

**RTU Course "Sensors and sensor networks"****33000 Faculty of Computer Science, Information Technology and Energy****General data**

Code	DST700
Course title	Sensors and sensor networks
Course status in the programme	Compulsory/Courses of Limited Choice
Responsible instructor	Dmitrijs Bļizņuks
Volume of the course: parts and credits points	1 part, 6.0 credits
Language of instruction	LV, EN
Annotation	In the study course many kinds technologies and implementations of sensor networks are observed. Special attention was attracted for advanced innovative technologies and implementations (as autonomous control, cognitive platforms, heterogeneous and cluster multilevel sensor networks), research and modeling techniques for architectural and infrastructure development. In the study course content are included sensor network design methods and service oriented architecture realization base topics. There are possibilities for student experimental and technological practice works. It is proposed sensor network control and management techniques which consisted with most popular methods and standards. The students are introduced with wireless sensor network diversity and self organization.
Goals and objectives of the course in terms of competences and skills	The aim of the study course is to prepare specialists who can use, find and develop solutions that promote the development of various processes rooted in the technology of all types of sensor networks. The tasks of the study course: - to develop the ability to analyse current protocols and choose the most appropriate for each specific task; - to develop the ability to appropriate sensor network architecture for the task; - to develop the ability to create a sensor data processing program for a microcontroller; - to teach how to create the electronic circuit diagram of sensors and microcontrollers.
Structure and tasks of independent studies	Students independently prepared for seminars and laboratory work. Before completing the laboratory work, the student must have prepared a theoretical part of the report with records of experimental results. Before the lecture, it is desirable to repeat the material of the previous lecture in order to be able to discuss the topic more actively.
Recommended literature	Obligātā/Obligatory: ACM Academic Initiative materials: <a href="http://portal.acm.org/dl.cfm">http://portal.acm.org/dl.cfm</a> , IEEE Academic Initiative materials, <a href="http://www.computer.org/portal/web/csdl">http://www.computer.org/portal/web/csdl</a> , DTSTK sagatavotie un izstrādātie mācību līdzekļi. V. Zagurskis, Bezvadu vides piekļuves vadības protokoli, 2005.g., 22.lpp., RTU, DITF, DADI, DTSTK, (elektr. vers.). V. Zagurskis, Pārklājums bezvadu speciālajos sensoru tīklos, 2006.g., 21.lpp., RTU, DITF, DADI, DTSTK, (elektr. vers.). V. Zagurskis, Bezvadu tehnoloģiju pielietošana sensoru tīklos, 2006.g., 99. lpp., RTU, DITF, DADI, DTSTK, (elektr. vers.). Papildu/Additional: V. Zagurskis, R. Kuzmenkovs, Harvardas arhitektūras RISC-procesori ar sadalītu datu un programmas atmiņas piekļuvi, (Laboratorijas darbi, mācību līdzekļi), 2008.g., 29. lpp. RTU, DITF, DADI, DTSTK, (elektr. vers.). Visi faili atrodas RTU ORTUS E-Studijas : Datoru tīklu un sistēmas arhitektūra - DST 450; Datoru tīkli un sistēmas - DST477 V.Zagurskis: <a href="https://moodle.rtu.lv/moodle/files/index.php">https://moodle.rtu.lv/moodle/files/index.php</a>
Course prerequisites	Academic (professional) bachelor degree of engineer science, native science or economic science.

**Course contents**

Content	Full- and part-time intramural studies		Part time extramural studies	
	Contact Hours	Indep. work	Contact Hours	Indep. work
Introduction sensor networks.	4	4	0	0
Sensor types.	6	6	0	0
Sensor measurements.	6	6	0	0
Signal conversion.	6	6	0	0
Digital signal processing.	6	6	0	0
Data transfer at sensor networks.	6	6	0	0
Data transfer protocols.	6	6	0	0
Transport level infrastructure.	4	4	0	0
Sensor network architecture.	6	6	0	0
Sensor network technology.	6	6	0	0
Sensor network access at TCP/IP networks.	6	6	0	0
Wireless sensor networks.	6	6	0	0

Heterogenous and cluster wireless sensor networks.	6	6	0	0
Security of sensor networks.	6	6	0	0
Total:	80	80	0	0

#### ***Learning outcomes and assessment***

Learning outcomes	Assessment methods
Is able to discuss the basic principles, advantages and limitations of sensor networks, knows the elements of infrastructure and technology life cycles.	Exam.
Is able to argue the need for the utilization (or non utilization) of network technologies depending on the type of production (business) process.	Practical works.
Using appropriate tools, is able to independently use ready-made methods and models to integrate production (business) processes, choosing the most appropriate for them in relation to the chosen goals.	Practical works.
Is able to monitor sensor network technology limitations for controlled industry processes.	Laboratory works.

#### ***Evaluation criteria of study results***

Criterion	%
Practical works	25
Laboratory works	25
Exam	50
Total:	100

#### ***Study subject structure***

Part	CP	Hours			Tests		
		Lectures	Practical	Lab.	Test	Exam	Work
1.	6.0	2.0	1.0	1.0		*	