Theresia van Essen (Delft University of Technology)

Hands-on Linear Optimisation

In this online course, we discuss the basic theory of (integer) linear optimisation that is needed to solve real-life optimisation problems. The course consists of three parts of 1 EC each:

I.   Linear optimisation
II.   Integer linear optimisation
III.   Heuristic solution methods

In Part I, we introduce the concept of a linear model and discuss how such a model can be solved 1) graphically, 2) by using the excel solver, 3) by using the simplex method and 4) by using a commercial solver in combination with Python.

In Part II, we introduce integer variables and several modelling tricks involving binary variables. We discuss the basic concept of branch-and-bound and solve integer linear programming models with the COIN Branch and Cut solver in Python.

In Part III, we introduce several heuristic solution methods (greedy, local search, simulated annealing, genetic algorithms) to solve (large) real-life problems. The students are asked to implement the various methods for a given real-life problem.

This online course can be used for various study programmes to acquire basic hands-on knowledge on Linear Optimisation. Each programme can offer a course tailored to their needs which builds upon this online course.

CV

Theresia van Essen received her MSc degree in Applied Mathematics from Delft University of Technology, The Netherlands, in 2009. In 2013, she obtained her PhD degree in Applied Mathematics from the University of Twente, The Netherlands. From 2013 until 2015, she had a position as lecturer at Delft University of Technology and a post-doctoral position at CWI, The Netherlands. After working as an assistant professor at Vrije Universiteit Amsterdam, The Netherlands, she has been an assistant professor at Delft University of Technology, since 2016. Her research focuses on applying and developing operations research techniques for applications in transportation and health care logistics.