GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Analog Electronic Circuits, PG_00047538		
Field of study	Electronics and Telecommunications		
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 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	exam
Conducting unit	Department of Microelectronic Systems -> Faculty of Electronics, Telecommunications and Informatics		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Stanisław Szczepański	
	Teachers	prof. dr hab. inż. Stanisław Szczepański	

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 MOSFET, JFET and bipolar transistors.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W05] Knows and understands, to an advanced extent, methods of supporting processes and functions, specific to the field of study	The student describes and classifies the methods of supporting the design and optimization of basic analog structures and digital electronic circuits.	[SW1] Assessment of factual knowledge
[K6_W06] Knows and understands the basic processes occurring in the life cycle of devices, facilities and systems specific to a given field of study.	The student describes the basic processes in the life cycle of devices using analog and digital electronic circuits.	[SW1] Assessment of factual knowledge
[K6_U06] can analyse the operation of components, circuits and systems related to the field of study, measure their parameters and examine technical specifications	The student classifies and describes basic structures of analog and digital electronic circuits. The student defines and explains the technical parameters of analog and digital electronic circuits. The student indicates and explains the applications of analog and digital electronic circuits.	[SU4] Assessment of ability to use methods and tools
[K6_W32] Knows the parameters, functions and methods of analysis, design and optimization of analogue and digital circuits and electronic systems	Student defines and explains technical parameters and functions of analog and digital electronic circuits.	[SW3] Assessment of knowledge contained in written work and projects
[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
Written exam	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