

## RTU Course "Basics of Computer Control"

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**General data**

Code	DDI711
Course title	Basics of Computer Control
Course status in the programme	Compulsory/Courses of Limited Choice
Responsible instructor	Dmitrijs Bļizņuks
Academic staff	Oļesja Grigorjeva Uldis Žaimis
Volume of the course: parts and credits points	1 part, 4.5 credits
Language of instruction	LV, EN
Annotation	The study course gives basic knowledge of computer control by looking at modern tendencies in the management and control of technological processes, emphasizing the common and different features of industry, agriculture, transport, services, etc. Students are introduced to the problems to be solved in each of the branches, with specific computer hardware, specific programming languages. Great attention is paid to the robotization of technological processes, intellectual management, decision making. Basic knowledge of industrial networks (Ethernet, Profinet, Profibus, etc.) is provided. Practical works ensure better understanding of the basics.
Goals and objectives of the course in terms of competences and skills	The goal of the study course is to provide knowledge about computer control guidelines, the problems to be solved in different industries, common solutions methods. The tasks are: - To teach solutions in the following areas: robotics, flexible management, smart home and office, adaptive and intellectual management. - To prepare specialists who can use the acquired knowledge in real tasks.
Structure and tasks of independent studies	Independent work is integrated with the acquisition of theoretical material and the performance of practical tasks. Students independently realize practical work for in-depth acquisition of key topics, based on detailed research and acquisition of system components and implemented projects in the field of computer control systems.
Recommended literature	Obligātā. / Obligatory: Edited By Chanchal Dey, Sunit Kumar Sen. Industrial Automation Technologies CRC Press, 2022 Frank Lamb. Industrial Automation: Hands-On McGraw-Hill Education, 2013 Papildu. / Additional: Spong, Mark W.. Robot modeling and control / Mark W. Spong, Seth Hutchinson, M. Vidyasagar. Hoboken, NJ : John Wiley & Sons, ©2006., [18], 478 lpp. : ilustrācijas ; 25 cm. Berger, Hans,. Automating with SIMATIC : integrated automation with SIMATIC S7-300/400 : controllers, software, programming, data communication, operator control and process monitoring /by Hans Berger. Erlangen : Publicis MCD Verlag, 2000., 214 lpp. : il. ; 25 cm.
Course prerequisites	Mathematics, Physics, Discrete Mathematics, Data structures.

**Course contents**

Content	Full- and part-time intramural studies		Part time extramural studies	
	Contact Hours	Indep. work	Contact Hours	Indep. work
Introduction to computer control	4	2	0	0
Computer control hierarchy	2	2	0	0
Control devices	4	4	0	0
Sensors and data processing	4	4	0	0
Industrial manipulators generations (programable, adaptive, intelligent, etc)	4	4	0	0
Computer control programming languages (IEC 61131-3)	8	8	0	0
Supervisory control and data acquisition (SCADA)	6	8	0	0
Human - machine interface (HMI)	4	4	0	0
Robot programming principles, direct and inverse control	4	4	0	0
Decision making in computer control systems (decision trees)	4	4	0	0
Control principles (PID, fuzzy logic)	4	4	0	0
Industrial networks (EthernetIP, Profibus, Profinet, etc)	4	4	0	0
Communication systems (OPC)	4	4	0	0
Prototyping	4	4	0	0
Total:	60	60	0	0

**Learning outcomes and assessment**

Learning outcomes	Assessment methods
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Is able to orient in the control of modern production processes and making decisions in computer control systems	Exam
Is able to analyze and explain the peculiarities of computer control in different applications in the fields	Exam
Is able to understand the robotic problems of different robot generations	Practical works
Is able to analyze and explain the difference between specific computer control hardware and everyday use hardware	Practical works

***Evaluation criteria of study results***

Criterion	%
Exam	50
Practical works	50
Total:	100

***Study subject structure***

Part	CP	Hours			Tests		
		Lectures	Practical	Lab.	Test	Exam	Work
1.	4.5	2.0	1.0	0.0		*	