

TSINGHUA MATHCAMP 2015 COURSE: COMPUTER SCIENCE COURSE DESCRIPTION

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This is an introduction to Computational Topology and Geometry (Seeing is Believing!) Here is a brief description.

It is an interdisciplinary course between mathematics and computer science. The course covers fundamental concepts and theorems in algebraic topology and differential geometry using a combinatorial/discrete approach. Profound topological and geometric concepts and theorems will be interpreted in the discrete setting and visualized by computer graphics techniques, and learned by constructing computational algorithms.

Computer Science Aspects : Object oriented programming method will be introduced; searching algorithms in graph theory, convex hull-envelop, Delaunay triangulation-Voronoi diagram in computational geometry ; discrete surface data structure, convex optimization; OpenGL, surface visualization.

Mathematics Aspects: Fundamental group; Riemannian metric, Gaussian curvature, Gauss-Bonnet theorem; Optimal Mass transportation theory; Discrete Surface Ricci flow.