

ROWAN UNIVERSITY
Department of Mathematics

Syllabus

Math 01.202 - Introduction to Geometry

CATALOG DESCRIPTION:

Math 01.202 Introduction to Geometry 3 s.h.

Prerequisites: Basic Algebra II

This course develops the fundamental concepts of Euclidean geometry from a modern point of view. Its topics include sets, points, lines, space, betweenness, incidence, congruence, parallelism, similarity, transformations, volumes, and areas. Non-Euclidean geometries are introduced. Not open to mathematics majors. Use of calculators is required. Students are expected to have completed an equivalent of Intermediate Algebra.

OBJECTIVES:

Students will be able to:

1. Discuss a variety of great geometric ideas in ways that transcend mathematics.
2. Use synthetic, analytic, and transformational techniques.
3. Discuss the similarities and differences between Euclidean and non-Euclidean geometries.
4. Apply the concepts of incidence, dimension, parallelism, congruency, similarity, self-similarity, perpendicularity, cardinality, and transformal geometry.
5. Use a variety of tools, physical models, and appropriate technology to develop and describe geometric concepts and relationships and their uses.
6. Demonstrate the kinds of proofs found in geometry.
7. Present written and oral arguments to justify conjectures and generalizations based on explorations.

CONTENT:

1. History of Geometry

Theorems and proof
Pythagorean Theorem
Golden Rectangle
Axioms

2. Geometric Constructions

Congruence, similarity, and incidence
Parallelism and perpendicularity
Polyhedra

Duality

Extensions to higher dimensions

3. Symmetry, Transformations and Equivalences

Reflections, rotations, translations

Isometries and symmetries

Topological equivalence

Projections

Self-similarity and fractal geometry

4. **Non-Euclidean Geometries**

Axiomatic systems

Finite geometries

Spherical geometry

Hyperbolic geometry

Comparing euclidean and non-euclidean geometries

Concepts of infinities

TEXTBOOKS:

Edward B. Burger and Michael Starbird: THE HEART OF MATHEMATICS, 2/E, Wiley, 2005.

L. Christine Kinsey and Teresa E. Moore: SYMMETRY, SHAPE, AND SPACE, Key College, 2002.

Gary L. Musser and Lynn E. Trimpe: COLLEGE GEOMETRY: A PROBLEM SOLVING APPROACH WITH APPLICATIONS, PrenticeHall, Upper Saddle, NJ, 1994.