SYLLABUS

Name: ***Algorithms and Data Structures (InfAAu>SI3AaDS19)***
Name in Polish:
Name in English: ***Algorithms and Data Structures***

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=885

Short description:

The aim of the course is to introduce the student to the problems of algorithms and data structures. The time complexity and selected computational problems and algorithms for solving them are presented. Data structures such as heaps, priority queues and operations performed on them are discussed. The student acquires the ability to analyze the complexity of algorithms, apply existing algorithms to solve specific problems. The topics discussed are illustrated with numerous examples.

Description:

ECTS: 3
Total workload: 75 hours (40 contact hours, 35 students' own work hours)
Forms of contact hours:
Lecture 15h
Table classes 15h
Other (consultations) 10h

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

Lectures:
1. Heaps and related data structures.
2. Graph algorithms.
3. Exhaustive search.
4. Greedy algorithms.
5. Pattern matching.
6. Data compression.
7. Combinatorial algorithms.

Table classes:
1. Heaps, heapsort and merge sort.
2. Graphs and graph algorithms.
3. Exhaustive search.
4. Greedy algorithms.
5. Pattern matching.
6. Data compression algorithms.
7. Combinatorial algorithms.

Bibliography:

1. T. Cormen, C. Leiserson, R. Rivest, Introduction to algorithms (4th ed.). MIT Press and McGraw-Hill, 2022 (or other edition).
2. R. Sedgewick: Algorithms in C++. Addison-Wesley Pub, 1992.
3. Z.J. Czech, S. Deorowicz, P. Fabian: Algorytmy i struktury danych. Wybrane zagadnienia. Politechnika Śląska, 2010.
4. D.E. Knuth: The art of computer programming, Addison-Wesley.
5. L. Banachowski, K. Diks, W. Rytter, Algorytmy i Struktury Danych, WNT, Warszawa, 1996.
6. E.M. Reingold, J. Nievergelt, N. Deo, Algorytmy Kombinatoryczne, PWN, Warszawa, 1985.

Learning outcomes:

- Knows advanced and detailed issues of algorithms and their analysis. (egzamin pisemny) K1A_W09
- Knows methods of calculating the computational complexity of algorithms. (egzamin pisemny) K1A_W15
- Can implement algorithms using the known programming language. (egzamin pisemny) K1A_U23
- Can use the acquired mathematical knowledge - including elements of the theory of computations - and statistical knowledge to describe processes, create models, write algorithms. (egzamin pisemny) K1A_U30

Assessment methods and assessment criteria:

Written final exam in the form of tasks or a test with 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)	3	2020/2021-Z	