GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Discrete Time Systems, PG_00048111		
Field of study	Electronics and Telecommunications		
Date of commencement of studies	October 2024	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	4	Language of instruction	Polish
Semester of study	7	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Microelectronic Systems -> Faculty of Electronics, Telecommunications and Informatics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Grzegorz Blakiewicz	
	Teachers	dr hab. inż. Grzegorz Blakiewicz	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	15.0	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	18.0	50

Subject objectives

Gain knowledge on construction and principle of operation of analog functional blocks in discrete-time systems. Gain skills to design, analysis and computer simulations of analog discrete-time functional blocks.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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	In laboratory student practiced design and computer simulation techniques of discrete-time functional blocks.	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment
[K6_W32] Knows the parameters, functions and methods of analysis, design and optimization of analogue and digital circuits and electronic systems	Student gained knowledge about basic analog discrete-time functional blocks.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge

Subject contents

1. Basic characteristics of integrated systems and CMOS technology
2. Characteristics of switched capacitor circuits
3. Switched capacitor resistance emulation
4. The time domain analysis of switched capacitor circuits
5. Switched capacitor amplifiers
6. Switched capacitor integrators
7. Z-domain models of switched capacitor circuits
8. Application of z-domain models to SC circuits analysis
9. Simulation of switched capacitor circuits
10. First-order switched capacitor filters
11. Characteristics of analogue-digital and digital-analogue
12. A survey of selected analogue-digital converter architectures
13. A survey of selected digital-analogue converter architectures
14. A survey of selected sigma-delta modulator architectures
15. An example of implementation of a digital-analogue converter with a sigma-delta modulator
16. An example of implementation of a analogue-digital converter with a sigma-delta modulator
17. Introduction to digital modulation and demodulation
18. Final test

<table>
<tr><td>Prerequisites and co-requisites</td><td colspan="3">No requirements</td></tr>
<tr><td>Assessment methods and criteria</td><td colspan="3"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Practical exercise</td><td>50.0%</td><td>30.0%</td></tr>
<tr><td>Midterm colloquium</td><td>50.0%</td><td>70.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">P. E. Allen, D. R. Holberg „CMOS Analog Circuit Design”, Oxford University Press, New York 2002.</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">J. J. Mulawka, „Układy mikroelektroniczne z przełączanymi pojemnościami”, WKŁ, Warszawa 1987.

P. E. Allen, E. Sanchez-Sinencio, „Switched Capacitor Circuits”, VNR, New York 1984.</td></tr>
<tr><td>eResources addresses</td><td colspan="2">Adresy na platformie eNauczanie:</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3"></td></tr>
<tr><td>Work placement</td><td colspan="3">Not applicable</td></tr>
</table>