Math 121 : College Geometry

California State University, Sacramento · Department of Mathematics & Statistics

A study of the axioms and theorems of Euclidean geometry. A comparison of several geometric axiom systems and their theorems, including those of some non-Euclidean and finite geometries.

Catalog Description

Study of the axioms and theorems of Euclidean geometry. A comparison of several geometry axiom systems and their theorems, including those of some non-Euclidean and finite geometries. **Graded**: Graded Student. **Units**: 3.0.

Prerequisites

Math 31; Math 32 or Math 35

Assignments

A variety of reading and problem solving assignments will be part of the course.

Examinations

There will be regular midterm examinations and a comprehensive final examination for this course.

Course Outline

I. Preliminaries (3 - 4 Weeks)
   A. Sets, logic, relations, mappings
   B. The real number system
   C. Axiom systems, models
   D. Incidence planes

II. Absolute Geometry (7 Weeks)
   A. Incidence axiom and ruler postulate
   B. Betweenness, segments, rays, convex sets, angles, triangles
   C. Plane separation and Pasch's postulate
   D. Congruence, SAS postulate, perpendiculars, inequalities
   E. Circles
   F. Isometries
   G. Saccheri quadrilaterals

III. Euclid's parallel postulate and Non-Euclidean (hyperbolic) Geometry (4 Weeks)
   A. Equivalent formulations of the parallel postulate
   B. Biangles, critical angle, absolute lengths
   C. Cayley-Klein and Poincare models of hyperbolic geometry
   D. Independence of the parallel axiom