UNIVERSITY OF DEBRECEN
Doctoral School of Informatics

Complex exam major subject	Model investigation of Systems and Processes
Syllabus	1. Concepts, mathematical description of physical phenomena: Definition of the real physical system, Definition of signal, The inputs and outputs, The definition of the system and process, linear and non-linear systems, parameter and variable. 2. Theory of distributed and concentrated parametric description, deterministic and stochastic systems, Concept of causality, Deterministic description with lumped parameters, The concept of static systems, The concept of dynamic systems, Concept of time invariant and autonomous systems 3. General principles of dynamical systems: Linear, quantized, single in and output system, ARMA System, Linear, quantized, one input-output system, Generalized derivative. 4. Types of drives in process: features and principles, Drive Control Methods and Feedback Devices, control of process: P, I, D, PID, sliding mode. 5. Model investigation of Systems and Processes in Industry 4.0: ICT technologies converting to the IoT, The impact of information and communication technology, digital enterprise, integrated cyber physical systems, elements of I4.0, vision of manufacturing, RAMI 4.0
Bibliography	1. Alasdair Gilchrist : Industry 4.0: The Industrial Internet of Things Apress, 2016 2. Dr. Korondi Péter, Dr. Huba Antal, Graff József, Dr. Aradi Petra, Czmerk András, Bojtos Attila, Dr. Fekete Róbert, Dr. Lakatos Béla: Rendszertechnika MOGI 2014 3. Korondi P: Basic concepts, mathematical description of physical phenomena 4. Korondi Péter: Csúszómód-szabályozás a teljesítményelektronikában és mechatronikában Akadémiai Kiadó ISBN: 978 963 454 100 4, 2017 5. Alp Ustundag, Emre Cevikcan : Industry 4.0: Managing The Digital Transformation (Springer Series in Advanced Manufacturing) 1st ed. 2018 Edition 6. Husi Géza: Industry 4.0 DE MK 2016
Compulsory subjects for this major subject	Model Investigation of Technical Systems
Recommended subjects for this major subject	