Załącznik nr 9
do Zarządzenia Rektora PŚk Nr 35/19
w brzmieniu ustalonym Zarządzeniem Nr 12/22

COURSE DESCRIPTION

Course code	full-time studies	
	part-time-studies	
Course name	**Teoria układów logicznych**	
Course name in English	**Theory of logic systems**	
Valid from academic year	**2022/23**	

PLACEMENT IN THE TEACHING PROGRAM

Field of study	**Computer Science**
Level of education	**1st degree**
Studies profile	**General**
Form and method of teaching classes	**Full-time and part-time studies**
Specialization	**All specializations**
Organizational unit responsible for the course	**Computer Science, Electronics and Electrical Engineering Department**
Course coordinator	**Adam Głuszek, Ph.D. Eng.**
Approved by	**Dean of the Faculty of Electrical Engineering, Automatic Control and Computer Science Roman Deniziak, KUT prof., D.Sc., Ph.D.**

GENERAL CHARACTERISTIC OF THE COURSE

Course affiliation		**Field of study course**
Course status		**Obligatory**
Language		**English**
Semester	full-time studies	**1st semester**
	part-time-studies	**1st semester**
Requirements		**–**
Exam (YES/NO)		**Yes**
ECTS		**5**

Course form		**lecture**	**classes**	**laboratory**	**project**	**other**
Hours per semester	full-time studies	**30**	**15**	**15**	**–**	**–**
	part-time-studies	**18**	**9**	**9**	**–**	**–**

LEARNING RESULTS

Category	Result Symbol	Learning Results	References to the field of study results
Knowledge	W01	the student knows and understands fundamental concepts from the area of digital electronics (digital signal, Boolean algebra, switching function, functionally complete system, finite state machine etc.)	INF1_W08
	W02	the student knows and understands internal structure and functioning of the basic digital devices (logic gates, flip-flops) and digital functional blocks	INF1_W08
	W03	the student knows and understands basic methods of combinational and sequential systems synthesis	INF1_W08
Skills	U01	the student is able to analyse the structure and functioning of the combinational and sequential systems	INF1_U08
	U02	the student can design simple combinational and sequential circuits	INF1_U08
	U03	the student can use digital circuits designing/simulating tools	INF1_U08
Social competence	K01	the student is ready to develop his knowledge by independent study and searching for suitable sources	INF1_K01 INF1_K02
	K02	student is ready to cooperate in the team for realization of the established schedule	INF1_K01 INF1_K02

COURSE CONTENT

Course Form	Content
lecture	1. Fundamental concepts from the area of digital electronics (digital signal, Boolean algebra, switching function, functionally complete system, finite state machine etc.)
	2. Basic logic devices – gates and flip-flops. Digital functional blocks (multiplexer, demultiplexer, counter, register, arithmetic blocks, memory, etc.).
	3. Analysing and designing of combinational logic circuits. Representation of the logic function. Minimization of the switching function (Karnaugh maps). Designing of the combinational circuits with the use of the logic gates. Iterative circuits.
	4. Analysing and designing of synchronous sequential logic circuits. Moore machine. Mealy machine. Representation of the finite state machine – state diagram, state/output table. Designing of the synchronous sequential circuits with the use of gates and flip-flops (counters, parity checking, serial adder, serial comparator, sequence detectors, simple control systems etc.).
	5. Realization of the modern digital circuits. Introduction to programmable logic devices.
classes	1. Using of the basic digital devices – logic gates and flip-flops.
	2. Minimization of the switching function with the use of Karnaugh maps.
	3. Designing of the combinational logic circuits with the use of logic gates.

	4. Designing of the synchronous sequential logic circuits with the use of gates and flip-flops (counters, serial parity checking, sequence detectors, simple control systems etc.).
laboratory	1. Introduction to the digital circuit designing/simulation software.
	2. Simulations of the basic digital devices – gates and flip-flops.
	3. Simulations of the digital functional blocks.
	4. Designing of the combinational logic circuits – simulations of the designed circuits.
	5. Designing of the synchronous sequential logic circuits – simulations of the designed circuits.

LEARNING RESULTS VERIFICATION METHODS

Result Symbol	Learning results verification methods					
	Oral Exam	Written Exam	Midterm	Project	Report	Other
W01		X	X			
W02		X	X			
W03		X	X			
U01		X	X			X
U02		X	X			X
U03		X	X		X	X
K01					X	X
K02					X	X

ASSESSMENT FORMS AND CRITERIA

Course Form	Assessment Form	Assessment Criteria
lecture	examination	Obtaining at least 50% of exam points
classes	final test	Obtaining at least 50% of final test points
laboratory	mid-term/final tests	Obtaining at least 50% of mid-term/final tests points

STUDENT'S VOLUME OF WORK

ECTS Balance												
No.	**Activity Type**	**Student Involvement**										**Unit**
		full-time studies					**part-time-studies**					
1.	Participation in classes according to the schedule	Lec	C	Lab	P	S	Lec	C	Lab	P	S	h
		30	15	15			18	9	9			
2.	Other (consultations, exams)	2	1	1			2	1	1			h
3.	**Total with the direct assist of an academic teacher**	**64**					**40**					h
4.	**Number of ECTS, that students obtains with the direct assist of an academic teacher**	**2,56**					**1,6**					ECTS
5.	**Hours of unassisted student work**	**61**					**85**					h
6.	**Number of ECTS that student obtains working unassisted**	**2,44**					**3,4**					ECTS
7.	**Practical classes volume of work**	**30**					**18**					h
8.	**Number of ECTS obtained by student at practical classes**	**1,20**					**0,72**					ECTS
9.	**Total student's volume of work expressed in hours**	**125**					**125**					h
10.	**ECTS**	**5**										ECTS

BIBLIOGRAPHY

1. Donzellini G., Oneto L., Ponta D., Anguita D.: "Introduction to Digital Systems Design", Springer, 2019.
2. LaMeres B.J.: "Introduction to Logic Circuits and Logic Design with Verilog", Springer, 2019.
3. Wakerly J.F.: "Digital Design: Principles and Practices", Prentice Hall, 1990.
4. Horowitz P., Hill W.: "The Art of Electronics", Cambridge University Press, 2015.