



Subject card

Subject name and code	Basics of Electronics and Measurement, PG_00047796						
Field of study	Informatics						
Date of commencement of studies	October 2020	Academic year of realisation of subject			2020/2021		
Education level	first-cycle studies	Subject group			Obligatory subject group 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	Department of Metrology and Optoelectronics -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Sylwia Babicz-Kiewlicz					
	Teachers	dr hab. inż. Jacek Jakusz dr inż. Stanisław Galla dr inż. Sylwia Babicz-Kiewlicz dr inż. Mateusz Ficek					
Lesson types and methods of instruction	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 Adresy na platformie eNauczanie: Podstawy Elektroniki i Miernictwa - INF niest. - Moodle ID: 7940 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=7940						
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_W05] Knows and understands, to an advanced extent, methods of supporting processes and functions, specific to the field of study		[SW1] Assessment of factual knowledge
	[K6_W08] Knows and understands the fundamental dilemmas of modern civilisation and basic economic, legal and other conditions of various types of activities related to the field of study, including the basic concepts and principles in the field of industrial property and copyright protection.		[SW1] Assessment of factual knowledge
	[K6_W42] Knows and understands, to an advanced extent, architecture, design principles and methods of hardware and software support for local and distributed information systems, including computing systems, databases, computer networks and information applications, as well as the principles of human cooperation with computers and computer-aided teamwork		[SW1] Assessment of factual knowledge
	[K6_U05] can plan and conduct experiments related to the field of study, including computer simulations and measurements; interpret obtained results and draw conclusions		[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information
[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		[SU1] Assessment of task fulfilment	
Subject contents	1. Introduction. 2. Passive components and independent sources in DC, frequency and time domains. 3. Ohm's and Kirchhoff's laws. 4. Norton's theorem. 5. Loop currents" and node voltages" methods. 6. Basic circuits analysis in frequency domain. 7. Electronic signals: types and timings. 8. Bipolar transistor (BJT): properties and Ebers-Moll model. 9. BJT static characteristics 10. DC and AC analysis of BJT based amplifier 11. Unipolar transistor (MOS): properties and Shichman-Hodges model 12. MOS static characteristics 13. DC and AC analysis of MOS based amplifier 14. Basic electronic circuits: operational amplifier, oscillator. 15. Basic logical gates: Invert, Nand, Nor 16. Basic metrological terms: measurement, converter, measuring instrument and system, measurement errors, standard and extended uncertainty. 17. Analog oscilloscope: block diagram, principles of operation. 18. Time base generator, triggering methods. 19. Oscilloscope measurement methods: phase, pulse parameters, observation of device characteristics. 20. Digital method of time interval measurement, +/- count error. 21. Digital methods of low and high frequency measurements. 22. Phase measurements. 23. Classification and characterization of digital voltage measurements methods. 24. Dual-slope integration ADC. 25. Voltage to frequency integration ADC. 26. DAC with R-2R ladder. 27. Flash ADC. 28. ADC with subrange 29. Measurements of AC voltage, AC/DC converters of true RMS value. 30. Digital multimeters: 2 & 4-wire resistance to voltage converters. 31. Digital storage oscilloscope, architecture, sampling techniques, modes of operations, applications. 32. Digital measurement methods of impedance parameters R, L, C, Z . 33. Classification and characterization of measuring systems. 34. Measuring systems based on general purpose interface bus (GPIB), signals and lines, three wire handshake process. 35. Virtual instruments.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Colloquiums	50.0%	50.0%
	Practical exercise	50.0%	50.0%
Recommended reading	Basic literature	1. A. Sedra: Microelectronic circuits, HRW, New York, 2. M. Stabrowski: Cyfrowe przyrządy pomiarowe, PWN, 3. Instrukcje i materiały pomocnicze do laboratorium na www.eti.pg.gda.pl/katedry/kose/dydaktyka/ ,	
	Supplementary literature	1. A. Filipkowski: Układy elektroniczne analogowe i cyfrowe, WNT, 2. J. Dusza, i inni: Podstawy miernictwa, Wyd. Politechniki Warszawskiej,	
	eResources addresses	Podstawy Elektroniki i Miernictwa - INF niest. - Moodle ID: 7940 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=7940	
Example issues/ example questions/ tasks being completed			

Work placement	Not applicable
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