

# The Department of Mathematics

2024–25–A term

**Course Name** Introduction to Algebraic Geometry

**Course Number** 201.1.6171

**Course web page**

<https://www.math.bgu.ac.il/en/teaching/fall2025/courses/introduction-to-algebra>

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

## Abstract

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

### Course topics

- .1 Affine and projective spaces, affine and projective maps, Segre and Veronese embeddings, Desargues's Theorem, Pappus's Theorem, cross-ratio, projective duality
- .2 Plane curves: rational curves, linear systems of curves, conics and the Butterfly Theorem, Pascal's Theorem, Chasles's Theorem, the group structure on a planar cubic, Bezout's Theorem
- .3 Affine algebraic varieties: Hilbert's Basis Theorem, Zariski topology, irreducible components, Hilbert's Nullstellensatz, the correspondence between the ideals and the algebraic sets, morphisms and rational maps between affine algebraic varieties
- .4 Projective varieties: graded rings and homogeneous ideals, the projective correspondence, morphisms, blow-ups, birational equivalence and rational varieties, Grassmannians
- .5 The basics of dimension theory
- .6 The basics of smoothness

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



- .7 Cubic surfaces and 27 lines. If time permits, other topics will be discussed such as abstract algebraic varieties, Chevaly's Theorem, Riemann-Roch Theorem and its applications.