

Course: Math (293) 232 - Number & Algebra for Teachers.

Catalog Description: I, II, S. 3 Hr. PR: MATH 126 with a "C" or better. (For pre-service elementary education majors only.) Use of properties of real numbers and algebra to illuminate conceptual understanding and enhance problem solving techniques. The use of technology and manipulatives is infused throughout the course.

Semester: Fall 2009

Course Format: 2 hr Lecture. 1 hr Laboratory 3 hr Credit

Prerequisites: Math 126 (College Algebra with a C or better)

Instructor: Dr. Laura Pyzdrowski 411 Armstrong Hall
293-2011 ext. 2358, lpyzdrow@math.wvu.edu

Schedule: Tuesday/Thursday

Lecture:	Tuesday 10 - 11:00, Thursday 10 - 11:00
Laboratory:	Thursday 11:00 - 12:00
Final:	Wednesday, December 16, 11:00 - 1:00

Location: Room 422 Armstrong Hall (Lecture and Laboratory)

Office Hours: To be announced or by appointment

Course Objectives: The objectives of this course are to improve the understanding of basic concepts and skills in the topic areas of number and algebra and to analyze elementary and middle school number and algebra topics from an advanced perspective. Computer laboratory explorations, experiments, and detailed problem-solving sessions will supplement the materials covered in the lecture part of the course.

Expected Learning Outcomes:

Upon successful completion of this course:

1. Students will be able to use algebra, Venn Diagrams, logic, properties of numbers and problem solving strategies to solve authentic problems.
2. Students will be able to compare the concepts in set theory to the concepts of logic.
3. Students will be able to use concepts illuminated by concrete models to explain why properties of numbers and algebra make sense.
4. Students will be able to compare and contrast various numeration systems and use them to express whole numbers (and vice versa).
5. Students will be able to describe how working in other numeration systems provides a deeper understanding of place value in the base 10 system.
6. Students will be able to describe the concept of function and use the domain, range, and various representations and properties of functions to solve problems.
7. Students will be able to represent operations on numbers and variables (add, subtract,

- multiply, divide, exponentiation) using various models and strategies and explain how the model/strategy may develop conceptual understanding.
8. Students will be able to compare and contrast fractions, decimals and ratios.
 9. Students will be able to perform operations on functions using various models, properties and strategies and explain how the model/strategy may develop conceptual understanding
 10. Students will be able to use and know when to apply properties of numbers such as closure, commutative, associative, identity, cancellation, and distributive properties.
 11. Students will be able to develop formal and informal proofs and arguments using deductive and inductive reasoning.

Required Text:

Mathematics for Elementary Teachers: A Contemporary Approach Eighth Edition

Publisher: Wiley

ISBN: 13-978-0470-10583-2

Grading: 3 Exams 37.5 % (300/800 points)

Group Assignments (in and out of class): 12.5 % (100/800 points)

Laboratories: 12.5 % (100/800 points)

Reflection Paper and Individual Assignments: 12.5% (100/800 points)

Final Exam: 25 % (200/800 points)

Total: 100 % (800 points)

Grade Assignment: 100 – 90 A

89 – 80 B

79 – 70 C

69 – 60 D

59 – 0 F

Grading Policy:

- There are no make-up exams except by prior arrangement with instructor.
- Late assignments will only be accepted at the next class meeting with a 10% penalty.
- Missed laboratories will be made up during last laboratory meeting. Students must be present in the laboratory to earn credit for doing the laboratory assignments.
- Exam grading appeals must be submitted in writing on the day the exam is returned.

Assignments: Assignments will typically be given once or twice weekly. Some assignments are completed in a group and some are completed individually. All group and individual assignments are weighted equally. The reflection paper is weighted as five individual assignments. The total worth of group assignments, individual assignments and the reflection paper is 25%.

Reflection Paper/Course Project: Students will receive a class handout describing the content expectations for this assignment as well as the parameters used for its assessment.

Attendance Policy: Consistent with WVU guidelines, students absent from regularly scheduled examinations because of authorized University activities will have the opportunity to take them at an alternate time. Make-up exams for absences due to any other reason will be at the discretion of the instructor. Missed in- class assignments may not be made-up.

Social Justice Statement : “West Virginia is committed to social justice. I concur with that commitment and expect to maintain a positive learning environment based upon open communication, mutual respect, and nondiscrimination. Our University does not discriminate on the basis of race, sex, age, disability, veteran status, religion, sexual orientation, color or national origin. Any suggestions as to how to further such a positive and open environment in this class will be appreciated and given serious consideration. If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class. Please advise me and make appropriate arrangement with Disability Services (293-6700).”

Academic Integrity Statement: "The integrity of the classes offered by any academic institution solidifies the foundation of its mission and cannot be sacrificed to expediency, ignorance, or blatant fraud. Therefore, I will enforce rigorous standards of academic integrity in all aspects and assignments of this course. For the detailed policy of West Virginia University regarding the definitions of acts considered to fall under academic dishonesty and possible ensuing sanctions, please see the Student Conduct Code at <http://www.arc.wvu.edu/rightsa.html> Should you have any questions about possibly improper research citations or references, or any other activity that may be interpreted as an attempt at academic dishonesty, please see me before the assignment is due to discuss the matter."

Schedule: Algebra and problem solving concepts will be interwoven throughout weekly laboratory sessions. Homework problems from the textbook will be assigned on a weekly basis.

Week Topic (Section of book for readings and homework):

- I. Introduction and an overview of problem solving (Section 1.1)
- II. Problem solving continued and an introduction to sets (Sections 1.2 and 2.1)
- III. Sets continued and an introduction to logic (Sections 2.1 and Appendix I)
- IV. Logic continued (Appendix I) and **TEST 1**
- V. Whole numbers, numeration and numeration systems (Sections 2.2 and 2.3)
- VI. Relations and functions and addition and subtraction of whole numbers (Sections 2.4 and 3.1)
- VII. Whole Numbers: Multiplication, division, ordering and exponents (Sections 3.2 and 3.3)
- VIII. Mental Math and algorithms (Selected topics from sections 4.1 - 4.3)
- IX. **TEST 2** and Number Theory (Section 5.1)
- X. Number Theory continued and introduction to fractions (Sections 5.2 and 6.1)
- XI. Fractions (Selected topics from sections 6.1 - 6.3)
- XII. Decimals and operations with decimals (Sections 7.1 and 7.2)
- XIII. Ratio, proportion and percent (Sections 7.3 and 7.4)
- XIV. **TEST 3** and Integers (Selected topics from sections 8.1 and 8.2)
- XV. Rational and real numbers (Selected topics from sections 9.1 - 9.3)

Comprehensive Final