

Math 1312
Introduction to Mathematical Reasoning

Prerequisites: Credit for or placement out of Math 1310 or Math 1311.

Textbook: *Essentials of Geometry for College Students*, by Lial, Steffenson, and Johnson; second edition, Pearson, Addison Wesley, 2004.

Course Description: Credit 3 hours (3-0). Principles of logic and proof, set theory, formal and informal geometry. May not apply toward a degree from the College of Natural Sciences and Mathematics.

Supplies: A small ruler and compass will be needed for many sections

[Course Policies \(pdf version\)](#)

Fall 2005 Syllabus

Chapter 1 — Foundations of Geometry

- 1.1 Inductive and Deductive Reasoning
- 1.2 Points, Lines, and Planes
- 1.3 Segments, Rays, and Angles
- 1.4 Introduction to Deductive Proofs
- 1.5 Formalizing Geometric Proofs
- 1.6 Constructions Involving Lines and Angles

Chapter 2 — Triangles

- 2.1 Classifying Triangles
- 2.2 Congruent Triangles
- 2.3 Proofs Involving Congruence
- 2.4 Isosceles Triangles, Medians, Altitudes, and Concurrent Lines
- 2.5 Proving Right Triangles Congruent
- 2.6 Constructions Involving Triangles

Chapter 3 — Parallel Lines and Polygons

- 3.1 Indirect Proof and the Parallel Postulate
- 3.2 Transversals and Angles
- 3.3 Polygons and Angles
- 3.4 More Congruent Triangles

Chapter 4 — Quadrilaterals

- 4.1 Parallelograms
- 4.2 Rhombus and Kite
- 4.3 Rectangles and Squares
- 4.4 Trapezoids

Chapter 5 — Similar Polygons and the Pythagorean Theorem

- 5.1 Ratio and Proportion
- 5.2 Similar Polygons
- 5.3 Properties of Right Triangles
- 5.4 Pythagorean Theorem
- 5.5 Inequalities Involving Triangles

Chapter 8 — Solid Geometry

- 8.1 Planes and Polyhedrons
- 8.2 Prisms
- 8.3 Pyramids
- 8.4 Cylinders and Cones

SUGGESTED HOMEWORK

Section Exercises

- 1.1 #2, 7, 8, 14, 15, 16, 17, 19, 20, 21, 26, 27, 30, 31, 33, 35, 38, 54, 55
- 1.2 #1 — 4, 10, 23, 24, 25 — 29
- 1.3 #1 — 20, 21 — 26, 29, 30, 33, 34, 35 — 38, 44, 46, 55, 64, 67
- 1.4 #1, 2, 3, 5, 8, 9, 12, 15, 18, 19, 20, 21, 25, 26
- 1.5 #1 — 5, 11, 12, 16, 19, 28
- 1.6 #4, 6, 8, 11, 14, 22, 25, 26, 27, 28
- 2.1 #11 — 20, 24 — 28, 33 — 36, 41 — 45
- 2.2 #7 — 11, 16, 19 — 24

- 2.3 #5 — 10, 14, 16, 18, 21 — 24
- 2.4 #7 — 12, 14 — 19, 20 — 27, 28
- 2.5 #7 — 16, 17, 18 — 20
- 2.6 #2, 8, 10, 16, 19, 22, 29
- 3.1 #1, 2, 4, 5 — 14, 17 — 22
- 3.2 #6, 9, 10, 16, 19, 24, 27, 33, 37, 38, 40
- 3.3 #10, 12, 14, 16, 17 — 24, 26, 28, 29, 30, 32, 35
- 3.4 #6, 9, 10, 13, 14, 17 — 19
- 4.1 #6, 10, 20, 22, 24, 25, 28, 30
- 4.2 #7 — 14
- 4.3 #1 — 13, 18, 20, 26, 27, 34
- 4.4 #14, 16, 20, 23, 33, 34, 36, 37
- 5.1 #4, 14, 22, 26, 28, 32
- 5.2 #10, 14, 16, 18, 22, 26, 30, 34, 36, 37, 43
- 5.3 #2 — 10 *even*, 12 — 20 *even*
- 5.4 #4, 14, 20, 34, 44, 46, 47, 49, 50, 52
- 5.5 #4, 8, 16, 24, 28, 32, 36, 38, 40, 44
- 8.1 #8, 12, 14, 15, 20, 22, 28
- 8.2 #9, 11, 15, 19, 20, 21, 22, 24, 25
- 8.3 #4, 6, 7, 10, 11, 12, 16
- 8.4 #2, 8, 12, 20, 24, 28, 32, 34