



Subject card

Subject name and code	Experimentarium I, PG_00068287						
Field of study	Biomedical Engineering, Biomedical Engineering, Biomedical Engineering						
Date of commencement of studies	October 2026	Academic year of realisation of subject				2027/2028	
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		

Subject contents	<p>Course content – laboratory</p> <ol style="list-style-type: none"> 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? 											
Prerequisites and co-requisites												
Assessment methods and criteria	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 40%;">Subject passing criteria</th> <th style="width: 30%;">Passing threshold</th> <th style="width: 30%;">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td></td> <td style="text-align: center;">100.0%</td> <td style="text-align: center;">40.0%</td> </tr> <tr> <td></td> <td style="text-align: center;">100.0%</td> <td style="text-align: center;">60.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade		100.0%	40.0%		100.0%	60.0%
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Recommended reading	Basic literature	<p>"Arduino Cookbook Recipes to begin, expand, and enhance your projects", M.Margolis, B.Jepson N.R.Weldin, O'Reilly, 2020. Ed. III</p> <p>"Arduino Playground - Geeky projects for the experienced maker", A.Warren, No Strach Press 2017</p>										
	Supplementary literature	<p>Advanced Arduino Techniques in Science, R.J. Smythe Apress 2021</p> <p>Scientific Arduino Programming, G.Organtini, INFN Roma 2016</p>										
	eResources addresses											
Example issues/ example questions/ tasks being completed	<p>During the course, students will carry out the following experiments, among others:</p> <ul style="list-style-type: none"> - 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 											
Practical activities within the subject	Not applicable											

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