(pieczęć wydziału)

COURSE DESCRIPTION

1. Course title: DIGITAL CIRCUITS THEORY	**2. Course code:** DCT
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: 1, 2, 3	
10. Faculty teaching the course: Faculty of Automatic Control, Electronics and Computer Science, Institute of Informatics	
11. Course instructor: Ph.D. Eng. Urszula Stańczyk	
12. Course classification: general	
13. Course status: obligatory	
14. Language: English	
15. Pre-requisite qualifications: elementary knowledge of mathematics and physics at the high school level	
16. Course objectives: Getting acquainted with the theory and gaining practical skills in the field of: synthesis (design), implementation, and analysis of digital circuits.	
17. Description of learning outcomes:[1]	

Nr	Learning outcomes description	Method of assessment	Teaching methods	Reference code
1	Student has knowledge in the field of digital algebra, necessary to describe digital elements and circuits.	Test, exam, laboratory report	Lecture, classes, laboratory	K1A_W01 K1A_W02
2	Student has ordered, theoretically founded knowledge in the field of digital circuit structures.	Exam	Lecture	K1A_W05 K1A_W07
3	Student is capable of choosing the methods of synthesis and analysis of a digital circuit.	Test, exam	Lecture, classes	K1A_U08

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

4	Student is able to design a digital circuit that implements a given algorithm in different variants and suggest its various realisations.	Test, exam, laboratory report	Lecture, classes, laboratory	K1A_U28 K1A_U29
5	Student is capable of performing a theoretical and experimental analysis of the correctness of the algorithm implemented in the tested circuit.	Test, exam, laboratory report	Lecture, classes, laboratory	K1A_U10 K1A_U14 K1A_U19
6	Student is able to interact and work in a group (laboratory section).	Laboratory exercise	Laboratory	K1A_U31 K1A_K02

18. Teaching modes and hours

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

30 / 0 / 0 / 15 / 0 / 0 (sem.1)

30 / 0 / 0 / 15 / 0 / 0 (sem.2)

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

19 Syllabus description:

Lecture

• Information - form and processing.
• Digital circuit, digital device and digital system.
• Algebra of digital circuits.
• Functionally complete set of basic logic elements.
• Classification of digital circuits.
• Combinational functional blocks.
• Synthesis and analysis of digital combinational systems.
• Iterative circuits and their synthesis.
• Sequential functional blocks.
• Synthesis of asynchronous sequential circuits.
• Synthesis of synchronous sequential circuits.
• The dynamics of sequential circuits.
• Synthesis of digital circuits with time dependencies.
• Synthesis of microprogrammable circuits.
• Programmable logic arrays.

Classes

Auditory (table) classes present exercises based on lecture topics.

Laboratory

Laboratory include practical exercises, on real circuits and computer emulators, in the scope of: getting acquainted with the structures of elements and functional blocks, implementing independently designed digital circuits and their testing and running, analysis of circuits with respect to occurrences of phenomena caused by signal propagation, experimental study of the effects of signal propagation (hazards, races) on the correctness of the algorithms implemented by the circuits.

List of exercises:

• Combinational digital circuits. Code converters. Systems with time dependencies.
• Elementary sequential systems.
• Asynchronous sequential circuits.
• Synchronous sequential circuits.
• Selected arithmetic systems.
• Dynamics of digital circuits.
• Registers and counters.
• Implementation of digital circuits using elements in MSI and LSI.
• Elements of computer-assisted design of digital circuits.
• Microprogrammable digital circuits.

20. Exam: yes (sem. 2)

21. Primary sources:

1. Stańczyk U., Cyran K., Pochopień B.: Theory of Logic Circuits Volume 1 - Fundamental issues. Wydawnictwo Politechniki Śląskiej, Gliwice 2007
2. Stańczyk U., Cyran K., Pochopień B.: Theory of Logic Circuits Volume 2 - Circuit design and analysis. Wydawnictwo Politechniki Śląskiej, Gliwice 2007
3. Kamionka-Mikuła H., Małysiak H., Pochopien B.: Teoria układów cyfrowych. Tom I. Układy kombinacyjne. Wydawnictwo Politechnik Śląskiej, Gliwice 2013.
4. Kamionka-Mikuła H., Małysiak H., Pochopień B.: Teoria układów cyfrowych. Tom II. Układy sekwencyjne. Wydawnictwo Politechniki Śląskiej, Gliwice 2013.

22. Secondary sources:

1. Kamionka-Mikuła H., Małysiak H., Pochopień B.: Praktyczna teoria układów cyfrowych. Wydawnictwo Politechniki Śląskiej, Gliwice 2011.
2. Praca zbiorowa pod redakcją H. Małysiaka: Teoria automatów cyfrowych. Laboratorium. Wydawnictwo Politechniki Śląskiej, Gliwice 2003.
3. Łuba T.: Synteza układów logicznych. Oficyna Wydawnicza Politechniki Warszawskiej. Warszawa 2005.
4. Mano Moris H., Kime Charles R.: Podstawy projektowania układów logicznych i komputerów. WNT, Warszawa 2007

23. Total workload required to achieve learning outcomes

Lp.	Teaching mode	Contact hours / Student workload hours
1	Lecture	60/90
2	Classes	30/30
3	Laboratory	30/30
4	Project	/
5	Seminar	/
6	Other	/
	Total number of hours	120/150

24. Total hours: 270

25. Numbers of ECTS: 10

26. Number of ECTS credits allocated for contact hours: 4

27. Number of ECTS credits allocated for in-practice hours (laboratory classes, projects): 2

26. Comments:

Approved:

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(date, Instructor's signature)

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(date, the Director of the Faculty Unit signature)