

**TSINGHUA MATHCAMP 2015 COURSE: ANALYSIS
AND TOPOLOGY COURSE DESCRIPTION**

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In this course, our aim is to introduce fundamental concepts in algebraic topology by means of calculus. The course will be based on the first few parts of the book "Algebraic Topology. A First Course" by William Fulton. After reviewing basic calculus and theory of topological spaces, we will proceed to see how calculus can be used to detect the topology of domains in \mathbb{R}^2 . This will lead to fundamental topological concepts like winding numbers, degrees, homology and cohomology, and also important results such as Brouwer Fixed Point Theorem, Jordan Curve Theorem, etc.