GDAŃSK UNIVERSITY
OF TECHNOLOGY

Subject card

Subject name and code	Semiconductor Devices, PG_00047563		
Field of study	Automatic Control, Cybernetics and Robotics		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2026/2027
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	3	ECTS credits	1.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department Of Microelectronic Systems -> Faculty Of Electronics Telecommunications And Informatics -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Łukasz Gołuński	
	Teachers	dr inż. Łukasz Gołuński	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	15.0	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	Learning through experiments of the operation principles of basic semiconductor devices and learning the methods of measuring their chatacteristics, as well as learning methods of determining values of their equivalent circuits, useful in designing of electronic circuits.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U02] can perform tasks related to the field of study in an innovative way as well as solve complex and nontypical problems, applying knowledge of physics, in changing and not fully predictable conditions	Student measures and analyzes static characteristics of diodes and transistors. Student measures and analyzes processes of switching in circuits with diodes or with transistors. Student measures and analyzes small signal amplifying properties of transistors in dependence on frequency. Student measures characteristics and analyzes properties of electroluminescent diodes. Student measures characteristics and analyzes operation of photodiodes, photoelements and optical relays in application circuits.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information
[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	Student measures and analyzes static characteristics of diodes and transistors. Student measures and analyzes processes of switching in circuits with diodes or with transistors. Student measures and analyzes small signal amplifying properties of transistors in dependence on frequency. Student measures characteristics and analyzes properties of electroluminescent diodes. Student measures characteristics and analyzes operation of photodiodes, photoelements and optical relays in application circuits.	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools

Subject contents	Static characteristics of semiconductor diodes. Switching characteristics of semiconductor diodes. Properties of stabilization diodes. IV characteristics of field effect transistors and extraction of parameters for their equivalent circuits. Small signal operation of transistors for small and medium frequencies. Pulse operation and models of transistors. Characteristics and models of electroluminescent diodes and photodiodes.
Prerequisites and co-requisites	

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Reports of experiments	50.0%	100.0%

Recommended reading

Basic literature	Our laboratory instruction booklets. Ch. Papadopoulos, "Solid-State Electronic Devices: An Introduction", Springer 2014 J.-P. Colinge, C.A. Colinge, "Physics of Semiconductor Devices", Springer 2002
Supplementary literature	M. Grundmann, The Physics of Semiconductors: An Introduction Including Nanophysics and Applications, 2ed., Springer 2010 A.S. Sedra, K.C. Smith, "Microelectronic Circuits", Oxford, 2007 Ch.C. Hu, Modern Semiconductor Devices for Integrated Circuits, Prentice Hall 2009
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	Connect a circuit presented on a diagram in the instruction booklet. The output voltage value of the generator should be adjusted so that the peak-peak value of Vce is 100 mV at f = 1 kHz. Take a record of the generator voltage Vgpp. Use it to calculate the low-frequency value of h21e0. Measure and plot the dependence of |h21e| on frequency. Determine experimentally the fbeta value. Calculate values of the emitter-base diffusion capacitance CdifE, the common-emitter current-gain cut-off frequency fT, and the electron transit time ttn.
Work placement	Not applicable