



## Course Syllabus

### **MATH 1350-Mathematics for Teachers I**

*Revision Date: 1/11/2017*

**Catalog Description:** This course is intended to build or reinforce a foundation in fundamental mathematics concepts and skills. It includes the conceptual development of the following: sets, functions, numeration systems, number theory, and properties of the various number systems with an emphasis on problem solving and critical thinking.

**Lecture hours = 3, Lab hours = 0**

**Prerequisites:** Math 1314 or equivalent

**Semester Credit Hours: 3**

**Lecture Hours per Week: 3**

**Lab Hours per Week: 0**

**Extended Hours: 1**

**Contact Hours per Semester: 64**

**State Approval Code: 27.0101.56 19**

### **Core Components and Related College Student Learning Outcomes**

This course counts as part of the academic requirements of the Panola College Core Curriculum and an Associate of Arts or Associate of Science degree.  Yes  No: If no, skip to Instructional Goals.

The items below marked with an X reflect the state-mandated outcomes for this course **IF this is a CORE course**:

- Critical Thinking Skills – to include creative thinking, innovation, inquiry and analysis, evaluation and syntheses of information
  - CT1: Generate and communicate ideas by combining, changing, or reapplying existing information
  - CT2: Gather and assess information relevant to a question
  - CT3: Analyze, evaluate, and synthesize information
- Communication Skills – to include effective development, interpretation, and expression of ideas through written, oral, and visual communication
  - CS1: Develop, interpret, and express ideas through written communication
  - CS2: Develop, interpret, and express ideas through oral communication
  - CS3: Develop, interpret, and express ideas through visual communication
- Empirical and Quantitative Skills – to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions
  - EQS1: Manipulate and analyze numerical data and arrive at an informed conclusion
  - EQS2: Manipulate and analyze observable facts and arrive at an informed conclusion

- Teamwork – to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal
  - TW1: Integrate different viewpoints as a member of a team
  - TW2: Work with others to support and accomplish a shared goal
- Personal Responsibility – to include the ability to connect choices, actions, and consequences to ethical decision-making
  - PR1: Evaluate choices and actions and relate consequences to decision-making
- Social Responsibility – to include intercultural competence, knowledge of civic responsibility, and the ability to engage effectively in regional, national, and global communities
  - SR1: Demonstrate intercultural competence
  - SR2: Identify civic responsibility
  - SR3: Engage in regional, national, and global communities

**Instructional Goals and Purposes:**

The purpose of this course is to: Demonstrate

1. Competence in applying both inductive and deductive methods of reasoning.
2. Competence in using set notation and identifying the union and intersection of sets.
3. Competence in identifying functions and relations and their graphs.
4. Competence in using various numerical representations of the number system, including different bases and scientific notation.
5. Competence in solving problems using properties of the whole numbers.
6. Competence in solving problems using the properties of the integers and ordering the integers.
7. Competence in applying the rules of number theory to the integers.
8. Competence in solving problems using the properties of the rational numbers.
9. Competence in solving problems using the properties of the real numbers.
10. Competence in solving geometry problems involving area, volume, constructions and congruence, parallel and perpendicular lines and translations, and the metric system.
11. Competence in organizing and representing statistical data, measuring central tendencies, and solving problems involving permutations and combinations.
12. Competence in computing slope and distance, and then using this knowledge to write the equations of lines.

**Learning Outcomes: [from the ACGM catalog]**

After studying all materials and resources presented in the course, the student will be able to:

1. Explain and model the arithmetic operations for whole numbers and integers.
2. Explain and model computations with fractions, decimals, ratios, and percentages.
3. Describe and demonstrate how factors, multiples, and prime numbers are used to solve problems.
4. Apply problem solving skills to numerical applications.
5. Represent and describe relationships among sets using the appropriate mathematical terminology and notation.
6. Compare and contrast structures of numeration systems

**Course Content:**

A general description of lecture/discussion topics included in this course are listed in the Learning Objectives / Specific Course Objectives sections of this syllabus.

Students in all sections of this course will learn the following content:

1. Given a sequence of numbers, complete the missing terms of the sequence and write the formula defining the sequence.
2. Identify the three types of valid arguments and draw Venn diagrams representing them.
3. Given true premises, supply a conclusion implied by the premises and identify if the argument is valid or invalid.
4. Identify the strategies for solving problems and use them to solve problems.
5. Given a set, identify the elements of the set and use proper set notation to name the set.
6. List the elements of the well-defined set using set-builder notation.
7. Define and apply the following: set union, set intersection, set complement, empty set, subset, and proper subset. Draw Venn diagrams to represent each.
8. Define and apply the Cartesian product (cross product).
9. Prove with sets and with Venn diagrams the properties of set union and set intersection.
10. Define and identify a relation and a function, and distinguish between the two.
11. Identify the domain and range of a relation and a function.
12. Define the reflexive, symmetric and transitive properties, and given a relation, discuss whether the relation is reflexive, symmetric or transitive.
13. Define an equivalence relation, and discuss whether a relation is an equivalence relation.
14. Determine the cardinality of a set.
15. Given two sets, determine whether the sets can be paired in a one-to-one correspondence.
16. Describe the features, advantages and disadvantages of the early systems of numeration.

