

Mathematics 191, Honors Seminar: Information Theory.

MWF 10-11, MS 6201

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Course description.

Textbook: Robert B. Ash, *Information Theory*, Dover Publ., New York, 1990 (available in the bookstore).

This course will be an introduction to classical information theory, which is generally regarded as having been founded by Shannon in 1948. We will deal with the notions of data encoding and decoding; transmission of data over a communication channel; error correction; capacity of a communication channel; and data compression. One of the principle ideas is that of a measure of information, also known as entropy. Thus we would cover, at the very least, the first four chapters of *Information Theory*.

Depending on the interests of the audience and available time, we may get into somewhat more advanced topics. Such possibilities include: further discussion of error correcting codes; Boltzmann's formula from statistical mechanics and entropy; dynamical entropy; and quantum information theory in the context of quantum communication.

At least for the bulk of the course, the prerequisites are rather minor: students would be expected to know some linear algebra (115A) and very basic probability theory, which will be reviewed at the beginning of the course (we will only deal with random variables having a finite number of possible values). Students are also expected to have some mathematical maturity and familiarity with proofs (on the level of ones encountered in the linear algebra 115A and analysis 131A).

If you want to take the course, but have a time conflict, please e-mail me in advance. It may be possible that the class be rescheduled.

Grading will be discussed at the first class meeting.