

**Naugatuck Valley Community College**  
**STEM Division**  
**Science, Technology, Engineering and Mathematics**

**Common Course Syllabus**

**Math for Elementary Education: Algebra, Number Systems MAT\*H143**

**COURSE TITLE:** Math for Elementary Education: Algebra, Number Systems, MAT\* H143

**COURSE DESCRIPTION:** This course is designed for students planning to become certified in early childhood, elementary or middle school level education. Problem solving strategies will be developed and integrated throughout, in accordance with the NCTM *Principles and Standards for School Mathematics*. Topics include conceptual and relational understanding of the real numbers, including the subsets of whole numbers, integers, rational and irrational numbers, with an emphasis on place value and the associated operations. Topics from numeration systems, number theory, and set theory will be developed as needed, with regular use of manipulatives and technology.

**NUMBER OF CREDITS:** 3 credit hours

**PREREQUISITE:** Grade of "C" or better in MAT\*H137 (Intermediate Algebra) or an appropriate score on a college placement exam.

**CALCULATOR:** A TI-84 (Plus) or TI-83 (Plus) or TI-73 graphing calculator is strongly recommended.

**COURSE OBJECTIVES:**

1. Make connections between mathematical concepts and skills through use of manipulatives.
2. Further develop and use problem-solving strategies.
3. Develop oral and written skills necessary to communicate mathematically with your future students.
4. Develop a greater awareness of your own mathematical thinking.
5. Develop a positive attitude towards mathematics.

**LEARNING OUTCOMES:** At the end of this course the student will be able to do the following:

1. Demonstrate Pólya's problem-solving principles and be able to recognize appropriate use of various strategies to solve problems.
2. Use the language of mathematics and appropriate vocabulary to explain mathematical concepts and terminology.
3. Use various manipulatives and models to demonstrate mathematical concepts and operations.
4. Perform mental arithmetic computation, estimation, and determine reasonableness of answers.
5. Develop a thorough conceptual understanding of place value concepts and their applicability to our base 10 system and in other number bases.
6. Demonstrate knowledge of the historical development and characteristics of various number systems.

7. Use the elements of set theory to develop mathematical concepts.
8. Use a repertoire of traditional and nontraditional algorithms for performing operations on different sets of numbers.
9. Demonstrate understanding of the conceptual meaning of operations on the subsets of real numbers and how operations relate to one another.
10. Demonstrate an understanding of properties applicable to each subset of the real numbers and how the subsets relate to each other.
11. Use calculators as a tool to explore concepts and verify answers.
12. Extend their mathematical knowledge by working and learning cooperatively.
13. Make connections to real life applications and create story and age-appropriate word problems.

<p>INSTRUCTIONAL UNITS:</p> <p>A. An Introduction to Problem-solving</p> <ol style="list-style-type: none"> <li>1. Pólya's problem solving principles.</li> <li>2. Strategies             <ol style="list-style-type: none"> <li>a. Guess and check</li> <li>b. Make an orderly list</li> <li>c. Draw a diagram</li> <li>d. Make a table</li> <li>e. Look for patterns</li> <li>f. Solve an easier problem</li> <li>g. Solve an equivalent problem</li> <li>h. Work backwards</li> <li>i. Eliminate possibilities</li> <li>j. Use a variable (solve an equation)</li> <li>k. Consider special cases</li> </ol> </li> <li>3. Application of the strategies along with Pólya's other principles to complete the solution of a problem.</li> </ol> <p>B. Sets and operations on sets</p> <ol style="list-style-type: none"> <li>1. Venn diagrams             <ol style="list-style-type: none"> <li>a. Subset</li> <li>b. Complement</li> <li>c. Intersection</li> <li>d. Union</li> </ol> </li> <li>2. Counting             <ol style="list-style-type: none"> <li>a. Cardinality of a set</li> <li>b. One-to-one correspondence</li> <li>c. Finite and infinite sets</li> <li>d. Equivalent sets</li> <li>e. Solving counting problems</li> </ol> </li> </ol> <p>C. Whole numbers</p> <ol style="list-style-type: none"> <li>1. Ordering the whole numbers</li> <li>2. Models for addition</li> <li>3. Models for subtraction</li> <li>4. Models for multiplication</li> <li>5. Models for division</li> <li>6. Properties of the whole numbers</li> </ol> <p>D. Numeration systems</p> <ol style="list-style-type: none"> <li>1. Past and present systems             <ol style="list-style-type: none"> <li>a. Egyptian</li> <li>b. Babylonian</li> <li>c. Roman</li> <li>d. Hindu-Arabic</li> </ol> </li> <li>2. Base 10 blocks to represent numbers in our base 10 system</li> <li>3. Non-decimal numeration systems</li> </ol>	<ol style="list-style-type: none"> <li>4. Algorithms for whole number addition and subtraction             <ol style="list-style-type: none"> <li>a. Use of base 10 blocks for illustrating concepts</li> <li>b. Student creation of problem situations using newspapers, internet and other resources</li> </ol> </li> <li>5. Algorithms for whole number multiplication and division</li> <li>6. Mental arithmetic and estimation and role of the calculator</li> </ol> <p>E. Divisibility</p> <ol style="list-style-type: none"> <li>1. Fundamental theorem of arithmetic</li> <li>2. Prime and composite numbers             <ol style="list-style-type: none"> <li>a. Divisibility tests</li> <li>b. Greatest common factor</li> <li>c. Least common multiple</li> <li>d. Use of factor trees and listing of sets to explore and explain concepts</li> </ol> </li> </ol> <p>F. The Integers</p> <ol style="list-style-type: none"> <li>1. Models</li> <li>2. Real world uses</li> <li>3. Addition and subtraction</li> <li>4. Multiplication and division</li> <li>5. Properties of the integers</li> </ol> <p>G. Rational Numbers (fraction form)</p> <ol style="list-style-type: none"> <li>1. Fundamental law of fractions</li> <li>2. Equivalent fractions</li> <li>3. Comparing fractions</li> <li>4. Algorithms for rational number sums and differences             <ol style="list-style-type: none"> <li>a. Use of models</li> <li>b. Role of estimation</li> <li>c. Word problems</li> </ol> </li> <li>5. Algorithms for finding products and quotients             <ol style="list-style-type: none"> <li>a. Array model</li> <li>b. Importance of estimation</li> <li>c. Creating word problems</li> </ol> </li> </ol> <p>H. Decimals</p> <ol style="list-style-type: none"> <li>1. Relating fraction to decimal form</li> <li>2. Expanded exponential forms</li> <li>3. Repeating and terminating decimals</li> <li>4. Non periodic and non terminating decimals -- the irrationals</li> <li>5. Algorithms for addition and subtraction</li> <li>6. Role of place value in assisting with placement of decimal point</li> <li>7. Algorithms for multiplication and division</li> <li>8. Ratio and proportion</li> <li>9. Percent</li> </ol>
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**GRADING SYSTEM:**

