# Geometry


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

## WHEN, WHERE, HOW MUCH?

**Term:** June 3 – Aug. 11, 2024
**In-Person (at QD) and Virtual (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
**Format:**

- 20 2-hour lectures + 20 1-hour homework recitation videos
- 20 homework assignments (selected problems 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.

## WHO TEACHES?

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

- Ph.D. from Cornell and post-doc at Princeton and Cornell
- 16 years and 15 math courses teaching experience
- Betty McKnight Speairs 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*, 10th 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*, 6th 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