MAT 124 Syllabus

General Information
MAT 124: Algebraic Thinking and Functions for Educators *(3hr, 3cr)*

Course Description: This course will examine representing and analyzing mathematical situations and structures using generalization and algebraic symbols and reasoning. Special attention will be given to the transition from arithmetic to algebra, working with functions, and how to use algebra to model, analyze, and predict change.

Prerequisites: Departmental Permission

Note: Material covered in this class will help teachers/teacher candidates prepare for a leadership position as elementary mathematics specialist.

Instructor: Your instructor will provide contact information, office hours and meeting times for your section.

Course Format and Grading

Expectations: This course covers algebraic representations and structures to analyze, model and predict mathematical situations. This course uses the problem-solving approach to teaching and learning mathematics concepts. Students are encouraged to ask questions. Class participation is essential. You are strongly encouraged to take good notes and do not miss class. Bring your concerns and challenges to the instructor's attention early on in the course so that they can address them effectively.

Homework: Homework will be assigned in class. Solutions to most problems from the previous session will be reviewed and discussed in class. In order to be successful in this course it is essential that you devote a lot of time to your homework.

Grades: Your grade will be made up of 70% exams and 30% assignments that include homework.

Text, Materials, and Accommodating Disabilities
References:

- Beckmann, S. (2018). Mathematics for elementary teachers (5th ed). Pearson.
- Billstein, R., Libeskind, S., & Lott, J. W. (2016). A problem-solving approach to Mathematics for elementary school teachers (12th ed). Pearson.
- Randall, C., & Thompson, A. (1996). Secondary math an integrated approach: Focus on algebra. Addison-Wesley
- Sonnabend, T. (2010). Mathematics for teachers: an interactive approach for grades k-8 (4th ed). Brooks/Cole Cengage Learning.

Materials: Physical and Virtual Manipulatives; Learning Tools

Calculator: Texas Instruments and Scientific Calculators

Accommodating Disabilities: Lehman College is committed to providing access to all programs and curricula to all students. Students with disabilities who may need classroom accommodations are encouraged to register with the Office of Student Disability Services. For more info, contact the Office of Student Disability Services, Shuster Hall, Room 238, 718-960-8441.

Course Objectives and Content

Course Objectives: This course meets the overall objectives for a CUNY common core Quantitative Reasoning course; these objectives and how they are met in this course are detailed in the sample final exam with scoring rubric attached to this document.

*At the end of this course, students will be able to:

SLO 1. Interpret and draw appropriate inferences from quantitative representations, such as formulas, graphs, or tables.

SLO 2. Represent quantitative problems expressed in natural language in a suitable mathematical format.

SLO 3. Use algebraic, numerical, graphical, or statistical methods to draw accurate conclusions and solve mathematical problems.

SLO 4. Effectively communicate quantitative analysis or solutions to mathematical problems in written or oral form.

SLO 5. Evaluate solutions to problems for reasonableness using a variety of means, including informed estimation.

SLO 6. Apply mathematical methods to problems in other fields of study.

*Course Topics

There is flexibility in the order and time allotted to each of the topics below, but all topics must be covered by the instructor and understood by the student. Historical development and perspective will be embedded within the topics where appropriate.

1. Real Number System and Properties
2. Variables and Expressions
    - Algebraic Notations, Symbols
    - Variables
    - Order of Operations
    - Structure of Expressions
3. Equality Relation and Equations

- Meaning of Equal Sign
- Solving Equations and Inequalities
- Proportional Relationships

4. Functions, Their Representations and Features
   - Domain and Range
   - Constant and Linear
   - Quadratic
   - Polynomial
   - Exponential
   - Other Functions
   - Sequences and Series
   - Transformations of Functions

5. Modeling with Functions and Predicting Change (Regression Equations)
   - Real World Applications

See Sample Final Exam and Scoring Rubric with SLOs and Topics alignment

Professional Standards

(Specific content and objectives will include the following standards from **NCTM CAEP Mathematics Content for Elementary Mathematics Specialist (Addendum to the NCTM CAEP Standards 2012).**

To be prepared to support the development of student mathematical proficiency, all elementary mathematics specialists should know the following topics related to algebra with their content understanding and mathematical practices supported by appropriate technology and varied representational tools, including concrete models:

C.2.1Algebraic notation, symbols, expressions, equations, inequalities, and proportional relationships, and their use in describing, interpreting, and modeling relationships and operations
C.2.2 Function classes including constant, linear, quadratic, polynomial, exponential, and absolute value, and how choices of parameters determine particular cases and model real- world situations
C.2.3 Functional representations (tables, graphs, equations, descriptions, and recursive definitions), characteristics (e.g., zeros, average rates of change, domain and range), and notations as a means to describe, interpret, and analyze relationships and to build new functions
C.2.4 Patterns of change in linear, quadratic, polynomial, and exponential functions and in proportional and inversely proportional relationships and types of real-world relationships these functions can model
C.2.5 Historical development and perspectives of algebra including contributions of significant figures and diverse cultures