Optimization Theory: Concepts, Methods, and Applications

Saturday, November 29, 2025 - Sunday, November 30, 2025

Scientific Program

Fundamentals of Optimization Theory
– Core concepts, problem types, and mathematical foundations.

Convex Optimization
– Theory, properties, and importance in practical applications.

Constrained and Unconstrained Optimization
– Analytical methods for problems with and without constraints.

Duality and Optimality Conditions
– Lagrangian duality, KKT conditions, and economic interpretations.

Linear and Nonlinear Programming
– Classical methods like simplex and modern approaches for nonlinear problems.

Numerical Optimization Algorithms
– Gradient-based, Newton-type, and iterative solution techniques.

Global Optimization and Metaheuristics
– Techniques for non-convex and complex optimization landscapes.

Stochastic, Robust, and Online Optimization
– Approaches for handling uncertainty, variability, and streaming data.

Optimization in Machine Learning and Data Science
– Loss minimization, regularization, and algorithm training.

Modeling and Solving Real-World Problems
– Using software tools (e.g., CVXPY, Pyomo, Gurobi) for practical applications.