אוניברסיטת
בן-גוריון בנגב

The Department of Mathematics

2021–22–A term

Course Name Riemann Surfaces and Arithmetic

Course Number 201.2.0451

Course web page
`https://www.math.bgu.ac.il//en/teaching/fall2022/courses/riemann-surfaces-and-ar`

Lecturer Dr. Daniel Disegni, `<disegni@bgu.ac.il>`, Office 108

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

Abstract

Requirements and grading[1]

הציון יחושב על סמך: עבודות בית, במשקל 10%; עבודה סופית, במשקל 90%.

Course topics

1. Doubly periodic functions. Lattices, complex tori. The field of elliptic functions.
2. Riemann surfaces: definitions, maps, the genus, Riemann–Hurwitz formula.
3. Differential forms on a Riemann surface. The Abel–Jacobi map.
4. Local study of holomorphic functions. Points of Riemann surfaces as valuations on the field of meromorphic functions. Classifications of the absolute values on the field of rational numbers. The field of p-adic numbers. The product formula.
5. Algebraic curves over a field. Algebraic curves over C and relation to Riemann surfaces.

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

6. Rational points. Arithmetic of curves according to the genus. The case of conics (genus 0). Hasse principle. Finite generation of the rational points on elliptic curves (genus 1): the case of Fermat quartic.

7. Modular surfaces and modular forms. Analytic construction of rational points on elliptic curves.