

# The Department of Mathematics

2022–23–A term

**Course Name** Algebra 1 for CS

**Course Number** 201.1.7011

**Course web page**

<https://www.math.bgu.ac.il/en/teaching/fall2023/courses/algebra-1-cs>

**Lecturer** Prof. Ido Efrat, <efrat@bgu.ac.il>, Office 106

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

## Abstract

## Requirements and grading<sup>1</sup>

### Course topics

- .1 General background: sets and operations on them, Complex numbers: definition (via ordered pairs), addition and multiplication, inverses, adjoint, absolute value. Real and complex polynomials and their roots.
- .2 Fields: Definition, properties, examples: Rationals, reals, complex numbers, integers mod  $p$ .
- .3 Linear equations over fields, matrices and elementary row operations, rank of a matrix, solutions of homogeneous and non homogeneous systems of linear equations and the connections between them.
- .4 Vector spaces over fields, subspaces, bases and dimensions, coordinates change of coordinate matrix, row rank as rank of a subspace, sums, direct sums of subspaces and the dimension theorem.
- .5 Matrices multiplication, the algebra of square matrices, inverse determinants: properties, Cramer's rule, adjoint and its use for finding the inverse.

---

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



- .6 Linear transformations basic properties kernel and image of a linear transformation representation of linear transformations by matrices and the effect of change of bases. linear functionals, dual bases