



COURSE UNIT DESCRIPTION

Course unit title	Code
Frameworks of Robotic Systems	

Annotation
Concepts and architectures for developing frameworks for robotic systems. Robot operating system ROS. Types of ROS components and their interactions. Development of ROS components. Testing of ROS components and their systems. Simulators. Variety of ROS components. Examples of robots with ROS.

Lecturer(s)	Department, Faculty
Coordinating: Assoc. Prof. Dr. Gintautas Daunys	Siauliai Academy, Višinskio 25, LT-76352, Šiauliai
Other:	

Study cycle	Type of the course unit
First	Optional

Mode of delivery	Semester or period when it is delivered	Language of instruction
Face-to-face	4 th semester	Lithuanian and English

Requisites	
Prerequisites: Programming in C or Python	Co-requisites (if relevant):

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		
The aim is to develop the skills of robotic systems design by mastering their development frameworks.		
Learning outcomes of the course unit	Teaching and learning methods	Assessment methods
Knowledge about robotic system frameworks	Lectures, Laboratory works	Test
Design software components of robotic systems	Lectures, Laboratory works	Defence of laboratory works
Design communication of robotic system components	Lectures, Laboratory works	Defence of laboratory works
Simulate operation of robotic systems	Lectures, Laboratory works	Defence of laboratory works

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
1. Concepts and architectures of robotic systems design frameworks	2				0		2	8	Search of references about

									robotic systems frameworks.
2. Robot operation system ROS	4				6		10	10	ROS installation and configuration
3. Design fundamentals of ROS components	4				6		10	10	ROS Publisher and subscriber development in ROS.
4. Communications of ROS components	4				6		10	10	Design of ROS services. Design of parameters server.
5. Simulation of robotic systems	4				10		14	12	Simulation of robotic system using Gazebo.
6. Analysis of examples of robotic systems on ROS basis	10				0		10	10	Search of references.
7. Preparation for exam								17	
Total	28				28		56	77	

Assessment strategy	Weight %	Deadline	Assessment criteria
Assignments of topic 2	15	Week 5	Assessment by grade in 10 point system. All assignments are obligatory. The cumulative score is calculated only when all interim assignments have been evaluated.
Assignments of topic 3	15	Week 8	
Assignments of topic 4	15	Week 11	
Assignments of topic 5	15	Week 14	
Theory of topics 1-5	40	Exams session	Test with 8 open-ended questions. The sum of question values is 10 points.

Author	Publishing year	Title	Issue of a periodical or volume of a publication; pages	Publishing house or internet site
Required reading				
Aaron Martinez, Enrique Fernández, and Aaron Martinez	2013	Learning ROS for Robotics Programming		Packt Publishing
Recommended reading				
		ROS documentation		http://wiki.ros.org/
		Programming for Robotics - ROS		https://rsl.ethz.ch/education-students/lectures/ros.html
Kumar Bipin	2018	Robot Operating System Cookbook		Packt Publishing