



Exchange programme Vrije Universiteit

Vrije Universiteit Amsterdam - Exchange programme Vrije Universiteit - 2022-2023

Exchange

Vrije Universiteit Amsterdam offers many English-taught courses in a variety of subjects, ranging from arts & culture and social sciences, neurosciences and computer science, to economics and business administration.

The International Office is responsible for course approval and course registration for exchange students. For details about course registration, requirements, credits, semesters and so on, please [visit the exchange programmes webpages](#).

Combinatorial Optimization

Course Code	X_401067
Credits	6.00
Period	P4+5
Course Level	300
Language Of Tuition	English
Faculty	Faculty of Science
Course Coordinator	dr. C.J. Jagtenberg
Examiner	dr. C.J. Jagtenberg
Teaching Staff	dr. C.J. Jagtenberg
Teaching method(s)	Partial Exam, Lecture, Seminar

Course Objective

In this course you will learn about the theory of combinatorial optimization problems. Also, you will apply the theory to model and solve complex problems using the available software. In particular, we consider performance measures for algorithms for combinatorial problems such as the running time and the quality of solutions.

Objectives:

- To obtain knowledge on the theory of combinatorial optimization
- To apply the theory to specific optimization problems:
- Given an algorithm, analyze the running time
- Given an algorithm, prove (a bound on) its performance
- Construct an own algorithm
- To model problems (for example by integer linear programming or dynamic programming)
- To solve optimization problems using software

Course Content

Subjects:

Graph theory, integer linear programming, network optimization algorithms, (matching, maximum flow, minimum cost flow, traveling salesman problem, vehicle routing), complexity of optimization (NP-hardness) approximation algorithms, dynamic programming, local search, online optimization, randomized algorithms.

Additional Information Teaching Methods

Lectures + Tutorials

Method of Assessment

Written exam (50%) + assignments (50%)

For both parts, a minimum score of 5.0 (out of 10) is required.

Entry Requirements

Operations Research (X_400618)

Literature

Lecture notes (available on Canvas)

Book (available online): Algorithms by Dasgupta, Papadimitriou, and Vazirani (2006). ISBN 9780073523408

Additional Information Target Audience

3BA

Recommended background knowledge

Familiar with some basic graph theory and some optimization problems like shortest path, maximum flow, or knapsack.
Basic knowledge of optimization techniques like linear programming and dynamic programming.
Some programming experience, preferably in Python.