GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Experimentarium I, PG_00068287		
Field of study	Biomedical Engineering		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2026/2027
Education level	first-cycle studies	Subject group	Optional subject group Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	4	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Chemistry and Technology of Functional Materials -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Radosław Pomećko	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	0.0	0.0	30.0	0.0	0.0	30

E-learning hours included: 0.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	30	2.0	43.0	75

Subject objectives

The aim of the course is to develop practical skills in using controllers and sensors to carry out planned physico-chemical experiments. By designing and conducting their own experiments, students will become familiar with the capabilities of the Arduino platform and its accompanying sensors.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U04] can apply knowledge of programming methods and techniques as well as select and apply appropriate programming methods and tools in computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study	The student is able to propose a set of sensors that enable the control of a conducted experiment. The student applies programming knowledge to manage the design and execution of laboratory experiments	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject
[K6_U09] can carry out a critical analysis of the functioning of existing technical solutions and assess these solutions, as well as apply experience related to the maintenance of technical systems, devices and facilities typical for the field of studies, gained in the professional engineering environment	The student is familiar with and effectively applies established technical solutions to control and carry out planned experiments.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools
[K6_U03] can design, according to required specifications, and make a simple device, facility, system or carry out a process, specific to the field of study, using suitable methods, techniques, tools and materials, following engineering standards and norms, applying technologies specific to the field of study and experience gained in the professional engineering environment	The student is able to design an experiment in order to obtain data of interest. The student can select an appropriate set of sensors and suitable tools for the designed experiment.	[SU5] Assessment of ability to present the results of task [SU1] Assessment of task fulfilment

<table>
<tr><td>Subject contents</td><td>Course content – laboratory
1.
Experiment purpose, execution, analysis
2.
Arduino Platform capabilities, extensions, examples of applications
3.
Arduino Programming simple exercises and experiments
4.
Classical Chemistry and Physics Experiments examples include the pendulum, light dispersion phenomena, etc.; description of conducted measurements, error analysis, methods for increasing accuracy
5.
Measuring Physical Parameters using sensors available on the Arduino platform
6.
Designing and Conducting Classical Experiments with measurement systems based on the Arduino platform. Is it only improved accuracy, or are entirely new data being obtained?</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td></td><td>100.0%</td><td>40.0%</td></tr><tr><td></td><td>100.0%</td><td>60.0%</td></tr></table></td></tr>
<tr><td>Recommended reading</td><td><table><tr><td>Basic literature</td><td>"Arduino Cookbook Recipes to begin, expand, and enhance your projects", M.Margolis, B.Jepson N.R.Weldin, O'Reilly, 2020. Ed. III

"Arduino Playground - Geeky projects for the experienced maker", A.Warren, No Strach Press 2017</td></tr><tr><td>Supplementary literature</td><td>Advanced Arduino Techniques in Science, R.J. Smythe Apress 2021

Scientific Arduino Programming, G.Organtini, INFN Roma 2016</td></tr><tr><td>eResources addresses</td><td></td></tr></table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>During the course, students will carry out the following experiments, among others:

- Determining gravitational acceleration using a mathematical pendulum

- Measuring the angle of total light reflection depending on the density of the medium

- Dispersion of white light and spectroscopy

- Determining the surface tension of solutions</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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