THE STRUCTURE OF THE NUMBER SYSTEM  
MATH 1410

Class Hours: 3.0  
Credit Hours: 3.0  
Laboratory Hours: 0.0  
Revised: Spring 07

Catalog Course Description:

Recommended for prospective elementary education teachers. Topics include problem solving,  
sets and relations, numeration systems, integers, elementary number theory, rational numbers,  
decimals and algebraic applications.

Entry Level Standards:

Students must be able to read at the college level.

Prerequisites:

High school algebra I, algebra II, and geometry, plus an ACT math score of at least 19; or DSPM  
0850 or equivalent math placement score.

Textbook(s) and Other Reference Materials Basic to the Course:

Textbook:
Musser, G. L., Burger, W. F., Peterson, B. E.  
2005.

Required Supplies:
Scientific calculator with statistical capabilities/fractional capabilities is required. A graphing  
calculator such as the TI-83 Plus is recommended.

I. Week/Unit/Topic Basis:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction, Exploration with Patterns, and Using the Problem-solving Process</td>
</tr>
<tr>
<td>2</td>
<td>Inductive and Deductive Reasoning, Comparison of Strategies for Problem Solving</td>
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<tr>
<td>3</td>
<td>Sets, Set Operations and Their Properties as a Basis for Whole Numbers</td>
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<tr>
<td>4</td>
<td>Numeration Systems (including other bases and multicultural), Review, Exam #1</td>
</tr>
<tr>
<td>5</td>
<td>Modeling Whole Number Operations in Base Ten as well as Other Bases</td>
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<tr>
<td>6</td>
<td>Algorithms, Mental Math, and Estimation for Whole Number Operations</td>
</tr>
<tr>
<td>7</td>
<td>Algorithms in Other Bases, Review, Exam #2</td>
</tr>
<tr>
<td>8</td>
<td>Primes, Composites, and Tests for Divisibility</td>
</tr>
</tbody>
</table>
II. Course Objectives*:

A. Master the critical thinking skills necessary to interpret set notation and Venn diagrams. VI.2

B. Construct, manipulate, and discuss mathematical systems. VI.1, 4

C. Master the real number system. VI.1, 3, 4

D. Understand mathematical reasoning in order to read, comprehend, and construct mathematical arguments. VI.1, 2

*Roman numerals after course objectives reference TBR’s general education goals.

III. Instructional Processes*:

Students will:

1. Successfully understand and interpret real world problems. Transitional Strategies, Active Learning Strategies, Mathematics Outcome

2. Successfully use a variety of problem solving strategies, both inductive and deductive reasoning. Active Learning Strategies, Mathematics Outcome

3. Work, either individually or in a group setting, to solve problems from different occupational fields. Solutions must be mathematically correct and be clear and correct in terms of the related occupational field. An example might include using sets and Venn diagrams to analyze given information about the number of students and student preferences and dislikes to determine an optimal reorganization of those students into smaller work groups. Communication Outcome, Transitional Strategies, Active Learning Strategies, Mathematics Outcome

4. Use calculator and computer technology as problem solving and exploration tools. Technological Literacy Outcome, Active Learning Strategies, Mathematics Outcome

5. Use a wide variety of mathematical modeling tools, both virtual and physical. Technological Literacy Outcome, Active Learning Strategies, Mathematics Outcome

*Strategies and outcomes listed after instructional processes reference TBR’s goals for strengthening general education knowledge and skills, connecting coursework to experiences beyond the classroom, and encouraging students to take active and responsible roles in the educational process.
IV. Expectations for Student Performance*

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

1. Use set notation and Venn diagrams in application problems. A
2. Utilize inductive and deductive reasoning. A, D
3. Utilize and manipulate the real number system. B, C, D
4. Master and explain various problem-solving strategies. A, B, D
5. Demonstrate an understanding of set notation. A
6. Show the difference between a finite and an infinite set. A
7. Manipulate relations between sets by using such terms as subsets, proper subsets, equality of sets, universal set, and empty set. A, B
8. Demonstrate an understanding of set-builder and roster notation. A
9. Manipulate operations on sets: intersection, union, difference, complement, and Venn diagrams. A, B
10. Demonstrate knowledge of commutative, associative, and distributive laws. A, B, D
11. Define natural numbers, whole numbers, rational numbers, irrational numbers, and real numbers. A, B, C, D
12. Demonstrate knowledge of division algorithm and divisibility tests. B, C, D
13. Define prime numbers, composite numbers, greatest common divisor, and least common multiple. B, C
14. Compute prime factorization of a number and use in applications. C
15. Use modeling tools to demonstrate mathematical ideas and processes. B
16. Demonstrate a greater understanding and appreciation of mathematics and its applications to other disciplines. A

*Letters after performance expectations reference the course objectives listed above.

V. Evaluation:

A. Testing Procedures:

Students are evaluated primarily on the basis of tests, quizzes, homework, portfolio, and/or a comprehensive final exam. A minimum of five major tests (in addition to the final) is recommended.

B. Laboratory Expectations:

Students will be expected to keep a portfolio of all laboratory experiments and projects. The portfolio will serve as a collateral file of future teaching references.
C. Field Work:

N/A

D. Other Evaluation Methods:

Excessive absences may lower the final grade.

E. Grading Scale:

<table>
<thead>
<tr>
<th>Score Range</th>
<th>Grade</th>
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<tbody>
<tr>
<td>93 - 100</td>
<td>A</td>
</tr>
<tr>
<td>88 - 92</td>
<td>B+</td>
</tr>
<tr>
<td>83 - 87</td>
<td>B</td>
</tr>
<tr>
<td>78 - 82</td>
<td>C+</td>
</tr>
<tr>
<td>70 - 77</td>
<td>C</td>
</tr>
<tr>
<td>60 - 69</td>
<td>D</td>
</tr>
<tr>
<td>Below 60</td>
<td>F</td>
</tr>
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VI. Policies:

A. Attendance Policy:

Pellissippi State Technical Community College expects students to attend all scheduled instructional activities. As a minimum, students in all courses must be present for at least 75 percent of their scheduled class and laboratory meetings in order to receive credit for the course (Pellissippi State Catalog). Individual departments/programs/disciplines, with the approval of the vice president of Academic and Student Affairs, may have requirements that are more stringent.

B. Academic Dishonesty:

Individual instructors must distribute their policies on academic dishonesty and calculator use during the first week of classes.

In addition to other possible disciplinary sanctions that may be imposed as a result of academic misconduct, the instructor has the authority to assign either (1) an F or a zero for the assignment or (2) an F for the course.

C. Accommodations for disabilities:

If you need accommodations because of a disability, if you have emergency medical information to share, or if you need special arrangements in case the building must be evacuated, please inform the instructor immediately. Please see the instructor privately after class or in his/her office. Students must present a current accommodation plan from a staff member in Services for Students with Disabilities (SSWD) in order to receive accommodations in this course. Services for Students with Disabilities may be contacted by going to Goins 127 or 131 or by phone: 694-6751(Voice/TTY) or 539-7153.

Posted: February 15, 2007