17. Given a Hindu-Arabic numeral, write the number in each of the early numeration systems. Write numerals from other systems into a Hindu-Arabic numeral.
18. Define exponent and apply the properties of exponents when solving problems.
19. Write a number in scientific notation, in standard form and expanded form.
20. Correctly read and write numbers in the Hindu-Arabic numeration system.
21. Define “number system” and use the roster method to define the set of whole numbers.
22. Define “addition” of whole numbers, and correctly identify the addends and the sum.
23. Apply the following properties of whole numbers: the closure property, the commutative property, the associative property, the identity property, and model or prove these properties given sets A, B, and C.
24. Define “multiplication” of whole numbers and correctly identify the factors and the product.
25. Define “subtraction” of whole numbers and correctly identify the minuend, subtrahend, and the difference.
26. Define “division” of whole numbers and correctly identify the dividend, divisor, quotient, and the remainder.
27. Define “algorithm” and use the Division Algorithm to find the quotient and the remainder.
28. Convert numbers in other bases to base ten and numbers in base ten to other bases.
29. Add, subtract, multiply and divide in other bases.
30. Use the roster method to identify the set of integers.
31. Apply the properties of integers when solving problems.
32. Add, subtract, multiply and divide integers, and use models to demonstrate the answer.
33. Apply the properties of inequalities for integers.
34. State the “Law of Trichotomy” for integers.
35. Define “absolute value” and use the definition to describe distance on a number line.
36. For two integers, define “a divides b.”
37. State the divisibility rules and use them to determine factors of a given number.
38. Use the Sieve of Eratosthenes to find the prime numbers between 1 – 100.

39. State the Fundamental Theorem of Arithmetic and use it to give the prime factorization of any integer.
40. Given two numbers, find the greatest common factor (GCD) and the least common multiple (LCM) using prime factorization. Use Euclid's Method to find the GCD of two integers.
41. Perform operations in clock arithmetic or modular arithmetic.

**Methods of Instruction/Course Format/Delivery:**

Methods of Instruction/Course Format/Delivery: Methods employed will include Lecture/demonstration, discussion, problem solving, analysis, and reading assignments. Homework will be assigned. Faculty may choose from, but are not limited to, the following methods of instruction:

1. Lecture
2. Discussion
3. Internet
4. Video
5. Television
6. Demonstrations
7. Field trips
8. Collaboration
9. Readings

**Major Assignments/Assessment:**

Faculty may assign both in- and out-of-class activities to evaluate students' knowledge and abilities. Faculty may choose from – but are not limited to -- the following methods attendance, class preparedness and participation. Collaborative learning projects, exams/tests/quizzes, homework, internet, library assignments, readings, research papers, scientific observations, student-teacher conferences, and written assignments.

The Mathematics Department does not accept late work.

**Assessment(s):**

1. Exam per Chapter
2. Comprehensive Final Exam

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1. Exam per Chapter
2. Project/Report
3. Comprehensive Final Exam

**Course Grade:**

Assignment Weights	
Class Participation	10%
Homework/Quiz Average	15%
Exams	55%
Comprehensive Final Exam	20%

**Letter Grades for the Course will be assigned as follows:**

- A: 90 < Average < 100
- B: 80 < Average < 90
- C: 70 < Average < 80
- D: 60 < Average < 70
- F: 00 < Average < 60

**Texts, Materials, and Supplies:**

- Textbook: A Problem Solving Approach to Mathematics for Elementary School Teachers 11<sup>th</sup> Edition ISBN 9780321756664
- MyMathLab Access ISBN 9780321199911
- Canvas Access
- Scientific Calculator

**Other:**

- For current texts and materials, use the following link to access bookstore listings: <http://www.panolacollegestore.com>
- For testing services, use the following link: <http://www.panola.edu/elearning/testing.html>
- If any student in this class has special classroom or testing needs because of a physical learning or emotional condition, please contact the ADA Student Coordinator in Support Services located in the Administration Building or go to <http://www.panola.edu/student-success/disability-support-services/> for more information.
- Withdrawing from a course is the student's responsibility. Students who do not attend class and who do not withdraw will receive the grade earned for the course.
- Student Handbook, *The Pathfinder*: <http://www.panola.edu/student-success/documents/pathfinder.pdf>