

**RTU Course "Modern Production Technologies Basics"**

33000 Faculty of Computer Science, Information Technology and Energy

**General data**

Code	EEI503
Course title	Modern Production Technologies Basics
Course status in the programme	Compulsory/Courses of Limited Choice
Responsible instructor	Leonīds Ribickis
Academic staff	Aivars Pumpurs
Volume of the course: parts and credits points	1 part, 6.0 credits
Language of instruction	LV, EN
Annotation	Production processes, tasks of their automatization, elements of the automatization systems, structure, operational principles. Industrial sensors, actuating mechanisms, control elements. Programing and control of the robot motion path, structure of the conveyors and their control, SCADA system, communication nets. CNC machines and systems, their connection with technologic processes, control principles.
Goals and objectives of the course in terms of competences and skills	To teach the principles of automated production realization, base of the elements of production, algorithmization and programming of control of the processes.
Structure and tasks of independent studies	Homeworks in pneumatic drive, development of programmes, preparation of practical works, reporting on the works.
Recommended literature	N.Mozga, A.Kamols. Mašīnbūves elastīgās automatizētās ražošanas projektēšanas pamati. Rīgas Tehniskā universitāte. Mācību līdzeklis. RTU izdevniecība, Rīga-2006. - 92 lpp. Fr.Sudenieks, A.Kamols, O.Liniņš, I.Boiko. Ražošanas Automatizācijas pamati. Rīgas Tehniskā universitāte. Mašīnbūves tehnoloģijas institūts, Rīga-2006. - 119 lpp. Sabri Cetinkunt. Mechatronics. University of Illinois at Chicago. Jon Willwy & sons, inc. 2007 Festo Didactic. Pneumatika, 4th Edition. Mācību grāmata. - 219 lpp. A.Kaķītis, A.Galiņš, P.Leščevičs. Sensori un mērīšanas sistēmas. Latvijas Lauksaimniecības universitāte.Tehniskā fakultāte. Mehānikas institūts. Jelgava-2008. - 395 lpp. Lexicon of Control Technology. Festo Didactic KG, Esslingen, 1991. - 262 p.
Course prerequisites	Knowledges in electrical drives, electronic equipment and programming technologies.

**Course contents**

Content	Full- and part-time intramural studies		Part time extramural studies	
	Contact Hours	Indep. work	Contact Hours	Indep. work
Technological processes and tasks of their automatization.	2	0	0	0
Levels of automatization, structural schemes, elements.	2	0	0	0
Industrial sensors, types, principles of operation, parameters, application.	6	0	0	0
Types of executive machines - hydraulic, pneumatic, electric.	4	0	0	0
Introduction into the structure of pneumatic control system, parameters.	2	0	0	0
PLC programmable logic controllers.	4	0	0	0
Types of industrial communication, protocols of information exchange.	2	0	0	0
Industrial robots, programming of motion control.	4	0	0	0
Application of SCADA system for visualization and control of the processes.	2	0	0	0
Digital controlled machines with NC and CNC.	4	0	0	0
1st. Practical work. Introduction into the structure of training FESTO small-size-plant.	4	0	0	0
2nd. Practical work. Investigation of mechatronic module function in the system of FESTO modular production.	4	0	0	0
3rd. Practical work. Development, examining and diagnostics of the mechatronic modules algorithms.	4	0	0	0
4th. Practical work. Investigation of the conveyor operation.	4	0	0	0
5th. Practical work. Programming of industrial robots and control of the results.	4	0	0	0
6th. Practical work. Investigation of industrial sensors.	4	0	0	0
7th. Practical work. Control of pneumatic systems.	4	0	0	0
Final assessment.	4	0	0	0
Total:	64	0	0	0

**Learning outcomes and assessment**

Learning outcomes	Assessment methods
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The students should be able to characterise industrial production processes and elements of the production systems.	Assessment work in the elements of production processes and systems. Defended practical work N1. Passed an exam.
The students are able to distinguish and select different industrial sensors.	Defended practical work N2. Passed an exam.
The students can explain principles of operation and control of pneumatic systems.	Work with calculation of pneumatic drive. Passed an exam.
The students are able to explain SCADA and communication nets operation and structure.	Test on SCADA and communication. Passed an exam.
The students can program operation of conveyor and robots.	Defended practical works N4, N5. Passed an exam.
The students can explain operation and principles of programming of CNC machines.	Successfully passed exam.

***Study subject structure***

Part	CP	Hours			Tests		
		Lectures	Practical	Lab.	Test	Exam	Work
1.	6.0	2.0	2.0	0.0		*	