## **Doctoral program name**

Theoretical Computer Science, Data Security and Cryptography

#### **Program Manager**

Dr. Vaszil György

## **Objectives of Doctoral Programme**

PhD students are introduced to the foundations and practical applications of the models and methods used in computer science with special regard to the fields of theoretical computer science, data security and protection, and the didactics of informatics education. In addition, students must become familiar with the methodology of scientific data collection, systematization and publication, and they are expected to join the research work in the field of their chosen topic.

#### **Academic and Research Fields**

#### Computer Science

Standard and nonstandard logical systems, computability and algorithmic complexity, parallel processes and algorithms. Formal languages and automata theory, automata networks, unconvential automata and unconvential models of computation. Classical artificial intelligence algorithms, automatic deduction, logical programming. Theory and application of rough sets.

# Data Protection and Cryptography

Design and analysis of cryptographic primitives, protocols and schemes. Solving complex cryptographic problems in areas such as IoT ecosystems, vehicular ad hoc networks, and blockchain technologies. Research on advanced protocols, identity management and authentication, and secure multi-party computation. Quantum- and post quantum-cryptography. Conducting security analyses using computational-security and process-calculus based tools.

# Didactics of Informatics

IT education and IT-supported education. Support for research areas that help examine traditional and new approaches and models, as well as the efficiency of digital processes and products, and the development of scientific methods. Support for digital and sustainable transformation processes.

# Members of the doctoral programme

Name	Academic degree	Topic poster	Instructor
Dr. Kalman Abari	PhD	-	Х
Dr. Peter Battyanyi	PhD	Х	Х
Dr. Csanád Bertók	PhD	-	Х
Dr. Piroska Biró	PhD	Х	Х
Dr. Gyongyi Bujdosó	PhD habil.	Х	Х
Dr. Maria Csernoch	PhD habil.	Х	Х
Dr. Attila Fazekas	PhD habil.	-	Х
Dr. Attila Laszlo Gilanyi	PhD habil.	-	Х
Dr. Hannusch Carolin	PhD	Х	Х
Dr. Tamas Herendi	PhD habil.	-	Х
Dr. Geza Horvath	PhD habil.	Х	Х
Dr. Tamas Kadek	PhD	-	Х
Dr. Gergely Kovasznai	PhD habil.	-	Х
Dr. Andras Tibor Kruppa	DSc	Х	Х
Dr. Benedek Nagy	PhD habil.	Х	Х
Dr. Norbert Oláh	PhD	-	Х
Dr. Ildiko Papp	PhD habil.	-	Х
Dr. Attila Pethő	DSc MTA rt	-	Х
Dr. Andrea Pinter-Huszti	PhD habil.	-	Х
Dr. Hedvig Szabo	PhD	-	Х
Dr. Szilvia Szeghalmy	PhD	-	Х
Dr. George Vaszil	DSc	-	X
Bodroginé Dr. Marianna Zichar	PhD habil.	-	Х

# Subjects

	Subject name	Credit	Subject teacher
Compulsory elective subjects	Nonstandard Logics	2	Dr. Battyányi Péter
	Automata and Languages	2	Dr. Horváth Géza
	Unconventional Automata	2	Dr. Nagy Benedek
	Classical First-order Logic	2	Dr. Fazekas Attila
	Semantics of Programming Languages	2	Dr. Battyányi Péter
	Rough Set Theory	2	Dr. Kádek Tamás
	Biomolecular Computing	2	Dr. Vaszil György
	Cryptographic Protocols	2	Dr. Pintér-Huszti Andrea
	Finite Fields and Applications	2	Dr. Herendi Tamás
	Cryptographic Tools for IT Security	2	Dr. Kádek Tamás
	Information and Coding Theory	2	Dr. Pethő Attila
	Cryptographic Algorithms	2	Dr. Pethő Attila
Уe	Number Theory	2	Dr. Bertók Csanád
mpulsor	Blockchain Technology	2	Dr. Oláh Norbert
	Developing Computational Thinking Skills	2	Dr. Csernoch Mária
	Sprego - Programming in Spreadsheet Environment	2	Dr. Csernoch Mária
ŏ	Knowledge-Transfer Items in Teaching Informatics	2	Dr. Csernoch Mária
	Emerging Technologies in e-Learning: Platforms, Tools and	_	
	Methods in e-Learning	2	Dr. Bujdosó Gyöngyi
	Qualitative and Quantitative Research Methods in		
	Education	2	Dr. Biró Piroska
	Computer Graphics in Education	2	Dr. Papp Ildikó
	Theoretical Foundations of Virtual, Augmented and Mixed Reality	2	Dr. Gilányi Attila László
	Classical AI Algorithms	2	Dr. Kádek Tamás
	Quantum computers	2	Dr. Kruppa András Tibor
	Theory of Computability and Applications	2	Dr. Battyányi Péter
	Combinatorial and Algorithmic Properties of Formal Languages	2	Dr. Nagy Benedek
	Context-free and Context-sensitive Languages	2	Dr. Horváth Géza
	Automated Theorem Proving	2	Dr. Kádek Tamás
	The Theory and Implementation of SAT Solvers and Bit-Vector Logics	2	Dr. Kovásznai Gergely
cts	Introduction to Membrance Computing Automata Networks	2	Dr. Vaszil György Dr. Horváth Géza
	Data-Level Approaches for Imbalanced Datasets	2	Dr. Szeghalmy Szilvia
ns	Organizational and Legal Aspects of Data Protection	2	Dr. Szabó Hedvig
ive	Computational Number Theoretical and Algebraic Program Packages	2	Dr. Hannusch Carolin
Elective subje	Design and Analysis of Cryptographic Protocols	2	Dr. Pintér-Huszti Andrea
	Privacy Enhancing Technologies	2	Dr. Pintér-Huszti Andrea
	Virtual Reality for Supporting Knowledge Sharing	2	Dr. Bujdosó Gyöngyi
	Lean-oriented Digital Education	2	Dr. Csernoch Mária
	Knowledge Space Theory in Practice	2	Dr. Abari Kálmán
	Supporting Education with Digital Technologies	2	Dr. Biró Piroska
	Creative Problem Solving Based on Design Thinking	2	Dr. Zichar Marianna
	3D Modeling in Education	2	Dr. Papp Ildikó
	Applications of Virtual, Augmented and Mixed Reality	2	Dr. Gilányi Attila László