

## **MAT 210 - Mathematics for Teachers - Number Systems**

**Credit, 3 sem. hrs.**

*Prerequisites:* Sophomore standing.

A development of the real number system for prospective elementary teachers. Emphasis is placed on developing number sense through problem solving, estimation, properties of real numbers and modeling algorithms.

**Rationale:** The acquirement of a thorough understanding of certain mathematical concepts in elementary school is critical to the development of a student's mathematical ability in later years. Therefore, it is important that the elementary teacher understand and be able to communicate these concepts to the student. This course is designed to strengthen knowledge involving the development of the real number system and review algorithms involving the fundamental operations of arithmetic.

**Professor:**

**Office in**

**Office Hours:**

### **Learning Objectives**

Upon the conclusion of this course, the student should be able to:

- state the four steps of Polya's problem solving process.
- use Polya's four steps and strategies to investigate mathematical content and to solve problems.
- use critical thinking skills
- demonstrate knowledge of sets, set vocabulary, and set notation.
- perform set operations.
- use Venn diagrams to describe set relationships.
- define and identify relations and functions.
- demonstrate knowledge of other numeration systems such as the Roman Numeration System and the Egyptian Numeration System.
- indicate knowledge of place-value.
- define and identify natural numbers, whole numbers, integers, fractions, rational numbers, irrational numbers, and real numbers.
- state and illustrate properties of natural numbers, whole numbers, integers, rational numbers, irrational numbers, and real numbers.
- describe and use models and algorithms for the basic operations with whole numbers, integers, rational numbers, and real numbers.
- use a variety of mental computation and estimation techniques.
- work with bases other than base-ten.
- discuss ordering of whole numbers, integers, rational numbers, irrational numbers, and real numbers.
- define and identify primes and composites.
- apply tests for divisibility.
- find the greatest common divisor.
- find the least common multiple.
- simplify fractions.
- demonstrate the ability to use properties of exponents.
- convert fractions to decimals and decimals to fractions.
- perform the basic operations on decimals.

- convert decimals and fractions to percents.
- use scientific notation.
- solve simple equations and inequalities.
- use equations and inequalities to solve problems in real-world situations.
- solve applications involving ratio and proportion.
- solve applications involving percents.

### Outline of Topics

The topics in the course will come from chapters 1-6 in the textbook. Students are expected to read the sections as they are presented and work the problems assigned with the sections.

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| <ul style="list-style-type: none"> <li>I. Problem Solving           <ul style="list-style-type: none"> <li>A. Polya’s Four Steps to Problem Solving</li> <li>B. Patterns &amp; techniques of problem solving</li> <li>C. Algebraic Thinking</li> </ul> </li> <li>II. Sets, Whole Numbers, and Functions           <ul style="list-style-type: none"> <li>A. Describing Sets</li> <li>B. Set operations &amp; their properties</li> <li>C. Operations on Whole numbers</li> <li>D. Properties of Whole Numbers</li> <li>E. Functions</li> </ul> </li> <li>III. Whole Number Computation           <ul style="list-style-type: none"> <li>A. Numeration systems</li> <li>B. Computation Algorithms</li> <li>C. Mental Math and Estimation</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>IV. Integers and Number Theory           <ul style="list-style-type: none"> <li>A. Operations on Integers</li> <li>B. Properties of the Set of Integers</li> <li>C. Divisibility</li> <li>D. Prime and Composite Numbers</li> <li>E. GCD &amp; LCM</li> </ul> </li> <li>V. Rational Numbers &amp; Fractions           <ul style="list-style-type: none"> <li>A. The Set of Rational Numbers</li> <li>B. Operations on Rational Numbers</li> <li>C. Properties of Rational Numbers</li> </ul> </li> <li>VI. Decimals, Percents, and Real Numbers           <ul style="list-style-type: none"> <li>A. Operations on Decimals</li> <li>B. Terminating/nonterminating Decimals</li> <li>C. Percents &amp; Applications</li> <li>D. Real Numbers &amp; their properties</li> </ul> </li> </ul> |
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### Academic Integrity

Students at Mississippi College are expected to abide by the statements regarding honesty, plagiarism and integrity as discussed edition of the *Mississippi College Undergraduate Catalog*. Tests, quizzes, and reports are assumed to be the student’s own work and **cheating/plagiarism in any form will not be tolerated**.

