

Abstract: Mini-course in Coding Theory

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Whenever data (documents, pictures, or other files) are transmitted or stored, errors may occur. Error-correcting codes are used to strategically add redundancy to information so that the original message can be recovered. The study of these codes and their properties is called coding theory, and historically the field has capitalized on several areas of mathematics to design and study good codes.

In the first part of this mini-course, we will start with the foundations of coding theory that were established by Claude Shannon and Richard Hamming. We will also see how more recent applications such as distributed storage and cloud computing are revolutionizing the subject of coding theory.

In the second session, we will see how linear subspaces defined by matrices can provide a useful description of a code, and how to detect errors and decode using linear algebra techniques. We will study several algebraic constructions of codes and discuss their practical applications.

Note: The first session will be accessible to a general undergraduate audience, and the second session will be accessible to those who have studied linear algebra.