

Operations Research

Objectives: This course is an introduction to operations research. Topics are chosen from convex optimization, analysis of variance, categorical data analysis, and nonparametric statistics.

Prerequisites: Linear Algebra, Analysis I and II, Probability and statistics

Syllabus

1. **Convex functions on real line.** Properties of smoothness. Conjugate convex functions. Remarkable inequalities.
2. **Convex sets in linear spaces.** Affine sets and convex sets. Separation theorems. Extremal points. The orthogonal projection.
3. **Convex functions on normed vector spaces.** Continuity. Support. Subdifferential. Rademacher's theorem. Classes of differentiable convex functions.
4. **Elements of optimization theory.** Maxima and minima. Minimax theorems. Applications to game theory. Linear programming. The simplex method. Convex programming.
5. **Statistical thinking and data analysis.**

Bibliography

1. S. P. Boyd and L. Vandenberghe, *Convex optimization*, Cambridge Univ. Press, 2004.
2. J. C ea, *Optimisation. Th orie et Algorithmes*, Dunod, Paris, 1971.
3. C. P. Niculescu and L.-E. Persson, *Convex Functions and their Applications. A Contemporary Approach*, Springer-Verlag, 2006.
4. A. Wayne Roberts and Dale Varberg, *Convex Functions*, Academic Press, 1973.

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