

# Seminar: Overview and Applications of the KKT Conditions And Duality

Luca Solbiati

October 25, 9:00  
2022

## Abstract

In the field of constrained nonlinear optimization the KKT conditions and the theory of duality have played a central role in the analysis and development of algorithms and modeling techniques.

While even a naive understanding of these concepts is very useful and practical, a deep knowledge of these results can aid significantly in the proper application of algorithms and models, delivering meaningful insights into the field of optimization and operation research in general.

The purpose of this seminar is to give an extensive and rigorous presentation of these results, together with examples, intuitions, and applications that motivate their study.

## References

- [1] Dimitri P Bertsekas. *Constrained optimization and Lagrange multiplier methods*. Academic press, 2014.
- [2] Stephen Boyd, Stephen P Boyd, and Lieven Vandenbergh. *Convex optimization*. Cambridge university press, 2004.
- [3] Trevor Hastie, Robert Tibshirani, Jerome H Friedman, and Jerome H Friedman. *The elements of statistical learning: data mining, inference, and prediction*, volume 2. Springer, 2009.
- [4] Philip Wolfe. A duality theorem for non-linear programming. *Quarterly of applied mathematics*, 19(3):239–244, 1961.
- [5] Stephen Wright, Jorge Nocedal, et al. Numerical optimization. *Springer Science*, 35(67-68):7, 1999.