GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Analog Nonlinear Circuits, PG_00067040		
Field of study	Electronics and Telecommunications		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2028/2029
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	1.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Microelectronic Systems -> Faculty of Electronics Telecommunications and Informatics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Bogdan Pankiewicz	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	0.0	0.0	0.0	15

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	15	1.0	9.0	25

Subject objectives

The aim of the course is to discuss the structure and properties of nonlinear electronic circuits, with particular emphasis on their implementation within integrated circuit structures.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W03] knows and understands, to an advanced extent, the construction and operating principles of components and systems related to the field of study, including theories, methods and complex relationships between them and selected specific issues - appropriate for the curriculum	The student knows the structure and parameters of basic analog nonlinear electronic circuits, as well as their applications.	[SW1] Assessment of factual knowledge
[K6_W10] knows and understands, to an advanced extent, the parameters, functions, and methods of analysis, design, and optimization of electronic circuits and systems, the definitions of error and measurement uncertainty, measurement methods, including time, frequency, and phase measurements, the properties of converters, and methods of digital signal processing, as well as the basic processes occurring in the life cycle of technical devices, objects, and systems, and methods of supporting processes and functions, specific to the field of study	The student knows the structure and parameters of basic analog nonlinear electronic circuits, as well as their applications.	[SW1] Assessment of factual knowledge

<table>
<tr><td>Subject contents</td><td>Course content – lecture
The lecture will cover the following topics:
1. Amplitude detectors.
2. Frequency detectors.
3. Phase detectors.
4. Phase and frequency detectors.
5. VCO (Voltage-Controlled Oscillators).
6. General structure of a Phase-Locked Loop (PLL).
7. Stability analysis of the PLL.
8. DLL (Delay-Locked Loop) circuits.
9. Applications of PLL and DLL systems.
10. BANDGAP reference voltage source.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Basic knowledge of circuit theory and the properties of electronic components</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>Homework and attendance</td><td>50.0%</td><td>50.0%</td></tr>
<tr><td>Midterm colloquium</td><td>50.0%</td><td>50.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>1) Paul R. Gray, Paul J. Hurst, Stephen H. Lewis, Robert G. Meyer: "Analysis and Design of Analog Integrated Circuits", Wiley, 2024.
2) Niedźwiecki M, Rasiukiewicz M.: "Nieliniowe elektroniczne układy analogowe", WNT 1991.</td></tr>
<tr><td>Supplementary literature</td><td>No requirements</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td></td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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