FAKULTETY kierunek MODELOWANIE MATEMATYCZNE I ANALIZA DANYCH st. II

MATHEMATICAL OPTIMIZATION AND APPLICATIONS
Educational Objectives (Cele kształcenia)
The aims of the course is to get an understanding of mathematical optimization. In particular so that the student knows the theory of convex optimization methods such as linear, quadratic, and semidefinite programming as well as their applications in theory and practise. The aim is also that the student will be confident in using numerical software packages.
Requirements (Wymagania)
Linear Algebra, Progamming with Python or Julia
Program content (Treści programowe)
• Review of linear algebra (matrix decompositions, positive semidefinite matrices, convex geometry) • Linear programming (duality theory, Farkas lemma, maximum weight matching) • Second-order cone programming • Semidefinite Programming (infeasibility certificates, duality theory, Lovasz theta bound on independent set size, euclidean distance matrices) • Approximation algorithms and randomized rounding (quadratic binary optimization, Goeman-Williamson randomized rounding) • Non-negative polynomials and sum-of-square certificates (Motzkin Polynomial, Putinar Positivstellensatz) • Polynomial optimization (Lasserre hierarchy)
List of literature (Wykaz literatury)
1. Lecture notes by Lovász, https://sites.math.washington.edu/~thomas/ 2. Blekherman et al, Semidefinite Optimization and convex algebraic geometry, https://www.mit.edu/~parrilo/sdocag/