

UNIVERSITY OF DEBRECEN
Doctoral School of Informatics

Doctoral Program Information Technology Systems and Networks with Industrial applications

Director of Doctoral Program

Objectives of Doctoral Program

Information Technology Systems and Networks subprogram: One of the main purposes of the program is to give firm and practical knowledge of advanced techniques of modeling, analysis, performance evaluating, maintaining, designing and creating complex information technology systems and networks to students intending to conduct research in this field. The modeling tools are based on the elements of the queueing theory. After completion of the courses students will be capable of applying the most important theoretical or experimental techniques in their chosen specific field and can start the research and practical part of their training. We study connection possibilities of information technology systems and their applications in architectural planning and maintenance. We examine transmission between information technology system with special attention on sound and video, including security questions as well. We also investigate reconfigurable embedded systems and sensor networks with emphasis on data acquisition and signal processing applications. We follow global trends of research and participate in international cooperations with the aim on applying theoretical result in practice.

Industrial and scientific applications of informatics subprogram: Studying the possibilities of interconnection between the elements of design, control and measuring systems, applications in engineering design, manufacturing, and maintenance, furthermore in the organisation of supply chains. Application of asymmetric parallel computers (GPU+CPU, FPGA+CPU) for data processing in manufacturing, supply and service processes. Modelling and simulation of industrial systems and processes. Optimization of products and technologies with IT support.

Academic and Research Fields

Queueing systems and their applications for performance evaluation of complex infocommunication systems: infocommunication networks, tool supported analysis of stochastic systems, modeling and analysis of information technology systems. Next generation networks, future Internet: application-centric design of wireless sensor platforms, QoS analysis of sensor networks, experimental measurement and analysis of network traffic, future Internet. Development of FPGA-based calculations: artificial neural networks hardware implementation using programmable logic devices, networked systems for calculations and measurements. Logic design with FPGA circuits, computer hardware modelling. Programming and testing properties of microcontrollers and embedded systems. Data transmission and communication between the elements of measuring systems. Developing effective solutions for industrial communication systems and digital manufacturing. Developing tools for condition monitoring and process monitoring. Integration of condition monitoring techniques into digital production systems. Process optimisation based on the integration of engineering design software and machine learning. Structure optimisation, analysis and modelling of mechanical properties of cellular structures. Measurement and analysis of noise propagation processes. Computer aided designing of gear pairs. Description of the connecting surface of the gear pairs using a mathematical model and special purpose software. Design and simulation of special gear manufacturing tools and clamping

UNIVERSITY OF DEBRECEN
Doctoral School of Informatics

devices. Analysis of the gear cutting technologies with IT support. Drive-train modelling and optimisation. Optimisation and control renewable energy systems. Complex design methods for mechatronics applications.

Participant Supervisors

Dr. Sztrik János, Dr. Oniga István, Dr. Gál Zoltán, Dr. Varga Imre, Dr. Kocsis Gergely, Dr. Szilágyi Szabolcs, Dr. Bérczes Tamás, Dr. Haller Piroska, Dr. Almusawi Husam Abdulkareem, Dr. Balajti István, Dr. Bodzás Sándor, Dr. Budai István, Dr. Husi Géza, Dr. Kocsis Dénes, Dr. Kocsis Imre, Dr. Mankovits Tamás, Dr. Pálinkás Sándor, Dr. Szemes Péter, Dr. Szíki Gusztáv Áron, Dr. Tóth János, Dr. Ailer Piroska, Dr. Tornai Róbert

Participant Tutors

Dr. Gál Zoltán, Dr. Oniga István, Dr. Sztrik János, Dr. Varga Imre, Dr. Bérczes Tamás, Dr. Buchman Attila, Dr. Kocsis Gergely, Dr. Kuki Attila, Dr. Szilágyi Szabolcs, Dr. Sütő József, Dr. Haller Piroska, Dr. Almusawi Husam Abdulkareem, Dr. Bodzás Sándor, Dr. Budai István, Dr. Husi Géza, Dr. Kocsis Dénes, Dr. Kocsis Imre, Dr. Krauszné Dr. Princz Mária, Dr. Mankovits Tamás, Nagyné Dr. Kondor Rita, Dr. Pálinkás Sándor, Dr. Szemes Péter, Dr. Szíki Gusztáv Áron, Dr. Tóth János

