SYLLABUS

Name: ***Arithmetic of Digital Systems (InfAAu>SI1AoDS19)***
Name in Polish:
Name in English: ***Arithmetic of Digital Systems***

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:

ZAL

Language:

English

Course homepage:

https://platforma2.polsl.pl/rau2/course/view.php?id=1027

Short description:

Students get acquainted with the theory and gaining practical skills in the scope of: principles of performing basic arithmetic operations and implementation methods of arithmetic operations in fixed-point and floating-point arithmetic and their selection, evaluation, and application.

Description:

ECTS: 3
Total workload: 75 hours (30 contact hours, 40 students' own work hours)
Lecture: 15 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

Lecture
Nonpositional and positional number systems. Decimal systems with binary encoding of digits. Decimal-binary codes. Principles of performing arithmetic operations in a number system with radix R. Choosing radix. Complements in a number system with radix R. Conversion of numbers (quotient-product method, direct methods, differential method). Conversion accuracy. Representation of numbers with sign (Sign-Magnitude, Radix Complement, Diminished Radix Complement). Formats of numerical words in digital systems. Fixed-point arithmetics (addition and subtraction, multiplication and division). Floating-point arithmetics (addition and subtraction, multiplication and division). Operations on binary coded decimal numbers (addition and subtraction, multiplication and division). Fundamental arithmetic circuits.

Classes
Positional number systems. Decimal systems with binary encoding of digits. Principles of performing arithmetic operations in a number system with radix R. Complements in a number system with radix R. Conversion of numbers (quotient-product method, direct methods, differential method). Representation of numbers with sign (Sign-Magnitude, Radix Complement, Diminished Radix Complement). Fixed-point arithmetics (addition and subtraction, multiplication and division). Floating-point arithmetics (addition and subtraction). Operations on binary coded decimal numbers (addition and subtraction).

Bibliography:

1. Stańczyk U., Cyran K., Pochopień B.: Theory of Logic Circuits Volume 1 - Fundamental issues. Wydawnictwo Politechniki Śląskiej, Gliwice 2007
2. Pochopień B.: Arytmetyka komputerowa. Akademicka Oficyna Wydawnicza EXIT, Warszawa 2012.
3. Pochopień B., Stańczyk U., Wróbel E.: Arytmetyka systemów cyfrowych w teorii i praktyce. Wydawnictwo Politechniki Śląskiej, Gliwice 2012.

Learning outcomes:

Knowledge: a student knows and understands
1. Elements of logic, mathematics (K1A_W02)
2. Fundamentals of physics, electrical circuits and electronics required to understand digital technologies (K1A_W05)
3. Representation of digital information and data structures as well as operations on them, and strategies leading to selection of structures must suited to a given task (K1A_W12)
4. Principles of performing fixed-point and floating-point arithmetic operations (K1A_W20)

Skills: a student can
1. Use learned knowledge and mathematical aparatus for description and analysis of problems, in particular execute calculations needed for solution of tasks from technical sciences (K1A_U07)
2. Use mathematical aparatus for description and analysis of objects occurring in tasks (K1A_U07)
3. Assess usefulness of methods and tools and choose a suitable method and approach for a typical problems and implementation of arithmetic operations (K1A_U21)

Assessment methods and assessment criteria:

Credit based on tests written in classes, two terms of repeats allowed.
Each part of the material must be positively graded.

The syllabus is valid from the 2025/26 academic year, and its content is not subject to changes during the semester.

Element of course groups in various terms:

Course group description	First term	Last term
Informatics S1 semester 1 common subjects (InfAAu>SI1-19-WSP)	2020/2021-Z	
Informatics sem. 1 (InfAAu>SI_1)	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)	3	2020/2021-Z	