

# Geometry

**CONTACT:** 214-907-8310, [meimei.shengxu@gmail.com](mailto:meimei.shengxu@gmail.com),  
**webchat:** [tsinghua954251](https://tsinghua954251)

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



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## WHEN, WHERE, HOW MUCH?

**Term:** June 2 – Aug. 10, 2025

**In-Person and Live Zoom Lecture:** Mon. 7-9pm CT, Fri. 5-7pm CT

**Recitation Video:** Available on Canvas on Wed. & Sun.

**In-Person Address:** QD Academy, 4100 Legacy Drive, Suite 404, Plano, TX 75024  
or 4116 W Spring Creek Parkway, Suite 500, Plano, TX 75024

### Format:

- 20 2-hour lectures + 20 1-hour homework recitation videos
- 20 homework assignments (to be graded) + 2 exams (to be graded)
- A student can request the video of a class if the student has to miss the class.

**Tuition:** \$940 (if register and pay by March 15), \$970 (after March 15)

## WHO TEACHES?

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

- Ph.D. from Cornell and post-doc at Princeton and Cornell
- 17 years and 15 math courses teaching experience
- Betty McKnight Spears Endowed Teaching Excellence Award in Math
- Recommendation by K-12 students and parents in anonymous testimonials on <https://xumath.org/testimonial/>
- Author of an undergraduate textbook *Introduction to Scientific Computing with Matlab and Python Tutorials*, Taylor Francis

## COURSE INFO

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

### Required Textbooks:

- [1] Customized notes by Prof. Xu (available before each class)
- [2] Ron Larson et al., *McDougal Littell Geometry*, 10<sup>th</sup> Edition, ISBN 0-618-25022-0: fundamental homework problems from this book
- [3] R. Rusczyk, *The art of Problem Solving (AoPS) Introduction to Geometry*: challenging problems mainly from this book

### References:

- [4] D.C. Alexander & G.M. Koeberlein, *Elementary Geometry for College Students*, 6<sup>th</sup> Edition, ISBN 1-285-19569-8
- [5] R.C. Jurgensen et al., *Geometry*, ISBN 0-395-97727-4

# TOPICS

## **Unit 1: Basics of Geometry**

1. Introduction and Overview
2. Points, Lines, Planes, Segments, Angles
3. Measurements, Relationships, Perimeter, Circumference, Areas
4. Proofs: Induction, Deduction, Proof by Contradiction

## **Unit 2: Perpendicular and Parallel Lines**

1. Properties of Perpendicular and Parallel Lines
2. Proving Lines are Parallel or Perpendicular
3. Linear Functions and Equations for Lines

## **Unit 3: Congruence**

1. Proving Triangles are Congruent
2. Using Congruence
3. Special Triangles
4. Proofs using Coordinates

## **Unit 4: Properties of Triangles**

1. Bisectors, Medians and Altitudes
2. Triangle Inequalities

## **Unit 5: Quadrilaterals and Polygons**

1. Parallelograms, Rhombuses, Trapezoids and Kites
2. Areas of Quadrilaterals
3. Polygons: Angles, Perimeters, Areas

## **Unit 6: Similarity**

1. Proportion and Similarity
2. Proving Triangles are Similar
3. Using Similarity: Length and Area

## **Unit 7: Right Triangles and Trigonometry**

1. Right Triangles: Similarity, Pythagorean Theorem
2. Solving Right Triangles

## **Unit 8: Circles**

1. Tangents, Arcs, Chords, Inscribed Angles, Sectors
2. Relationships in Circles
3. Circumference, Arc Length, Areas
4. Geometric Probability
5. Equations of Circles

## **Unit 9: Transformations and 3D Shapes**

1. Translations, Reflections and Rotations
2. Prisms, Cylinders, Pyramids, Cones, Spheres
3. Similar Solids