(pieczęć wydziału)

COURSE DESCRIPTION

1. Course title: DIGITAL CIRCUITS DESIGN	**2. Course code:** DCD
3. Validity of course description: 2018/2019	
4. Level of studies: first degree	
5. Model of studies: stationary	
6. Field of study: INFORMATICS	
7. Profile of studies: general academic	
8. Programme: ALL	
9. Semester: 3	
10. Faculty teaching the course: Faculty of Automatic Control, Electronics and Computer Science, Institute of Informatics	
11. Course instructor: Ph.D. Eng. Krzysztof Tokarz	
12. Course classification: general	
13. Course status: obligatory	
14. Language: English	
15. Pre-requisite qualifications: Electronics and Measurements, Digital Circuits Theory, Arithmetic of Digital Systems	
16. Course objectives: The object is to present functional properties, dynamic and static digital integrated circuits and the rules for their use in construction of digital devices. It gives the basic knowledge about functioning of elements of computers and internal modules of microprocessors.	

17. Description of learning outcomes:[1]

Nr	Learning outcomes description	Method of assessment	Teaching methods	Reference code
1	Student has the general knowledge, including functional properties, dynamic and static digital circuits as well as design and construction rules of digital devices in different technologies.	Test	Lecture, classes	K1A_W05 K1A_W07
2	Student knows the basic methods, techniques and tools used to solve simple tasks from the scope of digital system design	Test	Lecture, classes	K1A_W22

[1] należy wskazać ok. 5 – 8 efektów kształcenia

3	Student has the skill to design simple digital circuits.	Test	Lecture, classes	K1A_U28

18. Teaching modes and hours

Lecture / BA /MA Seminar / Class / Project / Laboratory:

30 / 0 / 0 / 15 / 0 / 0 (sem.3)

19 Syllabus description:

Lecture

Introduction, classification, purpose and area of applications of digital devices.

Basic techniques for the implementation of integrated circuits (TTL, CMOS).

Static, dynamic and functional parameters of integrated circuits.

Comparison of different implementation techniques. Input, control, processing blocks, output devices.

Integrated functional modules: 3-state buffers, multiplexers, encoders, decoders, code converters, priority coders, counters, registers, arithmetic systems, parallel transfer systems, parity bit generators, time circuits, generators, semiconductor memories, programmable PLD logic structures, displays, AD and DA converters.

Buses. Parallel asynchronous and synchronous registers and counters.

RAM memories - static SRAM and dynamic DRAM (asynchronous and synchronous). Ways to refresh the contents of DRAM memory. Building blocks of RAM with a given organization.

ROM memories, PROM, EPROM, E2PROM, FLASH. Construction of fixed memory blocks with a given organization.

Programmable logical PLD structures. Programming of permanent memories and PLD systems.

Digital signal transmission. Transmission lines, asymmetrical and symmetrical, line transmitters and receivers.

Input systems: buttons, keyboards. Output systems, seven-segment displays, LCD, numeric, alphanumeric, matrix, LED matrix displays.

Disturbances in digital circuits (external, internal: crosstalk, reflections) and ways of limiting their impact (shielding, blocking, wave fitting).

Damage to digital circuits and their models. Testing digital circuits. Methods of test generation.

Launching of digital circuits. Logic analyzers, signature analyzers.

Principles of designing digital devices. Power and assembly rules of electronic digital devices.

Classes

During the classes the examples of designing typical systems are presented with the necessary calculations related to, for example, the selection of resistor values for OC type outputs or counting the current limit of outputs.

20. Exam: no

21. Primary sources:

1. M. Łakomy, J. Zabrodzki „Cyfrowe układy scalone” PWN, 1983 r.
2. M. Łakomy, J. Zabrodzki „Układy scalone CMOS” PWN, 1991 r..

22. Secondary sources:

1. M. Łakomy, J. Zabrodzki „Liniowe układy scalone w technice cyfrowej” PWN, 1987 r.
2. J. Pieńkowski, J. Turczyński „Układy scalone TTL w systemach cyfrowych” WKiŁ, 1980r..

23. Total workload required to achieve learning outcomes

Lp.	Teaching mode	Contact hours / Student workload hours
1	Lecture	30/20
2	Classes	15/15
3	Laboratory	/
4	Project	/
5	Seminar	/
6	Other	5/5
	Total number of hours	50/40

24. Total hours: 90

25. Numbers of ECTS: 3

26. Number of ECTS credits allocated for contact hours: 2

27. Number of ECTS credits allocated for in-practice hours (laboratory classes, projects): none

26. Comments:

Approved:

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(date, Instructor’s signature)

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(date, the Director of the Faculty Unit signature)