A survey of volume inequalities

In this talk we will describe several problems and results about the volume in Euclidean space of various interesting subsets. We will consider identities and inequalities for the volume of certain convex sets and star-bodies. For example, it is known that if $C_N \subseteq \mathbb{R}^N$ is a cube, centered at the origin and having volume 1, if $\mathcal{S}_M \subseteq \mathbb{R}^N$ is an M-dimensional subspace with $1 \leq M < N$, then $C_N \cap \mathcal{S}_M$ has M-dimensional volume greater than or equal to 1. We will discuss a far reaching generalization of this inequality which has been conjectured, but remains unproved, in work of M. Gromov. The talk should be accessible to a general mathematical audience.