SYLLABUS

Name:	*Algorithms and Data Structures 2 (InfAAu>SM1AaDS219)*
Name in Polish:	
Name in English:	*Algorithms and Data Structures 2*

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=937

Short description:

The aim of the course is to introduce the listener to advanced issues of algorithms and data structures. Compression algorithms, graph algorithms, and pattern matching algorithms are presented. Students learn methods of problem solving using heuristic methods. They also learn about selected advanced data structures (suffix trees and suffix arrays) and methods of adding persistence to data structures. They also acquire skills in analyzing and evaluating algorithms.

Description:

ECTS: 4
Total workload: 100 hours (50 contact hours, 50 students' own work hours)
Forms of contact hours:
Lecture 30h
Table classes 15h
Other (consultations) 5h

Students' own work: reading the literature, preparation for classes, preparation for final exam.

Lectures:
1. Time and space complexity.
2. Time and space complexity - sorting methods.
3. Dictionaries.
4. Persistent data structures.
5. Shortest paths in graphs.
6. Selected graph algorithms.
7. Network flows.
8. Data compression.
9. Pattern matching.
10. Metaheuristic algorithms.
11. Suffix trees and suffix arrays.

Table classes:
1. Time complexity.
2. Persistent data structures.
3. Shortest paths in graphs.
4. Network flows.
5. Selected graph algorithms.
6. Data compression.

Bibliography:

1. L. Banachowski, K. Diks, W. Rytter: Algorytmy i Struktury Danych, Wydawnictwo Naukowe PWN, Warszawa, 2018.
2. T. Cormen, C. Leiserson, R. Rivest, Introduction to algorithms (4th ed.). MIT Press and McGraw-Hill, 2022 (or other edition).
3. Z.J. Czech, S. Deorowicz, P. Fabian: Algorytmy i Struktury Danych, Wydawnictwo Politechniki Śląskiej, Gliwice 2010.
4. A. Debudaj-Grabysz, S. Deorowicz, J. Widuch: Algorytmy i struktury danych. Wybór zaawansowanych metod", Wydawnictwo Politechniki Śląskiej, Gliwice 2012.
5. E.M. Reingold, J. Nievergelt, N. Deo: Algorytmy Kombinatoryczne, PWN, Warszawa, 1985.
6. D.E. Knuth: The art of computer programming, Addison-Wesley.
7. R. Sedgewick, Algorithms in C++, Addison-Wesley.

Learning outcomes:

- Has theoretical knowledge of algorithms and their computational complexity. (written exam) K2A_W03
- Knows advanced algorithms and data structures (graphs, persistent data structures, dictionaries, trees and suffix tables). (written exam) K2A_W07
- Can develop an algorithm that solves a given problem. (written exam) K2A_U01
- Can use English in the field of algorithm and data structures terminology. (written exam) K2A_U04
- Can choose the optimal algorithm to solve a given problem. (written exam) K2A_U11
- Can analyze algorithms, determines their computational complexity and estimate the complexity of problems. (written exam) K2A_U12

Assessment methods and assessment criteria:

Final written exam in the form of a test with tasks or multiple-choice questions. To obtain the credits it is necessary to acheive from the final exam a grade greater or equal to 3.0. The final grade is the grade of the last exam in which the Student took.

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

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	