

Syllabus of the Comprehensive Exam

MATH 580 Convex Analysis

Topics

- Convex sets. Convex functions. Generalized Convex Functions, Relative Interior
- The distance function. Separation of convex sets
- Normal cones. Continuity of convex functions
- Subdifferential, Subdifferential calculus
- Fenchel conjugate. Differentiability of convex functions
- Advanced properties of convex sets: Caratheodory theorem, Farkas lemma
- Radon theorem. Helly's theorem. Tangent cones. Mean value theorem
- Lower semicontinuity and existence of minimizers
- Constraint Qualifications.
- Fritz John and Karush-Khun-Tucker Optimality conditions

References

- B.S. Mordukhovich, *An Easy Path to Convex Analysis and Applications*. Morgan and Claypool (2014).
- J.B. Hiriart Urruty and C. Lemaréchal: *Fundamentals of Convex Analysis*. Springer (2001).