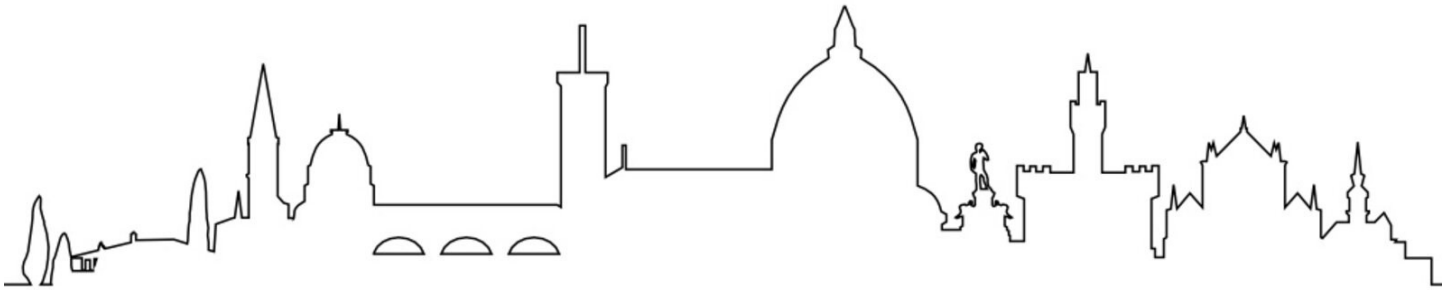

FLorence OPtimization talkS

Organized by

(NODA) Numerical Optimization and Data Analysis group (DIEF)
(GOL) Global Optimization Laboratory (DINFO)
University of Florence

May 13th 2026

Justo Puerto Albandoz

Professor at Universidad de Sevilla

Time&Location: 2:00 p.m. – Aula Caminetto – S.Marta

Title: *Ordered optimization: theory and applications*

Abstract: Ordered measures provide a powerful and flexible modeling paradigm, including a wide range of objectives such as fairness indices, risk and robustness criteria, among other aggregation operators. Despite their relevance, their integration into optimization models remains challenging, since ordering operations cannot be decoupled and must be embedded directly into the decision process. In this paper, a unified optimization framework is introduced for the computation and optimization of a broad class of ordered measures within a single algebraic structure. The proposed framework covers linear, quadratic, and nested ordered measures, yielding compact and strengthened mixed integer formulations that generalize many existing models. Structural properties and modeling trade-offs arising from different representations of ordering constraints are discussed. An extensive computational study is conducted to compare the alternative formulations. Finally, the versatility of the proposed framework is illustrated by integrating ordered measures into some representative optimization problems, namely quantile regression, robust scenario aggregation, Traveling Salesman Problem, and Weighted Set Covering Problem. These applications demonstrate how ordered measures can be systematically embedded into complex optimization models without ad hoc reformulations.