Óbuda University Bánki Donát Faculty of Mechanical and Safety Engineering	Institute of Mechatronics and Vehicle Engineering

Subject title and code: **Advanced Algorithms BMXHAE4BNF** **Credits:** *4*

Full-time study 2024/2025 *ac. year* 2 *semester*

The course is available at: mechatronical engineering

Supervised by: Dr. Frigyik András **Instructors:** Dr. Frigyik András

Prerequisite (neptun code): Object-Oriented Programming BMXOPE3BNF

Weekly number of lessons

Lecture: 1	Group seminar:	Lab: 2	Consultation:

Way of assessment: Exam (Oral)

Online consultation *(in case it's required):* *... (BBB link)*

Edu. goal: *The goal of the course is to demonstrate how to apply the knowledge the students acquired during the Algorithms and Data Structures and the Object -Oriented Programming courses to dynamical data structures and the related algorithms. Graph algorithms are behind many solutions to problems that arise in robotics and logistics: Problems related to optimal paths or routing problems, in general. The lab sessions provide the students with opportunities to try out the algorithms covered in the lecture and hone their skills on problems of ever increasing complexity.*
Topics: Linked list, binary search tree, graph algorithms, breadth-first and depth-first search, topological sorting, path-finding in graphs, minimal spanning trees.

Schedule

Education week	**Topics**
1.	Recursive algorithms 17
2.	Data structure: Array 24
3.	Singly linked list 3
4.	Ordered linked list 10
5.	Binary search tree: Insertion, traversal 17
6.	Binary search tree: Search 24
7.	Binary search tree: Deletion 31
8.	**Lab Midterm 7**
9.	Graph algorithms 14
10.	**Rector's holiday**
11.	Topological sorting
12.	Path-finding in graphs, Minimal spanning trees
13.	**Theory Midterm** **Make-up / Retake of Lab Midterm**
14.	Breadth-first / Depth-first search

Mid-semester requirements

Test		Assignment to be submitted		Lab measurement	
amount	dates	amount	deadlines	amount	dates
2	8th,13th week			10	1,2,3,4,5,6,7, 12,13,14 (week)

According to the HKR attendance of group seminars and lab exercises are mandatory.

Other requirements for participation in sessions not covered by the regulations and restrictions on substitutions:

Test		Assignment to be submitted		Lab measurement	
maximum points available	minimum score required to pass /test	maximum points available	minimum score required to pass / assignment	maximum points available	minimum score required to pass /lab
40/20 points	16/8 points	…points	…points	10 points	…points

Total number of points achievable in semester: …points				
Grading thresholds	**satisfactory** 40 % and above	**average** 55 % and above	**good** 70 % and above	**excellent** 85 % and above

Other evaluation criteria:

During the semester, in accordance with the schedule above, a student can make up one of the midterms if they have a valid official absence note (from a doctor or from a coach). The make up test for theory will happen during the semester at a separately assigned time. The blitz quizzes cannot be made up.

All main areas of the course are evaluated by tests. For the midterms only those solution elements (data or control structures and algorithms) are acceptable that were covered either in the lectures or at the lab sessions.

The course is to be considered successfully executed and a **midterm grade** is obtained if and only if the lab test and the theory test results are higher than 40%.

During the semester, the signature requirements can be **replaced** in the following cases: one of the laboratory tests failed; illness. In this way, only one of the tests can be rewritten.

Percentage-wise contribution of the different tests to the final grade: Lab midterms together 40%, theory midterm 20% and the oral exam another 40%. Blitz quizzes provide extra points: 5-5 points to lab and theory midterms, respectively.

Receive a signature denied entry:	Signature is **denied** if the student cannot justify the absence for the test, has failed to write any of the tests, or miss blitz quizzes more then twice, or the number of absences exceeds the number specified in SRS.
Required references:	(Undergraduate Topics in Computer Science) K. Erciyes - Algebraic Graph Algorithms. A Practical Guide Using Python-Springer (2022)
Recommended references:	
Quality assurance methods of the subject:	

Things, that are not included, can be found within the regulations of Óbuda University.