446SM MATHEMATICAL OPTIMISATION

Aims

Knowledge and understanding: capability of formulating a discrete optimization model to maximize or minimize a function of many variables subject to (i) equality and inequality constraints, and (ii) integrality restrictions on some or all of the variables.

Applying knowledge and understanding: capability of solving optimization models relying either on ad-hoc (e.g., Xpress, Cplex) or widespread (e.g., Excel, Matlab) software in different application areas, such as production planning and scheduling, logistics and transportation, health care, and telecommunications.

Making judgments: understanding how to translate a verbal description of a real-life optimization problem into a solvable mathematical formulation.

Communication skills: capability of explaining to a wide audience, both in verbal and graphical terms, in a formally precise albeit simple way the meaning of the various results that are usually obtained from a linear programming optimization model (e.g., dual and slack variables, optimality gap, branch-and-bound search criterion, etc.).

Learning skills: Capability of autonomously integrating different sources (textbooks, literature papers, optimization softwares, programming codes and libraries) to replicate and enhance existing formulations or designing new ones for real-life optimization problems.

Teaching Format

Besides face-to-face lectures on the most important theoretical aspects of integer and linear optimization, during the course some lab sessions and seminars from external guests will be provided.

Assessment

The final exam consists in the implementation, using the MOSEL language, of a (mixed-integer) linear programming problem, which is provided to the student in textual for. The student has to (i) mathematical formalize the problem, and (ii) implement the code to solve it.