### Methods of Instruction

Various instructional procedures are used including lecture, demonstrations using manipulatives, class discussions, student reports, and quizzes. Students are expected to bring a copy of the required text, paper, pencils, and a calculator to each class.

### Required Practices

Required practices for successful completion of this course include reading the assigned portions of the text, writing summaries of NCTM journal articles, completion of assigned problems, asking questions in class, and learning to use the calculator to solve problems.

### Instructional Materials

Text: Billstein, R. Liebskind, S. and Lott, J. W. (2010). *A Problem Solving Approach to Mathematics* (10th ed.) Addison Wesley. ISBN: 13: 978-0-321-57055-0. Calculator.

## Assessment

Assessment is based on **total points** and a basic 10-point scale. Requirements may include: Projects for 20 points each; homework checks or unannounced quizzes on homework for 5 or 10 points each (students with 2 absences or fewer will receive one drop homework grade); group problem solving and/or individual problem solving for 5 or 10 points each; a math journal/diary for 20 points; and 3 tests for 100 points each. The final exam is comprehensive and worth 150 points. Active class participation is expected and will be reflected in the point totals.

90 -100 % of total points = A

80 - 89 % of total points = B

70 - 79 % of total points = C

60 - 69 % of total points = D

Less than 60% of total points = F

## Other Policies

- ◆ Students having special requirements because of learning or physical disabilities should contact the Counseling and Career Development Center.
- ◆ Students are responsible for **all material covered and assigned** when they are absent.
- ◆ Make-up of tests/quizzes, etc. is at the discretion of the professor and will be accommodated **only for** illness, emergencies, school activities, and certain pre-arranged absences.
- ◆ The policy for the number of allowed absences is set by the college in the *Mississippi College Undergraduate Catalog*. A student receives an F upon receiving too many absences, 8 for a TR class. If a student comes in after the roll is taken, they will be counted absent unless they stay after class to offer the professor an explanation for the class disruption.

## STUDENT RESPONSIBILITIES

- ◆ Attend all class meetings **on time**.
- ◆ **Read** the assigned material.
- ◆ Attempt to complete **all homework** assigned **before** the next class meeting.
- ◆ See Dr. Floyd **before the next class meeting** if you are unable to complete most of the homework (email works great if you live off campus.) College classrooms are not for homework review. An appointment should be made with Dr. Floyd to clear up any major difficulties with homework.

## PROFESSOR'S RESPONSIBILITIES

- ◆ Begin class on time (And end class on time :-)
- ◆ Be prepared to explain content, vocabulary, symbols, and applications.
- ◆ Demonstrate mathematical relationships.
- ◆ Evaluate student comprehension of content, vocabulary, symbols, and applications.

## **MISSISSIPPI COLLEGE ACADEMIC POLICIES:**

Students should consult the Mississippi College policy manual located at <http://www.mc.edu/resources/publications/policies/> for official information regarding:

- Class attendance - Policy 2.10
- Grading - Policy 2.15
- Cheating - Policy 2.19
- Counseling and Career Services - Policy 2.25
- Research - Policy 2.27
- Counseling and Testing Center - Policy 2.34

Students who may require accomodation due to a documented handicap should follow the procedures located at <http://www.mc.edu/about/offices/counseling/disabilities/>

The Generic Grading Scale for this course is A = 90-100, B = 80-89, C = 70-79, D = 60-69. Individual instructors are free to choose a different grading scheme so students should consult their section's particular syllabus for the official grading scale to be utilized.

**Tutoring Hours:**

Hours and location for the departmental tutoring center are posted at <http://www.mc.edu/academics/academic-tutoring/> .