whole Numbers • Addition and Subtraction with Whole Numbers | Exploration 3: Textbook-Ch. 2.1, 3.1 & 3.2 |
| 7 & 8 | <ul style="list-style-type: none"> • Midterm • Multiplication and Division with Whole Numbers | Exploration 4: Textbook-Ch. 3.3 & 3.4 |
| 9 & 10 | <ul style="list-style-type: none"> • Divisibility • Prime and Composite Numbers • GCD and LCM | Exploration 5: Textbook-Ch. 4.1, 4.2 & 4.3 |
| 11 & 12 | <ul style="list-style-type: none"> • Integers and Operations with Integers | Exploration 6: Textbook-Ch. 5.1 & 5.2 |
| 13 & 14 | <ul style="list-style-type: none"> • Rational Numbers and Operations • Review | Exploration 7: Textbook-Ch. 6 |
| 15 | <ul style="list-style-type: none"> • Final Exam | |