

The Department of Mathematics

2023–24–A term

Course Name Algebraic Structures

Course Number 201.1.7031

Course web page

<https://www.math.bgu.ac.il/en/teaching/fall2024/courses/algebraic-structures>

Lecturer Prof. Victor Vinnikov, <vinnikov@bgu.ac.il>, Office 103

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

Abstract

Requirements and grading¹

Course topics

- Groups as symmetries. Examples: cyclic, dihedral, symmetric and matrix groups.
- Homomorphism. Subgroups and normal subgroups. Quotient groups. Lagrange's theorem. The isomorphism theorems. Direct products of groups.
- Actions of groups on sets. Cayley's theorem.
- Group automorphisms.
- Sylow's theorems. Application: classification of groups of small order.
- Composition series and Jordan–Hoelder theorem. Solvable groups.
- Classification of finite abelian groups, finitely-generated abelian groups.
- Symmetric group and alternating group. The alternating group is simple.
- Rings, maximal and prime ideals, integral domain, quotient ring. Homomorphism theorems.

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



- *Multilinear algebra*: Quotient spaces. Tensor products of vector spaces. Action of S_n on tensor powers. Exterior and symmetric algebras. Multilinear forms and determinant.
- *Optional topics*: group of symmetries of platonic solids, free groups, semidirect products, representation theory of finite groups.