Exchange programme Vrije Universiteit Amsterdam

Vrije Universiteit Amsterdam - Exchange programme Vrije Universiteit Amsterdam - 2024-2025

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.

Operations Research

Course Code	X_400618
Credits	6
Period	P4
Course Level	100
Language Of Tuition	English
Faculty	Faculty of Science
Course Coordinator	dr. D.A. van der Laan
Examiner	dr. D.A. van der Laan
Teaching Staff	dr. D.A. van der Laan
Teaching method(s)	Seminar, Lecture

Course Objective

Acquaint the student with the use of mathematical techniques for solving deterministic optimization problems. Subjects studied are:

- Modelling with linear and integer linear optimization
- Solution methods (algorithms) for solving these problems
- Fundamental problems in network optimization
- Dynamic programming

Course Content

The course is a first introduction to optimization. Given a large number of decisions to be made, subject to certain constraints on what combination of these decisions are allowed, what choices will lead to the best possible outcome (such as maximum profit)?

We will discuss the modelling of verbally-described practical problems using appropriate mathematical formulations - in particular, linear optimization and integer linear optimization models. Extremely powerful software tools for solving such models, and they are widely used in industry. We will see the basic algorithmic principles upon which these software tools are based: in particular, the simplex method for linear optimization, and building on this, the branch-and-bound method for integer linear optimization.

Many problems have specific structure that can be exploited to obtain much faster algorithms. We will see this in two contexts:

- Network optimization problems. What is the shortest way to get between two nodes in a network? Or the cheapest way to build a road network between a given collection of cities so that all cities are connected? We will develop efficient algorithms for these (and similar) problems.
- Dynamic programming. This is a fundamental technique in computer science. Determining whether and in which way this technique can be applied to a given problem is challenging, but it can provide extremely fast algorithms.

Additional Information Teaching Methods

Lectures: 4 hours per week. Tutorials: 3 hours per week. During lectures the material will be presented based on the book and supplementary lecture notes. In the tutorials, students will work on the exercises themselves and have the opportunity to get help from the teaching assistants. The last part of a few tutorials will be reserved to a small selection of exercises (pretest) to be handed in for grading. Students can work in small groups (2 or 3 per group) on these pretests.

Method of Assessment

- At most 3 pretests which will be scheduled during the tutorials. If the student participates in all 3 pretests then the best 2 pretest results will count for the pretest average. The pretest average may comprise 10 % of the final grade if the pretest average is higher than the exam grade. A student has to participate in at least 2 pretests for the possibility to use (for 10 %) the pretest average in computation of the final grade.

- A written exam will constitute the remaining 90% (or 100 % if pretest average is not counted) of the final grade.

Entry Requirements

None

Literature

H. Taha. Operations Research: An Introduction (10th Edition).
Provided lecture notes

Additional Information Target Audience

1BA

Explanation Canvas

Canvas will be used extensively during the course

Recommended background knowledge

None