GDAŃSK UNIVERSITY
OF TECHNOLOGY

Subject card

Subject name and code	Basics of Electronics and Metrology, PG_00058908		
Field of study	Informatics		
Date of commencement of studies	October 2026	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	Part-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	1	ECTS credits	7.0
Learning profile	general academic profile	Assessment form	assessment

Conducting unit	Metrology and Electronic Systems Department -> Faculty of Electronics Telecommunications and Informatics -> Faculties of Gdańsk University of Technology	
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Sylwia Babicz-Kiewlicz
	Teachers	dr inż. Sylwia Babicz-Kiewlicz dr hab. inż. Jacek Jakusz dr inż. Stanisław Galla

Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	0.0	0.0	45
	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	45	10.0	120.0	175

Subject objectives	Acquirement of basic knowledge and skills in the field of electronics and metrology

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 examines the basic working circuits of the transistor. Measures the frequency characteristics of operational amplifiers. It measures basic electrical quantities: voltage, current, resistance, power and electricity.	[SU1] Assessment of task fulfilment

Subject contents	Course content – lecture Electronics: 1. Passive elements and independent sources in the DC, frequency and time domains 2. Ohm's and Kirchhoff's laws 3. Norton's theorem 4. Method of circuit currents and node voltages 5. Analysis of elementary circuits in the frequency domain 6. Electronic signals: types of signals and their time courses 7. Properties and Ebers-Moll model of bipolar transistor (BJT) 8. Static characteristics 9. DC and AC analysis of BJT amplifier 10. Properties and Shichman-Hodges model of unipolar transistor (MOS) 11. Static characteristics 12. DC and AC analysis of MOS amplifier 13. Elementary electronic circuits; operational amplifier, generator 14. Basic logical functors: Invert, Nand, Nor Metrology: 1. Basic metrology concepts: measurement, transducer, device, measurement system 2. Digital oscilloscope: operating principle, triggering methods, applications 3. Oscilloscope measurement methods: phases, pulse parameters, X/Y characteristics of elements and systems 4. Digital methods of measuring time intervals, discretization error 5. Digital methods of measuring low and high frequencies 6. Digital phase measurements 7. Characteristics of digital voltage measurement methods

8. Integration A/C converters with double integration

9. Measurements of alternating voltages: measured parameters, AC/DC converters of effective value (True RMS)

10. Digital multimeters: resistance/voltage converters

11. Digital methods of measuring impedance parameters R, L, C, |Z|

Prerequisites and co-requisites

It is obligatory to read the Health and Safety Rules and the Regulations of the Metrology Laboratory. Teachers determine the form of verification. Without familiarizing yourself with the Health and Safety Rules and the Laboratory Regulations, it is not possible to start classes in the metrology laboratory.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Test wstępny + Praca na zajęciach + Sprawozdanie	50.0%	25.0%
Kolokwium/Prace domowe w formie grywalizacji	50.0%	25.0%
Kolokwium	50.0%	25.0%
Sprawozdanie	50.0%	25.0%

Recommended reading

Basic literature

A. Sedra: Microelectronic circuits, HRW, New York

Materials on eNauczanie

- Piotrowski J., Podstawy Metrologii, PWN 1977
- Piotrowski J., Podstawy miernictwa, WNT 2000
- Parchański J., Miernictwo elektryczne i elektroniczne, WSP 1998
- Jaworski J., Morawski R., Olędzki J., Wstęp do metrologii i techniki eksperymentu, WNT 1992
- Piotrowski J., Podstawy metrologii, Politechnika Śląska 1971
- Taylor J. R., Wstęp do analizy błędu pomiarowego, PWN 1999
- Tumański S., Technika pomiarowa, WNT 2007
- Chwaleba A., Poniński M., Siedlecki A., Metrologia elektryczna, WNT 2009

Supplementary literature

A. Filipkowski: Układy elektroniczne analogowe i cyfrowe, WNT

- Domańska A., Barzykowski J., Kujawińska M., *Współczesna metrologia wybrane zagadnienia*, WNT 2016
- Jakubiec W., Malinowski J., *Metrologia wielkości geometrycznych*, PWN 2018
- Bewoor A. K., Kulkarni V. A., *Metrology & Measurements*, Tata McGraw-Hill Education 2009 (dostępna częściowo w books.gogle)
- Banerjee G. K., *Electrical And Electronic Measurements*, PHI Learning Pvt. Ltd (dostępna częściowo w books.gogle)

eResources addresses

Example issues/ example questions/ tasks being completed

Discuss the method of digitally converting voltage to a digital value.Present the principle of digital time and frequency measurements.Use of an oscilloscope to observe and measure parameters of periodic and non-periodic signals.

Practical activites within the subject

Not applicable