GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Electronic Circuits, PG_00047760		
Field of study	Biomedical Engineering		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2024/2025
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	2.0	43.0	75

Subject objectives

Knowledge of methods on 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_W04] knows and understands, to an advanced extent, the principles, methods and techniques of programming and the principles of computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study, and organisation of systems using computers or such devices	Student defines and explains technical parameters of computers and electronic instruments based on the microprocessors as well as analog and digital programmable circuits. The student indicates and uses computer techniques and programmable electronic techniques.	[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

<table>
<tr><td>Subject contents</td><td>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.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></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>midterm colloquium</td><td>50.0%</td><td>100.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>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</td></tr>
<tr><td>Supplementary literature</td><td>No requirements</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:
Liniowe i nieliniowe układy elektroniczne (podstawy) - 2024/25(zima) - Moodle ID: 39570
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=39570</td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td></td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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