Bialystok University of Technology									
Field of study	**Computer Science**							**Degree level and programme type**	**Engineer's degree full-time programme**
Specialization/ diploma path	**---**							**Study profile**	academic
Course name	**Electronic Circuits and Measurements**							**Course code**	**FCS-00036**
								Course type	obligatory
Forms and number of hours of tuition	L	C	LC	P	SW	FW	S	**Semester**	1
	15		15					**No. of ECTS credits**	**6**
Entry requirements	Foundations of Electrotechnics and Electronics (FCS-00053), Digital Circuit Engineering (FCS-00056),								
Course objectives	Knowledge of digital electronic components, logic gates and digital circuits made in TTL and CMOS technologies. Understanding the principles of operation: semiconductor memories RAM and ROM, and the construction of programmable logic devices. Knowledge of the AD and DA converters.								
Course content	Lecture: Preparation of active elements on a silicon substrate. MOS and bipolar transistors. Technologies of realisation of TTL and CMOS integrated digital circuits . TTL ICs. NAND gate. Static and dynamic parameters of gates. TTL series chips. MOS digital circuits. NMOS gates. Digital signal transmission through the MOS transistor. CMOS circuits. Dynamic logic. Disadvantages of CMOS circuits. Family of CMOS digital circuits. BiCMOS families digital circuits. Orocess of analog-to-digital conversion. The basic structural components of AD and DA conferters. DACs. ADCs. Construction and operation of SRAM cell. Construction and operation of the DRAM cell. Organization of memory. Timing diagrams. Fast dynamic memory. ROM memory. General organization of ROM memory. Mask ROM, PROM, EPROM, EEPROM, FLASH. Programmable logic devices. Laboratory exercises: 1. Static and dynamic parameters of gates and flip-flops 2. Combinational blocks: multiplexers, demultiplexers and decoders 3. Arithmetic and logic blocks 4. Sequential blocks: registers and counters								
Teaching methods	informative lecture, lecture problem, laboratory exercises,								
Assessment method	Lectures - two half tests, specialistic workshop - evaluation of reports, short preparation tests								

Symbol of learning outcome	**Learning outcomes**	**Reference to the learning outcomes for the field of study**
LO1	knows the principles of operation of digital, analog / digital and digital / analog circuits	K_W02
LO2	knows the principles of signal processing	K_W02
LO3	knows the technology and uses different types of digital circuits	K_U03
LO4	applies the principles of health and safety in the use of electronic devices.	K_U03 K_U15
LO5	is able to plan and carry out measurements to determine the characteristics and parameters of electronic circuits. He is able to document the results and analyse them.	K_U03

Symbol of learning outcome	**Methods of assessing the learning outcomes**	**Type of tuition during which the outcome is assessed**
LO1	two tests	L
LO2	two tests	L
LO3	short test allowing attendance at laboratories	Lc
LO4	observation of students during measurement operations	Lc
LO5	report	Lc

Student workload (in hours)	**No. of hours**
1 - attendance at lectures - 15x1h	15
2 - attendance at laboratories - 15x1h	15
3 - preparation for laboratories -	40
4 - participation in student-teacher sessions -	5
5 - preparation of reports -	75
TOTAL:	**150**

Quantitative indicators	**HOURS**	**No. of ECTS credits**
Student workload – activities that require direct teacher participation	35 (4)+(1)+(2)	1.4
Student workload – practical activities	130 (5)+(2)+(3)	5.2

Basic references	1. John F. Wakerly; Digital Design, Principles and Practices, (4th Edition), Pearson/Prentice Hall, 2005. 2. M. Morris Mano, Michael D. Ciletti; Digital Design (4th Edition), Prentice Hall, 2006.
Supplementary references	1. All about circuits; http://www.allaboutcircuits.com/ , accessible on Internet (access in September 2013).
Organisational unit conducting the course	Department of Digital Media and Computer Graphics
Date of issuing the programme	Feb. 17, 2022
Author of the programme	dr inż. Wiktor Jakowluk

L – lecture, C – classes, LC – laboratory classes, P – project, SW – specialization workshop, FW – field work,S – seminar