

## **THEORY OF TEACHING OF MATHEMATICS**

### **Mathematical preparation of future undergraduate students**

supervisor: prof. RNDr. Jozef Doboš, CSc.

study form: full time

Annotation: Analysis of mathematical preparation of secondary school pupils for university level mathematics with the aim to align the expectation of university lecturers with the possibilities of mathematical education at secondary schools. Development of proposals for the improvement of the status quo.

### **Inquiry-based approaches to teaching functions**

supervisor: doc. RNDr. Stanislav Lukáč, PhD.

study form: full time

Annotation: Nowadays, we can observe efforts to apply inquiry approaches to mathematics and science education. Elementary functions belong to the basic topics of school mathematics. Misunderstanding of concepts and relationships associated with functions and their properties leads to various students' mistakes and misconceptions. Inquiry approaches to teaching have the potential for inductive way of building knowledge and understanding of educational content. The research aims involve: analysis of the possibilities to implement inquiry approaches to teaching functions in high school; development of teaching and learning materials based on the application of inquiry approaches to teaching functions; examining innovative teaching and learning materials in mathematics teaching and evaluation of the effect of the designed approaches on the development of students' inquiry abilities.

### **Diagnosis and development of computational thinking through solving of mathematical problems in programming environments**

supervisor: doc. RNDr. Lubomír Šnajder, PhD.

consultant: PaedDr. Ján Guniš, PhD.

study form: full time

Annotation: Problem solving is one of the key competencies of the 21st century (ATC21S, UNESCO, OECD, P21, EC). According to Cuny, Snyder and Wing (2010) under computational thinking can be understood as thought processes involved in formulating of problems and their solutions so that the solutions are represented in a form that can be effectively carried out by an information processing agent. Moreover, Wing (2011) adds also that the solution can be carried out by a human or a machine, or more generally, by the combination of humans and machines.

The research problems of the dissertation thesis are: 1. Diagnostics of pupils' computational thinking. 2. Methods of developing pupils' computational thinking by solving mathematical problems in programming environments. Recommended methodological framework of the research is Design-based research with two outcomes: a diagnostic tool to measure computational thinking skills and a teaching methodology for solving of selected mathematical problems in programming environments.