For the purpose of computing numerical credit point averages, grades are evaluated as follows for each semester hour of credit. Grades on exams, papers, and quizzes, will be based on this grading system.

Numeric Grade	Acceptable Letter Grade Range to be used by the instructor	Description
90 – 100	A– to A	Excellent
80 – 89	B–, B, B+	Above Average
70 – 79	C–, C, C+	Average
60 – 69	D–, D, D+	Below Average
Below 60	F	Failing

**CLASS CANCELLATION PROCEDURE:** *If the instructor is late, the class is expected to wait 15 minutes before leaving or until informed of a cancellation by a college official. Information on weather related closings/late openings concerning Naugatuck Valley Community College can be obtained through local radio and television stations, or via the college website (<http://www.nvcc.commnet.edu>). NOTE: An alternative assignment may be given if classes are canceled due to weather.*

**ACADEMIC HONESTY STATEMENT:** *At NVCC we expect the highest standards of academic honesty. Academic dishonesty is prohibited in accordance with the Board of Trustee's Proscribed Conduct Policy in Section 5.2.1 of the BOT Policy Manual. This policy prohibits cheating on examinations, unauthorized collaboration on assignments, unauthorized access to examinations or course materials, plagiarism, and other proscribed activities. Plagiarism is defined as the use of another's idea(s) or phrase(s) and representing that/those idea(s) as your own, either intentionally or unintentionally. Anyone who is caught cheating on exams, plagiarizing another's work or published material will fail the course regardless of progress made in the course.*

**CHILDREN ON CAMPUS:** *With permission of the instructor only – Children must be attended at all times by a responsible adult. The student must notify the instructor or supervisor prior to the beginning of the class or activity that a child is present. Instructors and/or supervisors are authorized to ask the student or program participants to leave should the presence of a child be disruptive.*

**CELL PHONE/PAGER USE POLICY:** *Students are hereby notified that cellular phones and beepers are allowed in class only if they are turned off or turned to a silent mode. Under no circumstances are telephones to be answered in class. Students who ignore this policy may be asked to leave class. When there are extenuating circumstances that require that a student be available by phone or beeper, the student should speak to the instructor prior to class, so that together they can arrive at an agreement concerning the device.*

**STUDENTS WITH SPECIAL NEEDS:** *Students who may require accommodations on the basis of a learning disability are encouraged to contact the Coordinator of Learning Disabilities. Students who may require accommodations on the basis of all other disabilities should contact the Coordinator of Disability Services. After providing documentation and completing the disability disclosure process, students are then encouraged to meet with their instructor(s) to discuss the accommodations approved by the appropriate Coordinator and to complete the Accommodations Agreement form. Accommodations are not retroactive, students are therefore encouraged to meet with their instructor(s) at the beginning of each semester. Instructors, in conjunction with appropriate college personnel, will provide assistance and/or accommodations only to those students who have completed the disability disclosure and accommodations process.*