UNIVERSITY OF DEBRECEN
Doctoral School of Informatics

Courses of the Information Technology Systems and Networks subprogram

Codes	Courses	Credits	Type of Exam.	Lecture	Practice	Lab	Tutor	Scient. Grad.
	Compulsory courses							
	Routing and Switching	2	K	2	0	0	Dr. Gál Zoltán	
	Reconfigurable Embedded Systems based Cyber-Physical systems	2	K	2	0	0	Dr. Oniga István	
	Queueing Theory	2	K	2	0	0	Dr. Sztrik János	
	Network science	2	K	2	0	0	Dr. Varga Imre	
	Compulsorily eligible courses							
	Stochastic Modeling of Informatics Systems	2	K	2	0	0	Dr. Sztrik János	
	Analytic methods in stochastic modeling	2	K	2	0	0	Dr. Bérczes Tamás	
	Communication in the Internet of Things	2	K	2	0	0	Dr. Buchman Attila	
	Agent-based models and simulation methods	2	K	2	0	0	Dr. Kocsis Gergely	
	Tools for Network Modeling	2	K	2	0	0	Dr. Kuki Attila	
	Performance analysis of multipath infocommunication technologies	2	K	2	0	0	Dr. Szilágyi Szabolcs	
	Communication Mechanisms of the Wireless Sensor Networks	2	K	2	0	0	Dr. Gál Zoltán	
	Classification and Regression with Machine Learning	2	K	2	0	0	Dr. Sütő József	
	Advanced computer architectures	2	K	2	0	0	Dr. Varga Imre	
	Optional courses							

Criteria to complete the program:

Students of the doctoral subprogram have to get 8 credits by taking compulsory courses. After this they have to collect 4 credits by taking 2 compulsorily eligible courses. The last 4 credits can be get by taking further courses of the doctoral school or other doctoral schools. Before taking subjects students have to consult with their supervisor about the order and time of taking them.

UNIVERSITY OF DEBRECEN
Doctoral School of Informatics

Courses of the Industrial and scientific applications of informatics subprogram

Codes	Courses	Credits	Type of Exam.	Lecture	Practice	Lab	Tutor	Scient. Grad.
	Compulsory courses							
	IT applications in the development of business processes	2	V	2	0	0	Budai István	PhD
	Model Investigation of Technical Systems	2	V	2	0	0	Husi Géza / Szemes Péter	PhD/PhD
	Advanced signal processing methods in technical diagnostics	2	V	2	0	0	Kocsis Imre	PhD
	Automated technical systems	2	V	2	0	0	Korondi Péter	PhD
	Compulsorily eligible courses							
	Computer aided modelling, finite element analysis and simulation of gear pairs	2	V	2	0	0	Bodzás Sándor	PhD
	Computer aided manufacturing and analysis of manufacturing processes	2	V	2	0	0	Bodzás Sándor	PhD
	Decision Models and Applications	2	V	2	0	0	Budai István	PhD
	Computer Process Control	2	V	2	0	0	Husi Géza	PhD
	Modeling of Sound Propagation	2	V	2	0	0	Kocsis Dénes	PhD
	Modeling IT systems to support enterprise processes	2	V	2	0	0	Krauszne Princz Mária	PhD
	Engineering modelling, simulation of dynamic systems	2	V	2	0	0	Nagyné Kondor Rita / Szíki Gusztáv Áron	PhD/PhD
	Finite element modelling of metal forming processes	2	V	2	0	0	Pálinkás Sándor	PhD
	Embedded systems and wireless sensors networks	2	V	2	0	0	Buchman Attila	PhD
	Optional courses							

Criteria to complete the subprogram:

Students of the doctoral subprogram have to take the four compulsory courses of the program (8 credits) and – in accordance with the suggestions of the supervisor – further two compulsorily eligible courses (4 credits). Additional 4 credits should be obtained based on the guideline of the Doctoral School.