Course title: NP-complete Problems in Graph Theory	**Neptun code:** **GEMAK420-a**
Course coordinator: Dr. József Túri, PhD, associate professor	
type of lesson and number of lessons: **lecture (2)**	
method of evaluation: colloquium	
curriculum location of the subject: (autumn/spring semester): autumn and spring	
pre-study conditions *(if any)*: -	
The task and purpose of the subject:	
The aim of the course is to acquaint the students with the complete NP problems of graph theory.	
Course description:	
In the course, we examine graph theory problems that are NP-complete problems. We show that if a problem is NP-complete, it does not necessarily mean that it is dismissible. We show examples that, although NP complete, are still manageable and partially solvable. Furthermore, we show solution attempts for how to try these approach problems and at least partially solve them. In addition, we present a connection and an analogy regarding how closely the problems seemingly far from graph theory are related to the problems described above. During the course, we examine the clique problem of an undirected graph, the circumscribing vertex set problem, the independent set problem, the stretched path problem, the graph coloring and chromatic number problem, the graphomorphism problem, the Chinese postman problem for graphs with both directed and undirected edges, the definition of the smallest maximal independent vertex set, definition of the maximal pairing containing the fewest lives, definition of the complete coloring problem, definition of the achromatic number.	
Required literature:	
1. Johnson, David S., Computers and Intractability: A Guide to the Theory of NP-Completeness, W. H. Freeman, (1979), Oxford Press 2. Complexity results on k-independence in some graph products, RAIRO Oper. Res.58 (2024), no.3, 2367–2378. 3. Distinct sizes of maximal independent sets on graphs with restricted girth, RAIRO Oper. Res.58 (2024), no.3, 2379–2391.	
Recommended literature:	
1. Papp, László F.(H-BUTE-CIT): Restricted optimal pebbling is NP-hard, Discrete Appl. Math.357(2024), 258–263.	