Synopsis

In a manner that is reminiscent of the way a sphere may be pieced together from overlapping disk images, a scheme may be pieced together from affine schemes. An affine scheme is the geometric guise of a commutative ring with unity. Specific case: if $k$ is a field, its $n$-dimensional affine space $\mathbb{A}^n_k$ is the geometric guise of the polynomial ring $k[x_1, \ldots, x_n]$, while its $n$-dimensional projective space $\mathbb{P}^n_k$ is a non-affine scheme that may be pieced together using overlapping copies of $\mathbb{A}^n_k$.

While every scheme is locally affine, a scheme embodies global information that may not easily be discerned simply by viewing it as a union of affine schemes. The cohomology of coherent modules encodes much global geometric information. In the case of an affine scheme a coherent module is the same thing as a finitely-generated module over the ring associated with the affine scheme, and the cohomology of a coherent module is trivial.

Text

*Algebraic Geometry* Robin Hartshorne, Springer (Graduate Texts in Mathematics), ISBN 0387902449

Prerequisites

The course is intended to complement Math 725 as offered during the fall semester of 2005.

**Formal Prerequisites** The core courses in algebra, Math 520 A & B. General topology, Math 540A.
Helpful Topics for Background Many things, while not formally necessary, may provide helpful motivation including commutative algebra, homological algebra, algebraic curves, and algebraic topology.