COURSE UNIT DESCRIPTION

Course unit title	Code
Robotic Systems Infrastructure Models	

Annotation
This module will provide students with knowledge of robotic cell structure and how robotic systems work. Knowledge of system component working principles, functions and interaction. Gain background knowledge of various types of sensors, digital electronics, industrial controlers, pneumatics and robotic manipulators.

Lecturer(s)	Department, Faculty
Coordinating: Dainius Balbonas **Other: Edvardas Bielskis**	Siauliai Academy

Study cycle	Type of the course unit
First cycle studies	Compulsory / Individual studies

Mode of delivery	Semester or period when it is delivered	Language of instruction
Face-to-face	3 semester	Lithuanian/English

Requisites	
Prerequisites:No	**Co-requisites (if relevant):No**

Number of ECTS credits allocated	Student's workload (total)	Contact hours	Individual work
5	**133**	**56**	**77**

Purpose of the course unit: programme competences to be developed		
To gain an understanding of the fundaments and structure of robotic industrial systems.		
Learning outcomes of the course unit	**Teaching and learning methods**	**Assessment methods**
Knowledge of the structure and operation of a robotic system.	Formal lecture, Interactive lecture	Examination
Ability to understand the principles of operation of individual components of a robotized system.	Formal lecture, Interactive lecture, Laboratory classes, Library / information retrieval tasks, One-to-one tutorials	Examination, Individual homework, Laboratory examination
Ability to analyze interactions between components of robotic systems..	Interactive lecture, Library / information retrieval tasks, One-to-one tutorials	Examination, Individual homework

Course content: breakdown of the topics	Contact hours							Individual work: time and assignments	
	Lectures	Tutorials	Seminars	Workshops	Laboratory work	Internship/work placement	**Contact hours, total**	**Individual work**	**Assignments**
Introduction to Industrial Robotics.	2	-	-	-		-	**2**		Study of the presented literature, preparation for laboratory works. Searching for information in various sources
Sensors are used in robotic systems.	6	-	-	-	8	-	**14**	**17**	
Digital Logic and controllers.	4	-	--	-	6	-	**10**	**14**	
Pneumatic systems.	4	-	-	-	-	--	**4**	**10**	
Robotic manipulator and its structure.	4	-	-	--	6	-	**10**	**13**	
Interaction of components of a robotized system.	4	-	-	-	4	-	**8**	**10**	
Safety systems	4	-	-	-	4	-	**8**	**13**	
Total	**28**	**-**	**-**	**-**	**28**	**-**	**56**	**77**	

Assessment strategy	Weight %	Deadline	Assessment criteria
Defence of the individual homework	25	Till the end of the smester	Scope and completeness of the work, as well as the quality of the written work are assessed. It is possible to score 25 points.
Defense of laboratory works	25	Time during the semester	The quality of laboratory work reports is evaluated, 10 points can be collected (max 2 point from each laboratory). Evaluated answers to the questions asked during the laboratory defense year, can be scored 15 points (max 3 point from each laboratory). Total 25 points from laboratory defense.
Exam	50	Time during the session	During the exam, the students solves a test of 25 closed type questions and completes one practical task. The value of each closed question is 1 point, the value of the practical task is 25 points (the completed task is 25 points, the incomplete task is evaluated in steps by 5 points (25, 20, 15 and so on)). The maximum grade of the exam is 50 points (25 for the first part and 25 for the second part). Final evaluation. The system of ten grades and gathered evaluation system are being employed. The system of ten grades and gathered evaluation system are being employed. Individual homework (25%), reporting for laboratory work (25%), exam (50%).

Author	Publishing year	Title	Issue of a periodical or volume of a publication; pages	Publishing house or internet site
Required reading				
S. Bouchard	2017	Lean Rorobtics. A guide to making robots work in your Factory		Samuel Bouchard https://leanrobotics.org/
J. Fraden	2010	Handbook of Modern Sensors. Physics, Designs, and Applications		Springer, (electronic version)
D. Balbonas, E. Bielskis	2019	Robot Maitenance Training material		

		medžiaga (electronic version).).		
W. Bolton	2006	Programmable logic controllers		Amsterdam, Elsevier
Recommended reading				
N. Ndjountche	2016	Digital Electronics 1 (Vol. 1)		John Wiley & Sons, Incorporated (electronic version)
S. Ločs, P. Drozdovs.	2019	Maintenance of Industrial Robot. Training material medžiaga (electronic version).		
K. Iniewski.	2017	Smart Sensors for Industrial Applications.		CRC Press
R. Towers, L. Ross, J. Masterson, S. Fardo	2010	Robotics: Theory and Industrial Applications.		Goodheart-Wilcox Publisher