

Algebra 1 Part 1, Fall 2023 (Part 2 will be offered in Spring 2024)

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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 Speairs 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*, 2001st 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