

Collegio Carlo Alberto

Allievi Program

Optimization for Economics

Instructor: Claudio Mattalia

Contact Information

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Office Hours: After the lectures

Objective of the course

The goal of this course is to provide students with mathematical tools that are necessary for understanding modern economics, doing research of practical work. The object of study in this course – a problem of finding an optimal course of actions subject to feasibility constraints – appears in almost every subfield of economics (consumption choice problem, theory of firm, macroeconomics, industrial organization, labor economics, etc.). The art of solving such problems, however, is usually “too applied” to find space in a purely mathematical curriculum. In this course, the emphasis will be put on the theory of constrained optimization, but the objective is also to provide an integrated treatment that relates the mathematical theory to economics.

Structure of the course

During the lectures, the theory and mathematical background will be presented and typical problems will be solved. Each week a problem set will be assigned, and the solutions will be available the week after.

Formal course requirements include attendance of the lectures, a midterm exam and a final exam.

Outline of the course

A good command of single variable calculus and linear algebra is required. The topics presented during the course are the following:

- Functions of several variables
- Calculus of several variables
- Implicit functions and their derivatives
- Quadratic forms
- Unconstrained optimization: first-order conditions and second-order conditions
- Constrained optimization with equality constraints and with inequality constraints: first-order conditions and second-order conditions
- Lagrangian function, Lagrange multipliers and their meaning

Textbook

Simon-Blume, *Mathematics for Economists*, W. W. Norton & Company, 1994 (Chapters from 13 to 19).