SYLLABUS

Name: ***Digital Circuits Theory (InfAAu>SI2DCT19)***
Name in Polish:
Name in English: ***Digital Circuits Theory***

Information on course:

Course offered by department: Faculty of Automatic Control, Electronics and Computer Science
Course for department: Silesian University of Technology

Default type of course examination report:

EGZ

Language:

English

Course homepage:

https://platforma2.polsl.pl/rau2/course/view.php?id=975

Short description:

The objective of the course is getting acquainted with the theory and gaining practical skills in the field of: synthesis (design), implementation, and analysis of digital circuits of various types.

Description:

ECTS: 4
Total workload: 100 hours (50 contact hours, 50 students' own work hours)
Lecture: 30 hours
Classes: 15 hours
Other: 5 hours (e.g., example task solution discussions, solution analysis)
Students' own work: literature analysis, preparation for classes, preparation for test, preparation for exam

Lectures:
Elementary sequential circuits. Synthesis of asynchronous sequential circuits with Switching Sequence Table method, and Huffman's method. Implementation of asynchronous sequential circuits with feedback loops and flip-flops. Dynamics of asynchronous sequential circuits (hazards, races, cycles). Synthesis of synchronous sequential circuits. Sequential functional blocks (counters, registers, arithmetic circuits, memory). Synthesis of microprogrammable circuits in various structures. Synthesis of switching circuits with delay units.

Classes:
Elementary sequential circuits. Synthesis of asynchronous sequential circuits with Switching Sequence Table method, and Huffman's method. Implementation of asynchronous sequential circuits with feedback loops and flip-flops. Dynamics of asynchronous sequential circuits (hazards, races). Synthesis of synchronous sequential circuits. Synthesis of microprogrammable circuits in various structures.

Bibliography:

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.
5. Kamionka-Mikuła H., Małysiak H., Pochopień B.: Praktyczna teoria układów cyfrowych. Wydawnictwo Politechniki Śląskiej, Gliwice 2011.
6. Praca zbiorowa pod redakcją H. Małysiaka: Teoria automatów cyfrowych. Laboratorium. Wydawnictwo Politechniki Śląskiej, Gliwice 2003.

Learning outcomes:

Knowledge: a student knows and understands:
1. elements of logic (K1A_W02)
2. fundamentals of physics, electrical circuits and electronics required to understand digital technologies (K1A_W05)
3. fundamentals of digital technologies required to solve simple engineering tasks
K1A_W20 elements of arithmetics of digital systems (K1A_W07)

Skills: a student can:
1. use learned knowledge - formulate and solve complex and specific problems, execute tasks in not entirely controlled and predictable conditions by: suitable selection of sources and information retrived from them, assessment, critical analysis and synthesis of information, selection of methods and tools, including advanced communication technologies (K1A_U01)
2. communicate with environment using specialised terminology (K1A_U02)
3. prepare well-documented report of performed engineering tasks (K1A_U03)
4. plan and perform experiments, including computer simulations, interpret obtained results and draw conclusions (K1A_U10)
5. use the rules of logic thinking in analysis of physical and technical processes (K1A_U11)
6. design, according to specification given, and implement simple devices, objects, systems typical for computer science domain, and execute processes applying suiltable methods, techniques, tools and sources (K1A_U17)
7. design and implement simple digital circuits (K1A_U28)

Social competences: a student is prepared to:
- acknowledge the significance of learning in the process of solving theoretical and practical tasks, and consulting experts in case of problems (K1A_02)

Assessment methods and assessment criteria:

The course is continued from the previous semester.

Semester 2 (lecture+classes): final grade based on classes and exam grades.
Classes grade is based on test written during classes, two terms of retake tests allowed. Every part of the material must be positively graded.
Exam grade is based on written exam, two terms of retake exams allowed. To be admitted to exam, positive grade from test for classes is required.
Examptions from exam are possible, detailed rules are announced during lectures.

The course is continued in the next semester.

The syllabus is valid from academic year 2025/26 and its content cannot be changed during the semester

Element of course groups in various terms:

Course group description	First term	Last term
Informatics S1 semester 2 common subjects (InfAAu>SI2-19-WSP)	2020/2021-L	
Informatics sem. 2 (InfAAu>SI_2)	2024/2025-Z	

Course credits in various terms:

<without a specific program>

Type of credits	Number	First term	Last term
European Credit Transfer System (ECTS)	4	2020/2021-Z	