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on _____

Logic and Programming (Arduino platform)
LV: Loģika un programmēšana (Arduino platforma)

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LAIS course code	
Form of evaluation	Exam
Academic credit points (ECTS credit points)	3 ECTS
The total number of contact lessons	16
The number of lectures	6
The number of practical classes	10
Prerequisites	Basic programming skills
Part of the study program	Industry study courses

Introduction and objective of the study course

This is a practical course made to introduce the students with the capabilities of Arduino, an open-source computer hardware/software platform for building digital devices and interactive objects that can sense and control the physical world around them.

This course incorporates a Project-Oriented Problem Based Learning (POPBL) model that is intended to align students' views with industry needs, which ensures that the student will gain necessary practical experience and knowledge throughout realistic project work.

This course will introduce the students with the fundamental logic and programming concepts, which will be immediately applied on an Arduino microcontroller with several exercises and projects. During this course the students will learn how to work with Arduino microcontroller, create electronic circuits and apply C/C++ programming language for solving real-life problems of various scenarios.

Study results

Having acquired the study course, students are expected to gain the following competences and skills:

- Capability of distinguishing tasks that can be solved using Arduino platform;
- Understanding of Arduino sketch structure and flow;
- Understanding the best practice concepts for programming and prototyping;
- Capability of building their own innovative sensor project with Arduino, and apply their acquired knowledge from other courses in practice;
- Ability to use a ‘sketching’ approach; adapt fragments of more complex programs and use existing libraries to achieve desired behavior;
- Ability to construct simple circuits necessary for connecting sensors and actuators to Arduino;
- Awareness of hardware capabilities and limitations of a microcontroller;
- Skills of debugging, testing, optimizing and documenting embedded software;

Organization mode of students’ individual work

The independent work of students includes:

- a regular learning of the course by using lecture materials, study literature, internet resources and teamwork;
- course project development;
- work with various libraries,
- preparations for the exam.

Evaluation of study results

The final result is made of:

- Team projects and homework 20%,
- Milestone tests 20%,
- Course paper 20%,
- Final exam 40%.

Study course outline

No.	Title of the topic
1.	Introduction to Arduino as a development platform.
2.	Analog and digital signals in real world applications.
3.	Multitasking with Arduino.
4.	Prototyping and building sensor projects.
5.	Interfacing with Java.
6.	Displaying and processing sensory data.
7.	Building innovative sensory devices (teamwork projects).

Study course schedule

No. of the class	Title of the topic	Type of class, amount of academic hours
1.	Introduction to Arduino as a development platform.	1x lecture, 1x practical class
2.	Analog and digital signals in real world applications.	1x lecture, 1x practical class

No. of the class	Title of the topic	Type of class, amount of academic hours
3.	Multitasking with Arduino.	1x lecture, 1x practical class
4.	Prototyping and building sensor projects.	1x lecture, 1x practical class
5.	Interfacing with Java.	1x lecture, 1x practical class
6.	Displaying and processing sensory data.	1x lecture, 1x practical class
7.	Building innovative sensory devices (teamwork projects).	2x practical classes / laboratory work
8.	Course summary. Preparations for the exam.	2x practical class

Basic literature

Brian W. Evans, *Arduino Programming Notebook*, 2007.

Scott Fitzgerald and Michael Shiloh, *Arduino Projects Book*, 2012.

Julien Bayle, *C Programming for Arduino*, 2013.

Other sources of information

Developer sites:

<https://create.arduino.cc/projecthub> - Arduino Project Hub;

<https://www.arduino.cc/> - Official Arduino web resource;

<https://www.hackster.io/arduino/projects> - Hackster.io, a division of Avnet, is the world's fastest growing developer community for learning, programming, and building hardware.