

MIDDLESEX COUNTY COLLEGE
EDISON, NJ
MASTER SYLLABUS

Course ID and Name: MAT 113, Mathematical Structures I

Department: Mathematics

Prerequisites: MAT-013 or demonstrated proficiency in algebra as determined by Multiple Measures.

Co-requisites: None

Course Description: This course exposes students to various problem solving techniques and their applications in the mathematical fields of set theory, algebra, the structure of the real number system, and elementary probability theory. The content of the MAT-113 and MAT-114 course sequence is representative of topics covered on the Praxis Core Academic Skills for Educators Mathematics Test.

General Education Status: GE MST

Credits: 3 **Lecture Hours:** 3 **Lab Hours:** 0

E-book(s) and Other Course Materials:

E-book: A Survey of Mathematics, 10th Edition by Angel, Abbott, and Runde

Required Software: MyMathLab (E-Book included)

Policies:

Disability Support

Students with disabilities, whether physical, learning or psychological, who believe that they may need accommodations in this class, are encouraged to contact Disability Services as soon as possible to ensure that the accommodations are implemented. Please meet with the Disability Services staff in Edison Hall, Room 100, (732) 906-2546.

Code of Student Conduct

To foster a productive learning environment, the College requires that all students adhere to the Code of Student Conduct which is published in the college catalog and website.

Core Learning Outcomes*

Upon successful completion of the course, students will be able to:

1. Use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.
 - a. Translate quantifiable problems into mathematical terms and solve these problems using mathematical or statistical operations.
 - b. Construct graphs and charts, interpret them, and draw appropriate conclusions.
2. Communicate accurate mathematical terminology and notation to explain strategies to solve problems and interpret solutions.

3. Utilize various reasoning, problem-solving, and critical thinking techniques to solve applications among the laws of probability, the normal curve, and confidence interval inferences.

4. Understand the language and concepts of Mathematical Structures as well as the formal mathematical definitions that accompany them.

*Imported from the NJCCC GE Learning Goals (2011), NJCCC (2011), and AMATYC (2008)

Content Strands and Content Objectives

Content Strand	Students will be able to...
Problem Solving Skills (CLO 1a, 2, 3, and 4)	<ul style="list-style-type: none"> ▪ apply Pólya’s Method to solving problems. ▪ use inductive and deductive reasoning to solve problems involving patterns or arguments. ▪ write simple linear equations in one variable to model real-world situations and solve them appropriately. ▪ write proportions to model real-world situations and solve them appropriately. ▪ solve problems involving percentages and percent change.
Set Theory (CLO 1a, 1b, 2, 3, 4)	<ul style="list-style-type: none"> ▪ illustrate the definitions of set, element, subset and proper subset. ▪ determine whether a set is finite or infinite and find its cardinality, if it is finite. ▪ determine the how many subsets and proper subsets a set has. ▪ perform the operations of union, intersection, complement, set difference, and Cartesian product on sets. ▪ construct a Venn diagram for different universes and to check the equality of sets defined by set operations. ▪ solve problems involving sets and cardinality using Venn diagrams.
Real Numbers and their Structure (CLO 1a, 2, 3, 4)	<ul style="list-style-type: none"> ▪ use properties of real numbers to answer questions about arbitrary operations. ▪ classify real numbers into their appropriate subsets. ▪ use models to illustrate concepts related to rational numbers. ▪ use scientific notation to solve problem involving quantities which are large in magnitude. ▪ solve problems using the Pythagorean Theorem. ▪ simplify expressions involving square roots. ▪ classify algebraic structures as groups or rings. ▪ analyze discrete systems for algebraic structure. ▪ Solve problems involving clock arithmetic and integers in modulo n.
Elementary Probability Theory (CLO 1a, 1b, 2, 3, 4)	<ul style="list-style-type: none"> ▪ illustrate the definitions of chance experiment, event, sample space, probability, and odds. ▪ construct a tree diagram to model a multi-stage sample

	<p>space.</p> <ul style="list-style-type: none">▪ calculate theoretical and experimental probabilities.▪ calculate the odds in favor of an event and against an event.▪ calculate the probabilities of complementary and compound events.▪ calculate conditional probabilities using a contingency table.▪ calculate the expected value and fair price of a game of chance.
--	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------