

# Algebra **1** Part 1, Fall 2023

(Part 2 will be offered in Spring 2024)



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United States



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**TO REGISTER:** <https://xumath.org>

## WHEN, WHERE AND HOW MUCH?

**Term:** Aug 19, 2023 – Jan 3, 2024

**In-Person (at QD) and Virtual (live zoom) Lecture:** 7-9:00pm (CT), Sat  
(zoom or video for Nov. 25-Thanksgiving, Dec. 23-Christmas, Dec. 30-New Year)

**Homework Solving Video:** Wed, posted after homework due time

**In-Person Address:** QD Academy, 4100 Legacy Drive, Suite 404, Plano, TX 75024

**Format:**

- 20 2-hour lectures + 20 1-hour homework solving video
- 18 homework assignments (to be graded) + 2 take-home exams (to be graded)

## WHO TEACHES?

**Dr. Sheng Xu:** Associate professor of math at Southern Methodist University

- Received Ph.D. from Cornell and did post-doc at Princeton and Cornell;
- Taught 11 different math courses at SMU in past 15 years;
- Received Betty McKnight Spears Endowed Teaching Excellence Award
- Recommended by K12 students and parents in anonymous testimonials on <https://xumath.org/testimonial/>
- Published an undergraduate textbook *Introduction to Scientific Computing with Matlab and Python Tutorials*, Taylor Francis, 2022

## COURSE INFO

**Syllabus, Sample Notes and Videos:** <https://xumath.org>

**Required Textbooks:**

- [1] Customized notes by Prof. Xu with reference to various books (available before each class)
- [2] Ron Larson et al., *McDougal Littell Algebra 1: Applications, Equations and Graphs*, 2001<sup>st</sup> Edition: fundamental homework problems from this book

**References:**

- [3] R. Rusczyk and M. Crawford, *The art of Problem Solving (AoPS) Introduction to Algebra*: optional challenging problems mainly from this book
- [4] R.G. Brown et al., *Algebra: Structure and Method*, Book 1

# SCHEDULE

## Part 1 (Fall 2023)

### **Unit 1: Fundamental Concepts**

1. Numbers; Arithmetic; Absolute Values
2. Variables; Laws; Expressions; Equations; Inequalities
3. Function Basics

### **Unit 2: Linear Equations and Inequalities**

1. Solving Linear Equations and Inequalities
2. Word Problems
3. Graphing Linear Functions and Inequalities

### **Unit 3: Systems of Linear Equations**

1. Solving Linear Systems
2. Word Problems
3. Graphing Linear Systems and Inequalities

### **Unit 4: Exponents**

1. Laws of Exponents
2. Exponential Expressions and Equations
3. Exponential Growth and Decay

## Part 2 (Spring 2024)

### **Unit 5: Quadratic Functions**

1. Factoring Quadratic Expressions
2. Completing the Square
3. Solving Quadratic Equations
4. Parabolas

### **Unit 6: Polynomials and Factoring**

1. Adding, Subtracting and Multiplying Polynomials
2. Factoring Polynomials
3. Special Factorization

### **Unit 7: Ratios, Proportion and Rational Expressions**

1. Ratio, Percent, Conversion Factor, Proportion, Rates
2. Rational Expressions and Equations
3. Graphing Simple Rational Functions

### **Unit 8: Radicals**

1. Square and Cubic Roots
2. Radical Expressions
3. Pythagorean Theorem and Distance Formula

### **Unit 9: Others**

1. Counting
2. Probability and Statistics
3. Sequences and Series