

The Department of Mathematics

2025–26–B term

Course Name Graph rigidity

Course Number 201.2.7002

Course web page

<https://math.bgu.ac.il/en/teaching/spring2026/courses/graph-rigidity>

Office Hours <https://math.bgu.ac.il/en/teaching/hours>

Abstract

Requirements and grading¹

Course topics

Graph rigidity theory studies the structural stability of frameworks, which are embeddings of graphs in d -dimensional space. These frameworks can be viewed as mechanical structures built from rigid rods (edges) connected by joints or hinges (the vertices), around which they are free to rotate. The basic question in rigidity theory is: Is a given structure rigid or flexible? That is, can the vertices be continuously moved in a way that preserves all edge lengths, other than by trivially translating or rotating of the entire framework? The theory of rigidity lies at the intersection of combinatorics, geometry, and algebra, and its history can be traced back to the foundational work of Maxwell and Cauchy in the 19th century. This theory has found applications in diverse fields, such as biology (the structure of proteins), control theory (formation control of autonomous vehicle systems), and structural engineering. In this course, we will explore various classical problems and results, as well as more recent developments in rigidity theory, providing an introduction to key concepts, techniques, and open questions in the field.

¹Information may change during the first two weeks of the term. Please consult the webpage for updates