RTU Course "Control Technique with Microprocessor Controllers"

33000 Faculty of Computer Science, Information Technology and Energy

General data

Code	EEP582
Course title	Control Technique with Microprocessor Controllers
Course status in the programme	Compulsory/Courses of Limited Choice
Responsible instructor	Leonīds Ribickis
Academic staff	Aivars Pumpurs Andrejs Potapovs Mihails Gorobecs
Volume of the course: parts and credits points	1 part, 4.5 credits
Language of instruction	LV, EN
Annotation	The technologic process continuous automatic control systems are studied. The basic principles and the necessary control elements for closed loop control are studied. The regulator programming for system optimum operation is studied.
Goals and objectives of the course in terms of competences and skills	The aim of the study course is to provide knowledge how to build the automation systems by using controllers. The tasks of the study course are to provide information about sensor and actuator interfacing to controller device and the programming of the controller to achieve the optimum operation of the system.
Structure and tasks of independent studies	Students need to prepare for each laboratory work, made pre-preparation of the algorithms and their possible computer realization with its checking before the lesson by teacher.
Recommended literature	Obligātā/Obligatory: 1. P.Apse-Apsīti, L.Ribickis, Viedās elektrotehnoloģijas un lietiskais internets, RTU Izdevniecība 2015-100lpp. 2.Galiņš A., Leščevics P. Programmējamie loģiskie kontrolleri: mācību līdzeklis. Jelgava: LLU, 2008. – 135 lpp. 3. Edited by M.Castilla, Control Circuits in Power Electonics, The Institute of Engineering and Technology - 2016, 442P. 4. Edited by F.Blaabjerg, Control of Power Electronic Converters and Systems, Elsevier, 2018-380p. Papildu/ Additional: 1. I. Raņķis, V.Bražis Regulēšanas teorijas pamati, Lekciju konspekts, Atkārtots izdevums, Rīgas Tehniskā universitāte Rīga, 2007. 2.J. A.Rehg, G.J.Sartori Industrial Electronics, Prentice Hall, NY, 2006, 862 p.
Course prerequisites	Industrial electronics, industrial process automation.

Course contents

Content	Full- and part-time intramural studies		Part time extramural studies	
	Contact Hours	Indep. work	Contact Hours	Indep. work
Technological processes, automation, automation tasks.	2	0	1	2
Technological process parameters, the analogue and digital processing.	2	0	2	2
Microprocessor controller design principles.	2	0	1	2
Microprocessor controller architecture.	2	0	1	2
Data input and output from the controller.	2	4	1	4
Controller programming basics.	4	4	2	6
Controller programming examples.	2	6	0	6
Lab.w. No. 1. Introduction to programming environment and commands.	4	4	2	8
Lab.w. No. 2. Algoritmization of technological process No.1.	4	8	2	8
Lab.w. No.3. Input of the algorithm of technological process No. 1 on the computer.	4	6	2	8
Lab.w. No.4. Control system test of technological process No. 1.	4	8	2	10
Lab.w. No.5. Elaboration and test of Control system of technological process No. 2.	4	8	2	10
Lab.w. No.6. Elaboration and test of Control system of technological process No. 3.	4	8	2	10
Lab.w. No.7. Elaboration and test of Control system of technological process No. 4.	4	8	2	10
Tests lesson.	4	8	2	8
Total:	48	72	24	96

Learning outcomes and assessment

Learning outcomes	Assessment methods
Is able to create a control algorithm for given technological process.	Accomplished homework.

Understands basic principles of controller programming.	A working controller program has been compiled for given control algorithm. Successfully accomplished laboratory work.
Is able to select the controller device for given automatization task.	Accomplished homework. Successfully accomplished laboratory work. Successfully passed exam.
Understands basic principles of process visualisation and can create user interface.	Successfully accomplished laboratory work. Successfully passed exam.
Understands the principles of closed control loop design.	Accomplished homework. Successfully accomplished laboratory work. Successfully passed exam.

Evaluation criteria of study results

Criterion	%
Laboratory works	30
Home works	30
Exam	40
Total:	100

Study subject structure

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