

**LAGUARDIA COMMUNITY COLLEGE**  
**CITY UNIVERSITY OF NEW YORK**  
**DEPARTMENT OF MATHEMATICS, ENGINEERING AND COMPUTER SCIENCE**

***MAT123 – Quantitative Reasoning for Modern Problem-Solving***

3 Credits, 6 Contact Hours: 5 hours class + 1 hour lab

Prerequisite: CSE099 and MAT095 or Equivalents

**Catalog Description:**

This course introduces selected topics in mathematics that help solve quantitative problems arising in diverse fields of study. For each topic studied, emphasis will be placed on both the underlying mathematical concepts and on significant practical applications. The resulting problem-solving exercises - in areas such as personal finance and gaming - will motivate inquiry/exploration in such areas as algebra, probability, and statistics, set theory and logic.

**Purposes and Goals:** Upon completion of this course, the student should be able to:

1. Analyze non-routine problem situations and identify/evaluate potential solutions using the four-step problem solving process.
2. Model quantitative relationships using algebraic equations or inequalities.
3. Carry out set operations to achieve a final, resultant set.
4. Solve counting problems and calculate probabilities using counting functions.
5. Use inquiry and problem-solving skills to reach conclusions and write cogently about the decision-making process.
6. Solve network problems requiring a shortest path or minimum spanning tree.
7. Solve simple problems related to personal finance.

**Instructional Objectives:** The instructor is expected to:

1. Familiarize students with the four-step problem solving process: inquiry and contextual understanding; modeling and solution planning; solution generation and selection; feasibility and reasonableness testing.
2. Enable students to represent quantitative relationships using algebraic language.
3. Introduce students to sets and set operations.
4. Provide students with the skills to solve counting problems and calculate probabilities.
5. Provide students with the inquiry and problem solving skills to make decisions and writing skills necessary to communicate these, even when some quantitative factors are uncertain.
6. Introduce graphs and networks.
7. Familiarize students with investing options and simple versus compound interest.

**Student Learning Objectives:** This course fulfills the Pathways common core with the following student learning objectives:

1. Interpret and draw appropriate inferences from quantitative representations, such as formulas, graphs, or tables.
2. Use algebraic, numerical, graphical, or statistical methods to draw accurate conclusions and solve mathematical problems.
3. Represent quantitative problems expressed in natural language in a suitable mathematical format.
4. Effectively communicate quantitative analysis or solutions to mathematical problems in written or oral form.
5. Evaluate solutions to problems for reasonableness using a variety of means, including informed estimation.
6. Apply mathematical methods to problems in other fields of study.

**Attendance:**

1. Students are expected to attend all class meetings, as in-class work is an integral part of the course.
2. Students are responsible for all materials and assignments covered in class.
3. All absences are required to be explained and documented to the instructor.
4. A failing grade is assigned to any student with 6 or more unexcused absences—approximately equivalent to 12 hours of class.
5. An absence is marked when the student misses more than half of a class session.
6. A student is considered late if she or he misses more than 20 minutes of class time.
7. Three late marks are equivalent to one absence.
8. Students should consult the college catalog to find out the terms and conditions under which WU, incomplete, or F grades may be given by an instructor.

**Course Materials:**

Classroom activities, course readings, homework assignments, lab exercises, and support materials can be found in the class website in the “My Open Math” learning management system. Your instructor will provide you with sign in information for your course section. **While there is no single textbook to purchase for the course, you will be required to print out text to have available for a classroom or lab activity. Failure to have such material when needed could adversely affect your grade.**

A large portion of these materials come from:

“Math in Society”, by David Lippman, Edition 2.1 (2017)

<http://www.opentextbookstore.com/mathinsociety/>

“College Mathematics”, from the Scottsdale Community College Student Workbook series

“Quantitative Models for Management” by Steven Cosares, Fred Rispoli, and Paul Abramson, *RMC Publications*, 3<sup>rd</sup> Edition (2011).

**Standard Scientific Calculator.** A basic calculator that can add, subtract, multiply, and divide plus basic functions like exponents and square roots. Check with your instructor the types of calculators allowed in class. Mobile phone calculators are not allowed to be used during quizzes or exams.

**Evaluation:**

Quizzes, Midterm Exam,	40%
Homework, Labs, Class Work	20%
Projects, Problem-Solving Essay	20%
Final Examination	20%

## Course Schedule

The following tentative schedule is intended to cover the six hours of classroom and lab time each week. It is expected that students will spend about the same amount of time each week to complete assigned readings, homework, and to prepare for classes, labs, quizzes and exams.

**Week 1:** The language of algebra; scaling; measurement and counting; visualization, illustrations and geometry. Lab: Introduction to applications systems

**Week 2:** Units and conversion; functions and graphs; Estimation. Numbers in our world. Lab: Spreadsheet basics

**Week 3:** Boolean logic and truth tables; Representations of relationships; Dynamics: representing and measuring changes over time. Lab: Spreadsheet Practice  
Quiz # 1

**Week 4:** Applications of algebra and geometry in households, businesses, government and the Arts.  
Mini-Project #1

**Week 5:** Modeling basics and abstraction; Polya's four-step problem solving approach; Graph models.  
Lab: Obtaining data from the Internet  
Quiz #2

**Week 6:** Probability basics; counting functions; set notation; set operations and Venn diagrams; representing beliefs. Lab: Storing data, organizing data, transforming data into information

**Week 7:** Critical thinking; utility; decision models; expected value and risk; applications in business, finance and the arts.  
Midterm Exam

**Week 8:** What-if analysis; decision trees and decision-making. Lab: Spreadsheet statistics  
Problem-Solving Essay  
Mini-project #2

**Week 9:** Simulation and forecasting; applications. Lab: Spreadsheet simulation  
Quiz #3

**Week 10:** Modeling fairness; Allocation of scarce resources.  
Mini Project #3

**Week 11:** Social networks and connectivity; voting systems Lab: Models for Gerrymandering  
Quiz #4

**Week 12:** Game theory and applications

**Week 13:** Final Exam