DISCRETE MATHEMATICS

Vertex colourings of a graph induced by edge or total colourings
supervisor: prof. RNDr. Mirko Horňák, CSc.
study form: full time
Annotation: An edge colouring of a graph can in a natural way induce a vertex colouring of that graph (e.g. by means of the set or the multiset of colours of edges incident to a vertex, or else, if colours are positive integers, by means of the sum or the product of numbers present at a vertex). A total colouring assigns colours to edges and vertices as well, and so possibilities how to use it to induce a vertex colouring are even more rich. One can impose on the induced colouring different requirements (to be proper, to be surjective, …) and to look for the minimum possible number of colours in an original colouring that enables to fulfill the involved requirement.

Clones of compatible operations
supervisor: doc. RNDr. Miroslav Ploščica, CSc.
study form: full time
An (n-ary) operation on a given algebra is called compatible if it preserves all congruences of this algebra. The set of all compatible operations forms a clone (it contains all projections and is closed under composition). This clone contains all polynomial operations. The aim of the thesis is to find generators of this clone, for selected types of algebras. Especially interesting is the case when all compatible operations are polynomial (so called affine complete algebras).

Generalisation of the Minimum Vertex Cover Problem and the Maximum Independent Set Problem
supervisor: doc. RNDr. Gabriel Semanišin, PhD.
study form: full time
Annotation: The Minimum Vertex Cover Problem and the Maximum Independent Set Problem play a central role in the algorithmic graph theory. Recently a few generalisations of them became important in relation to a communication in various types of networks. The aim of the thesis is to study graph-theoretical and algorithmic aspects of these problems.

Structural properties of embedded graphs
supervisor: doc. RNDr. Roman Soták, PhD.
consultant: RNDr. Mária Maceková, PhD.
study form: full time
Annotation: To investigate local structural properties of graphs embedded to surfaces.

Generalised graph colourings
supervisor: doc. RNDr. Roman Soták, PhD.
study form: full time
Annotation: To study chromatic characteristics of graphs. To investigate their list version generalisations and corresponding analogues.