## **Doctoral program name**

Theoretical foundations and applications of information technology, artificial intelligence and stochastic systems

## **Program Leader**

Dr. István Fazekas

## **Objectives of Doctoral Programme**

The participating students should learn about the theoretical foundations of information technology and stochastic systems, get an idea of the possible applications of the theory and develop appropriate research skills to enrich the theory. Among the topics to be covered, priority is given to those that increase the quality and intelligence of computer services, thus directly satisfying the needs of the information society.

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

Modeling of complex systems: stochastic and computer models including machine learning tools. Scientific computing: solving statistical, numerical analysis and operations research problems, their application in the fields of natural and social sciences (meteorology, economics, ...). Investigation of operations research methods, their scientific and industrial applications. Stochastic models for describing temporal and spatial processes. Investigation of stochastic financial, insurance and other econometric models using statistical and machine learning methods. Mathematical background and applications of machine learning. Statistical, mathematical and software tools of business intelligence. Mathematical and computer analysis of asymptotic properties of stochastic models. Modeling of network evolution using random graphs and computer experiments.

Library informatics, metadata management; Web applications, web archiving, virtual reality. Information theory and history; digital media theory, digital reading and learning narratives; digital libraries, electronic collections, repositories.

## Members of the doctoral programme

Name	Academic degree	Topic poster	Instructor
Dr. Agnes Eva Baran	PhD, habil.	Х	Х
Dr. Sandor Baran	DSc, habil.	Х	Х
Dr. Gergo Bogacsovics	PhD	-	Х
Dr. Bujdosóné Dani Erzsébet	PhD, habil.	Х	Х
Dr. Maria Borbély Eszenyiné	PhD		Х
Dr. István Fazekas	DsC, habil.	Х	Х
Dr. József Mihály Gáll	PhD	Х	Х
Dr. Attila Gilanyi	PhD, habil.		Х
Dr. Sandor Kalai	PhD, habil.		Х
Dr. Martin Nemeth	PhD		Х
Dr. Margit Némethi-Takács	PhD		Х
Dr. Anett Racz	PhD, habil.	Х	Х
Dr. Patricia Agnes Szokol	PhD, habil.		Х
Dr. Tibor Gábor Tajti	PhD	Х	Х
Dr. Agnes Virag	PhD	Х	Х
Dr. Marta Viragos	PhD	Х	Х

# **Subjects**

	Subject name	Credit	Subject teacher
ıbjects	Scientific computing techniques	2	Dr. Agnes Eva Baran
	Stochastic models	2	Dr. József Mihály Gáll
	Statistical modeling	2	Dr. István Fazekas
	Multidimensional statistical analysis	2	Dr. Sandor Baran
	Chapters from the theory of stochastic processes	2	Dr. Sandor Baran
	Selected chapters from probability theory	2	Dr. István Fazekas
e sı	Machine learning basics	2	Dr. István Fazekas
ctiv	Machine learning applications	2	Dr. Agnes Eva Baran
ele	Large language models and agent systems	2	Dr. Tibor Gábor Tajti
ory	Modeling and optimization	2	Dr. Anett Racz
Compulsory elective subjects	Digital reading narratives, reading theories, e- literature	2	Dr. Bujdosóné Dani Erzsébet
	Information history	2	Dr. Bujdosóné Dani Erzsébet
	Metadata management and cataloging	2	Dr. Margit Némethi-Takács
	Web archiving	2	Dr. Martin Nemeth
	Library management: scientific communication, digital libraries, digital repositories management	2	Dr. Marta Viragos
ots	Stochastic optimization	2	Dr. Agnes Eva Baran
	Stochastic algorithms	2	Dr. Sandor Baran
	Optimization software and implementations	2	Dr. Anett Racz
	Decision models	2	Dr. Anett Racz
	Convergence of probability measures	2	Dr. István Fazekas
	Financial mathematics	2	Dr. József Mihály Gáll
	Insurance mathematics	2	Dr. József Mihály Gáll
tive subjects	Computer statistics	2	Dr. Patricia Agnes Szokol
ns (	Advanced collaborative learning methods	2	Dr. Tibor Gábor Tajti
tive	Artificial intelligence in practice	2	Dr. Gergo Bogacsovics
Elect	Digital communication	2	Dr. Agnes Virag
	Quality and knowledge management in a digital library environment	2	Dr. Maria Borbély Eszenyiné
	Digital media culture and media theory	2	Dr. Sandor Kalai
	Digital competences	2	Dr. Maria Borbély Eszenyiné
	Copyright in the digital world	2	Dr. Marta Viragos
	Virtual, augmented, mixed reality and their applications	2	Dr. Attila Gilanyi