ÓBUDA UNIVERSITY					
John von Neumann	*Faculty*	**Applied Mathematics**			*Institute*
Hungarian title of the course:	**Algoritmuselmélet**			*Neptun code:*	**NAMAE1AANM**
English title of the course:	**The theory of algorithms**			*Credit:*	**5**
Type (compulsory/obligatory:)	**compulsory**	*Education Type*	**Full-time**	*Semester :*	**2022-23 2.**
Study field:	**Algorithm theory, complexity theory**				
Lecturer:	**Dr. Gábor Hegedüs**				
Required preliminary knowledge:	**Discrete mathematics**				

Weekly teaching hours:	*Lecture:*	**2**	*Practical work:*	**1**	*Laboratory work:*	**0**
Exam type:		**w**	*Language of course:*	**English**	*In timetable:*	**y**

CURRICULUM

Abstract:

Dinamical programming, graph algorithms: BFS, DFS, maximal matching in bipartitate graphs, Bellman-Ford's, Floyd's, Dijkstra's algorithm, sorting: insertion sort, bubble sort, shell sort, merge sort, quick sort, bucket and radix sort, binary search tree, 2-3 tree, B tree, Jarnik-Prim's algorithm, Kruskal's algorithm, P, NP, coNP classes and their connections, NP-completeness

Detailed schedule of the course:

***Topics of lectures**:*

No.	Description
1.	Ordo, omega, theta, branch and bound, dinamical programming (binomial coeffients, backpack)
2.	Graphs,, breadth first search, depth first search, maximal matching in bipartitate graphs
3.	Bellman-Ford's , Floyd's, Dijkstra's algoritmus
4.	searching (linear, binary), sorting: insertion sort, bubble sort, shell sort
5.	sorting: :shell sort, merge sort, bucket and radix sort
6.	No lecture
7.	First midhalf test
8.	binary search tree, 2-3 tree, B tree, AVL tree
9.	minimal spanning trees: Kruskal's and Prim's algorithm
10.	Decision problems, P, NP and coNP classes

11.	No lecture
12	NP-completeness, NP-complete problems
13	2. midhalf paper
14	1. repairing paper

Practical work:	
No.	
1.	Ordo, omega, theta, branch and bound, dinamical programming (binomial coeffients, backpack)
2.	Graphs,, breadth first search, depth first search, maximal matching in bipartitate graphs
3.	Bellman-Ford's , Floyd's, Dijkstra's algoritmus
4.	searching (linear, binary), sorting: insertion sort, bubble sort, shell sort
5.	sorting: :shell sort, merge sort, bucket and radix sort
6.	No lecture
7.	First midhalf test
8.	binary search tree, 2-3 tree, B tree, AVL tree
9.	minimal spanning trees: Kruskal's and Prim's algorithm
10.	Decision problems, P, NP and coNP classes
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12	NP-completeness, NP-complete problems
13	2. midhalf paper
14	1. repairing paper

Requirements
Attendance at lectures:
It is compulsory to attend the lectures. The rules of education and exam directory (TVSZ) are the guidelines.
Exams and tests (types, data)
All exams are written.

Requirements for qualification:

The students can get the lecturer's signature just in case if they wrote both test papers.

To admit the exam tests that can be acquired in two mid(half)test papers **writing score (100 points) must be at least 50% over.**

In the mid(half)year written test papers theoretical issues and task problems are included. The theoretical issues are the material of the lectures and/or the board exercises.

If both mid(half)year test papers are written by the student, then he gets an opportunity for repeating the weaker mid(half)year test paper on 14. week.

In this case the total points will be calculated based on the corrective (and no the original) mid(half) year test paper.

If the student both mid(half) year tests wrote, but did not achieve the 50 points needed to be admitted to the exam test, then during the first two weeks of the exam period once a pre-specified time may attempt to repair. Then he needed to write from the material of the whole semester and the obtainable score of 50% must be achieved to be admitted to. The student may enter the repair procedure through the „Neptun" system with paying the special charge fee for the repair procedure.

Type of exam (written, oral, tests etc.) and the method of assessment:

Type of the exam test: in written form.

It is possible to give recommendable marks to the students if the student wrote both mid(half) year tests and achieved the 50 points needed to be admitted to the exam test. The following result of the sum of the points of the midhalf tests determines the following grades:

74-100 point: class (5)

50-73 point: fine (4).

The examination test consists of theoretical and practical parts: theoretical questions to answer for a maximum of 50 points, the practical tasks will be for a maximum of 50 points. The total score on the exam test received from the points of the theoretical questions and plus of the practical tasks received.

The resulting point sum can be determined by the Grade exam in the following table:

Total point for tests	**The colloquium given grade**
86–100	class (5)
74–85	fine (4)
62–73	fair (3)
50–61	sufficient (2)
0–49	insufficient (1)

Literature

Compulsory:	◆ PPT files on the homepage of institute
Recommended:	◆ R. Sedgewick, K. Wayne: Algorithms
Others:	◆ Herbert S. Wilf: Algorithms and Complexity

Quality Management

The structure of the course is harmonized with other lecturers from different universities. Assessment of students is carried out at every lecture, and at the end of semester. The ppt files are continuously renewed according to the new literature data.

Date:. 13.01.2023.

Lecturer:	**Dean:**