GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Electronic circuits, PG_00064046		
Field of study	Technical Physics		
Date of commencement of studies	October 2025	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	3	Language of instruction	Polish
Semester of study	5	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Division of Electrochemistry and Surface Physical Chemistry -> Institute of Nanotechnology and Materials Engineering -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Ryszard Barczyński	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	15.0	15.0	0.0	45

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	45	5.0	50.0	100

Subject objectives

The aim of this course is to familiarize students with basic electronic circuits implemented using operational amplifiers. Particular attention is paid to circuits found in measurement systems.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U05] designs and builds a simple measuring device	The student independently builds a circuit used in measurement technology using an operational amplifier.	[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
[K6_W06] has knowledge of electronics	The student knows the principles of operation and properties of basic electronic components and systems.	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects
[K6_U04] plans and conduct experiments, critically analyzes their results, draw conclusions and forms opinions, has laboratory work experience	The student designs and builds an electronic system used in measurement technology, tests and analyzes its parameters and characteristics.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task
[K6_W07] has knowledge of the construction and operation of physical instruments, measurement and research equipment	The student analyzes and describes the principle of operation of individual elements of measuring equipment.	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects

<table>
<tr><td>Subject contents</td><td>Course content – lecture
* Amplifier as a quad, feedback, amplifier stability. * Fulfillment of degrees
amplifiers on an operational amplifier, sum amplifier, integrator, derivative circuit,
current-voltage converter. * Selective amplifiers, active RC filters. * Non-linear analog blocks
functional. * Broadband and power amplifiers. * RC, LC and quartz generators. * Layouts
impulse, flip-flop. * Power supply systems, linear and impulse voltage stabilizers * Digital blocks
functional, synthesis of combinational and sequential logic circuits.
Course content – laboratory
Construction of basic electronic circuits using operational amplifiers.
Course content – project
Designing a system (e.g. an anti-aliasing filter) based on assumed parameters, Construction and testing of a prototype.</td></tr>
<tr><td>Prerequisites
and co-requisites</td><td>None.</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>Project</td><td>51.0%</td><td>25.0%</td></tr>
<tr><td>Lectures</td><td>51.0%</td><td>25.0%</td></tr>
<tr><td>Tutorial</td><td>51.0%</td><td>25.0%</td></tr>
<tr><td>Laboratory</td><td>51.0%</td><td>25.0%</td></tr>
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</td></tr>
<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>* WWW site * Michał Polowczyk, Elektronika dla fizyków, PWN Warszawa * P. Horowitz, W.
Hill, Sztuka elektroniki, WKŁ 2003 * U. Tietze, Ch. Schenk, Układy półprzewodnikowe</td></tr>
<tr><td>Supplementary literature</td><td>* Ben G. Streetman, Przyrządy półprzewodnikowe * Ch.L. Alley, K.W. Atwood, Elementy i układy półprzewodnikowe * Behzad Razavi, Fundamentals of microelectronics, Wiley 2008. * Mirosław Rusek, Jerzy Pasierbiński, Elementy i układy elektroniczne w pytaniach i odpowiedziach, NT Warszawa 2006.</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
</table>
</td></tr>
<tr><td>Example issues/
example questions/
tasks being completed</td><td>Which goal cannot be achieved by using negative feedback in an amplifier circuit?
A) Reducing the sensitivity of the amplifier to the spread of element parameters. B) Reduction
non-linear distortions. C) Increase the gain. D) Widening the bandwidth
amplifier.
To obtain a 1V signal at the output of a certain differential amplifier, you can apply it between...
its inputs have a 1mV signal. When we change the supply voltage by 1V, the output voltage will change by 10mV. The amplification factor of this amplifier is therefore...
A) 120dB. B) 40dB. C) 60dB. D) 90dB.</td></tr>
<tr><td>Practical activites within
the subject</td><td>Not applicable</td></tr>
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