

Vincenzo Bonifaci

Convex Optimization

Advanced topics in Numerical Analysis

The lectures will be in the period November 15 — December 20, 2023

Every Wednesday 14.00-16.00 and Friday 14.00-16.00 (except December 8) Room TBA,
Dipartimento di Matematica e Fisica, Università Roma Tre via Lungotevere Dante, 376 — also
accessible by walking from Largo San Leonardo Murialdo, 1

Lectures will also be streamed on the Microsoft Teams platform.

Prospective students should express their interest by sending an email message to the lecturer (vincenzo.bonifaci@uniroma3.it) in order to be enrolled in the course, or if they seek additional information.

PROGRAM:

The aim of the course is to provide students with fundamental concepts in convexity and convex optimization, as well as their application to nonlinear optimization problems. The course will focus on how to recognize convexity, how to formulate convex relaxations of nonlinear optimization problems, and how to solve convex optimization problems. The course is addressed at an audience from all areas of mathematics. Planned topics include:

- * Convex sets, convex hulls, polyhedra and polytopes, extreme points, Minkowski's theorem
- * Convexity of functions, inequalities related to convexity, subgradients, conjugate functions
- * Bregman divergence, generalized Pythagorean inequality, projections onto convex sets
- * Convex optimization problems, Lagrange duality, Karush-Kuhn-Tucker optimality conditions
- * Convex optimization algorithms, gradient and subgradient methods, iteration complexity