

## The Department of Mathematics

2021–22–B term

**Course Name** Coding Theory

**Course Number** 201.1.4501

**Course web page**

<https://math.bgu.ac.il/en/teaching/spring2022/courses/coding-theory>

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

### Abstract

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

### Course topics

Coding Theory investigates error-detection and error-correction. Such errors can occur in various communication channels: satellite communication, cellular telephones, CDs and DVDs, barcode reading at the supermarket, etc. A mathematical analysis of the notions of error detection and correction leads to deep combinatorial problems, which can be sometimes solved using techniques ranging from linear algebra and ring theory to algebraic geometry and number theory. These techniques are in fact used in the above-mentioned communication technologies.

#### Topics

- .1 The main problem of Coding Theory
- .2 Bounds on codes
- .3 Finite fields
- .4 Linear codes
- .5 Perfect codes

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



.6 Cyclic codes

.7 Sphere packing

.8 Asymptotic bounds

**Bibliography:** R. Hill, A First Course in Coding Theory, Clarendon Press,  
Oxford 1986