

COM 5180 Mathematical Methods for Communications

Syllabus

The aim of this course is to introduce useful and practical tools for the study of communication theory, error-correcting codes, and convex optimization. We will particularly focus on techniques in linear algebra. The basic topics we cover are listed as follows.

1. Positive-definite/semidefinite Matrices. Quadratic Forms
2. Eigendecomposition and its Applications (Karhunen-Loève Expansion)
3. Linear Systems and Decompositions (LU, LDM, Choleskey Factorization)
4. Least Squares, Orthogonal Projections, Singular Value Decomposition.
5. QR and Householder Decomposition
6. Finite Fields. Cyclic Codes.

We may cover the above topics out of order depending on the topics. In addition to these topics, we may also include some important topics at the end of the semester such as (not limited to) the following topics.

- Dual Spaces
- Canonical Forms

Assessment

- 2 Quizzes (25% and 35%)
- Final (45%)