GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Electronic Circuits, PG_00047559
Field of study	Automatic Control, Cybernetics and Robotics

Date of commencement of studies	October 2024	Academic year of realisation of subject	2025/2026
Education level	first-cycle studies	Subject group	Obligatory subject group 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	3	ECTS credits	3.0
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. Bogdan Pankiewicz
	Teachers	dr hab. inż. Bogdan Pankiewicz

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	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	3.0	42.0	75

Subject objectives	Knowledge of methods of analysis and design of analog electronic circuits structures based on the MOSFED, JFET and biopolar transistors.

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 classifies and provides fundamental analog structures and their description in the form of fundamental performance parameters.	[SW1] Assessment of factual knowledge
	[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 defines and explains performance parameters of analog and digital electronic circuits. The student indicates and explains applications of analog and digital electronic circuits.	[SU4] Assessment of ability to use methods and tools

Subject contents	1. Introduction, categories of the electronic circuits 2. Power supply and biasing techniques for bipolar and MOS transistors 3. Models, DC and AC analysis of bipolar and MOS amplifiers 4. Frequency-domain analysis of bipolar and MOS amplifiers 5. Bipolar and CMOS differential amplifiers - properties and integrated circuit (IC) realizations 6. Functional blocks for linear ICs realized in bipolar and CMOS technologies 7. Operational amplifiers and their applications 8. Analytical models and analysis of IC amplifiers (bipolar and CMOS) 9. IC wideband amplifiers (bipolar and CMOS) 10. CMOS operational transconductance and transresistance amplifiers. 11. IC bandpass amplifiers 12. IC power amplifiers 13. Amplifiers with negative feedback loop. 14. Design of bipolar and CMOS amplifiers with negative feedback 15. Noise properties of active circuits 16. Synthesis methods for continuous-time active filters 17. Switched capacitor and switched current filters 18. CMOS programmable analog arrays - properties and applications 19. Analog Application Specific Integrated Circuit (ASIC) design 20. IC layout and design verification tools 21. Analog multiplier and its applications 22. Amplitude , frequency and phase detectors 23. Oscillations in the lossy resonance circuit. Negative resistance . Feedback-type oscillator structure. 24. Well-known feedback-oscillator structures 25. Relaxation-mode oscillators 26. Oscillators based on a high-Q resonator . Crystal-oscillator. 27. Signal generation in the phase-locked loop 28. Power supply rectifiers and filters. 29. Analog voltage regulators 30. Switching DC/DC and AC/DC converters.
Prerequisites and co-requisites	

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Midterm colloquium	50.0%	100.0%

Recommended reading	Basic literature	Guziński A: "Liniowe elektroniczne układy analogowe", WNT, 1994 Tietze U., Schenk Ch.:"Układy półprzewodnikowe", WNT2009 Sedra A.S., Smith K.C.: "Microelectronic circuits", Oxford University Press, New York, Oxford, 2004
	Supplementary literature	No requirements
	eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	
Work placement	Not applicable