

Course title: Discrete Mathematics I.	Neptun code: GEMAN401-a
Course coordinator: Jenő Szigeti, professor of mathematics	
type and number of lesson: 6 occasions/semester	
method of accountability: submission and discussion of a detailed presentation	
curriculum location of the subject: autumn/spring	
pre-study conditions: none	
The task and purpose of the subject:	
Introduction to combinatorics and graph theory and to some aspects of algebra	
Course description:	
Exclusion-inclusion (sieve) formula and its applications: number of fixed point free permutations, number of surjective functions, Euler's phi function. Catalan numbers: different equivalent definitions. Some combinatorial identities. Graph theory: chromatic number, Brooks theorem, perfect graphs, Turan's problem, complete matchings, theorems of Tutte, linear algebraic methods in graph theory, further topics in recent graph theory. Introduction to Ramsey theory. Semigroups, groups and rings. Permutation groups.	
Required literature:	
<ol style="list-style-type: none"> 1. Richard P. Stanley (Massachusetts Institute of Technology): Enumerative Combinatorics, Vol. 1 and 2, Cambridge University Press, 2010 2. Reinhard Diestel (Universität Hamburg): Graph Theory, Graduate Texts in Mathematics (GTM, volume 173), Springer, 2017 	
Recommended literature:	
<ol style="list-style-type: none"> 1. Stephan Foldes: Fundamental Structures of Discrete Mathematics, Wiley 2. J. Riordan: Combinatorial identities, R.E. Krieger Pub. Co. 	