The Vienna Graduate School on Computational Optimization (VGSCO) is a joint research and training program of the University of Vienna, TU Wien, IST Austria and Vienna University of Economics and Business funded by the Austrian Science Funds (FWF). Its main goal is to give PhD candidates a comprehensive training in different areas of optimization with special emphasis on algorithmic and numerical aspects. It fosters scientific collaboration between the PhD students and their advisors representing a broad spectrum of topics and areas in the field of optimization.

The VGSCO currently announces a PhD position in the area of

**Complexity of Discrete Optimization**

*(IST Austria, Supervisor: Vladimir Kolmogorov)*

Some classical problems in combinatorial optimization can be solved in polynomial time (finding maximum-weight spanning tree or maximum-weight matching in an undirected graph, minimizing a submodular function, ...), while other problems are NP-hard (MAX-CUT, k-coloring, ...). The focus of this project will be to understand better the boundary between easy and hard discrete optimization problems. Recently there has been a lot of progress on one particular framework, namely *(Valued) Constraint Satisfaction Problem* (VCSP). It culminated in a resolution of a long-standing "CSP dichotomy conjecture". The goal will be to study some extensions of VCSPs. Potential topics include algorithms for NP-hard VCSP classes with "partial optimality" guarantees, i.e. algorithms that identify a part of an optimal solution. Another direction is studying "Boolean Edge CSPs" that generalize the perfect matching problem.

The candidates are expected to have strong mathematical skills. Background in combinatorial optimization and strong computer skills are also a plus.

The advertised position is associated with IST Austria in the Research Group on Discrete Optimization of Prof. Vladimir Kolmogorov. The successful candidate will become a member of the Vienna Graduate School on Computational Optimization. The duration of the employment is of 3 years with possibility of extension. Employment is as a full-time PhD student at IST, and the planned start of the position is fall 2020.

**Application Requirements and Procedure**

The candidates must have a master degree (or equivalent) in Mathematics at the moment the PhD position starts. The application documents should contain a letter of motivation; the scientific CV with publication list, if available; higher education certificates/diplomas; the diploma/master thesis and letter(s) of recommendation. Applications have to be submitted at: vgsco.univie.ac.at/positions/application. The deadline for applications is June 15, 2020.