HOSTOS COMMUNITY COLLEGE
DEPARTMENT OF MATHEMATICS

MAT 100	**Introduction to College Mathematics I**
CREDIT HOURS:	**3.0**
EQUATED HOURS:	**3.0**
CLASS HOURS:	**3.0**
PREREQUISITE:	**Pre-requisite: MAT 20, MA 20 or equivalent, placement or exemption** **Pre/Co-requisite: ESL 35 or Higher**
REQUIRED TEXTS:	**Angel, Abbott, Runde, A Survey of Mathematics with Applications (2012), 9th Edition. ISBN13:9780321759665**
DESCRIPTION:	**This course provides skills in finite mathematics. Topics: set theory, symbolic logic, systems of numeration, and the metric system.**
EXAMINATIONS:	**A minimum of four partial tests (suggested 15% each) and a comprehensive departmental final examination (suggested 40%).**
GRADES:	**A, A^-, B^+, B, B^-, C^+, C, D, I, F.**

LEARNING OUTCOMES FOR MAT 100:

The main aim of student learning outcome is to understand the following Mathematical concepts. In order to reach these understanding, students will:

1. Interpret and draw appropriate inferences from quantitative and qualitative representations, such as Venn diagrams, truth tables etc.

2. Use numerical and statistical methods as well techniques from probabilities and number theory to draw accurate conclusions and solve mathematical problems.

3. Represent quantitative problems expressed in natural language in a suitable mathematical format such as use of Venn diagrams, logical statements,

measure of center, spread or variation, system of numeration in base 10 and

operation of bases other than 10.

4. Effectively communicate quantitative analysis or solutions to mathematical problems in written form such as set theory notation, Venn diagrams, logic statements, DeMorgan's law of sets and DeMorgan's law of logic.

5. Evaluate solutions to problems for reasonableness. Recognize patterns and use these patterns for predicting the general term in a sequence.

6. Apply mathematical methods to problems in other fields of study including Economic, Computer Science, Statistics, Modular number theory and Probabilities.

MAT 100

COURSE OUTLINE

I. SEQUENCES OF REAL NUMBERS
   1. Arithmetical Progressions
   2. Multi-level Arithmetical Progressions
   3. Geometrical Progression
   4. Harmonic Progressions

II. BASIC DEFINITIONS AND PROPERTIES OF SET:
   1. Define set, subset, proper subset, empty set, universal set
   2. Describe sets by rule and roster
   3. Define complement of a set
   4. Find the number of subsets that can be formed from an indefinite set
   5. Identify equivalent sets
   6. Classify sets as finite or infinite

III. RELATIONSHIPS BETWEEN SETS:
   1. Define and find the intersection of sets
   2. Define and find the union of sets

IV. SETS OF POINTS:
   1. Draw Venn diagrams illustrating the union of sets
   2. Draw Venn diagrams illustrating the intersection of sets
   3. Use Venn diagrams to show that two sets are equal

V. BASIC DEFINITIONS AND PROPERTIES OF SETS:
1. Classify numbers as ordinal, or cardinal
2. Construct a one-to-one correspondence between the elements of two sets

EXAM 1 (Suggested 15%)

VI. LOGICAL STATEMENTS:
1. Translate English statements into symbolic form
2. Write the negation, conjunction and disjunction of given statements
3. Write the converse, inverse and contrapositive of given statements

VII. TRUTH TABLE:
1. Give a truth value to a given compound statement
2. State whether or not two given statements are equivalent.
2. Determine whether or not a given statement is a tautology.

EXAM 2 (Suggested 15%)

VIII. PROBABILITY
1. Find the probability of an event such as: Rolling a dice, Picking a card from a random deck or tossing a coin.
2. Describe the sample space of a probability experiment.
3. Find the probability of two events occurring that are mutually exclusive
4. Find the probability of two events occurring that are not mutually exclusive.

