

ALGEBRAIC COMBINATORICS

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Combinatorics is in the central fields of modern mathematics, with connections to other areas including number theory, geometry, theoretical computer science and information theory. It also has increasingly important wide-ranging applications to our real life, such as Internet, 5G Networks and Artificial Intelligence. Algebraic methods has been widely used in braches of combinatorics and has been proved to be powerful and major tools. In this course, we plan to systematically introduce basic algebraic methods in combinatorics and emphasize on how to apply these methods to solve various combinatorial problems (such as enumeration, design, and optimization) in fields like Discrete Geometry, Graph Theory and Set Theory. The featured concepts and examples that we will highlight contains linear space method, polynomial method, adjacency matrices of graphs, and combinatorial nullstellensatz.