IX. NUMBERS AND NUMERALS:
1. Define number and numeral
2. Write Roman (Egyptian) numerals
3. Compute in the Roman (Egyptian) system of numeration

X. PLACE VALUE IN THE DECIMAL SYSTEM:
1. Write numbers in expanded notation
2. Write numbers in the decimal notation

XI. OTHER BASES:
1. Discover other systems of notation
2. Write numbers in other bases
3. Translate numbers from base 10 to base x
4. Translate numbers from base x to base 10

XII. OPERATION IN OTHER BASES:
1. Perform addition in bases 2, 5 and 12
2. Perform addition in bases 2, 5 and 12
3. Perform multiplication in bases 2, 5 and 12
4. Perform division in bases 2, 5 and 12

EXAM 3 (Suggested 15%)

XIII. MOLULAR ARITHMETIC:

1. Add and subtract on a 12-hour clock
2. Multiply and divide on a 12-hour clock
3. Compute in arithmetic modulo 5
4. Compute in arithmetic modulo10

XIV. FACTORIZATION AND PRIME NUMBERS:

1. Find the factors of any counting numbers
2. Distinguish between prime and composite number
3. Find the prime factorization of any counting number

XV. THE METRIC SYSTEM:

1. Units of measure in the metric system
2. Conversion of measurements within the metric system
3. Conversion between the Metric and English systems

EXAM 4 (Suggested 15%)

FINAL EXAM (Suggested 40%)

LEARNING OUTCOMES ASSESSMENT TOOLS:

SLO #1: Interpret and draw appropriate inferences from quantitative and qualitative representations, such as Venn diagrams, truth tables etc.

- In unit test 1, students will analyze and interpret Venn diagrams drawing appropriate inferences from these diagrams to solve problems.
- In unit test 2, students will analyze and interpret truth tables drawing appropriate inferences to determine the truth of given statement. (The comprehensive final exam will also evaluate this learning objective)

SLO #2: Use numerical and statistical methods as well techniques from probabilities and number theory to draw accurate conclusions and solve mathematical problems.

- Every unit test and the final require students to use numerical methods to reach a conclusion and in so doing solve a given problem.
- Notable examples: Use numerical methods to solve problems requiring converting between different numeral systems such as Roman Numerals to standard notation, convert between base 2 as well as other base systems to the standard base 10 system and vice versa. (unit tests 3&4)
- Use techniques and methods from probabilities (unit 3 test) to draw accurate conclusions about how likely an event is to occur and use these conclusions to solve mathematical problems concerning the probability of an event(s).

SLO #3: Represent quantitative problems expressed in natural language in a suitable mathematical format such as use of Venn diagrams, logical statements, measure of center, spread or variation, system of numeration in base 10 and operation of bases other than 10.

- In unit test 1, students must translate given quantitative statements expressed in natural language and accurately represent these in terms of Venn diagrams.
- In unit test 2, students must translate given logical statements expressed in natural language and accurately represent these in a truth table format.

SLO #4: Effectively communicate quantitative analysis or solutions to mathematical problems in written form such as set theory notation, Venn diagrams, logic statements, DeMorgan's law of sets and DeMorgan's law of logic.

- Every unit test and the final require students to apply analysis of quantities and then communicate the results or conclusion in written form to solve mathematical problems.
- Examples: In unit test 1, set theory will be used to analyze quantities and find solutions to mathematical problems. In unit test 2, logic statements and truth tables will be used to determine the truth value of a given statement. In unit test 3, methods of probability will be used to determine how likely an event is to occur. In unit test 4, quantitative analysis of different base systems will be used to convert between base systems and perform modular arithmetic calculations.

SLO #5: Evaluate solutions to problems for reasonableness. Recognize patterns and use these patterns for predicting the general term in a sequence.

- In unit test 1, students will be required to recognize patterns and use these patterns to predict a future or "n" th term. A sense of what is a reasonable extension of the pattern presented is all but essential.
- In unit test 3, students will need to apply methods of probability to determine how like an event is to occur. A sense of what is reasonable is essential in understanding what is the range of possible solutions and greatly assists this process.
- In unit test 4, conversion within the metric system and between American and metric units requires a sense of what is a reasonable solution to check one's answer. (The comprehensive final exam will also evaluate this learning objective).

SLO #6: Apply mathematical methods to problems in other fields of study including Economic, Computer Science, Statistics, Modular number theory and Probabilities.

- In this course mathematical methods will be applied to: Computer Science-Modular number theory (Unit test 4 base two system) and Probabilities (Unit test 3) (The comprehensive final exam will also evaluate this learning objective)