

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Discrete mathematics and mathematical basics of computer		Code 1010342611010347256
Field of study Mathematics	Profile of study (general academic, practical) (brak)	Year /Semester 1 / 1
Elective path/specialty -	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: Second-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 15 Classes: 15 Laboratory: - Project/seminars: -		No. of credits 4
Status of the course in the study program (Basic, major, other) (brak)		(university-wide, from another field) (brak)
Education areas and fields of science and art the sciences Mathematical sciences		ECTS distribution (number and %) 4 100% 4 100%
Responsible for subject / lecturer: dr Jacek Gruszka email: jacek.gruszka@put.poznan.pl tel. 61 665 33 20 Electrical Engineering ul. Piotrowo 3A, 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Basic knowledge of mathematical logic, abstract algebra and mathematical analysis
2	Skills	Array bill knows, knows how to develop a role in a number of the infinite, knows the concept of group
3	Social competencies	He sees the need to acquire new skills
Assumptions and objectives of the course: The aim of the course is to familiarize students with the basic concepts and methods of discrete mathematics and its applications		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. He knows and understands the basic concepts, theorems and methods of discrete mathematics - [K_W01, K_W04]		
2. Able to assess the difficulty of the problems in the field of discrete mathematics, and select a method to solve them - [K_W11, K_W03]		
3. He knows some of the types of practical problems using combinatorial models - [K_W04, K_W06]		
Skills:		
1. Can understanding the present known zag adnienia and their applications - [K_U02]		
2. .Can independently carry out strict reasoning with knowledge - [K_U13, K_U01]		
3. Able to use knowledge of the elements of discrete mathematics - [K_U15]		
Social competencies:		
1. Able to critically assess their level of understanding of a given problem and the lack of elements of reasoning - [K_K01]		
Assessment methods of study outcomes		
One test (problematic issues, students can use their notes)		
Written exam		

Course description

Mathematical Induction

Recursion:

- Recursive definitions
- Recursive dependencies
- Fibonacci numbers
- generating functions
- Catalan numbers

Counting sets and functions:

- Counting of subsets
- Dirichlet drawer principle
- On-off rule

Group of permutations:

- distribution of permutations into cycles
- Burnside's lemma

Generating functions:

- development of rational functions
- generating functions in solving of recursive dependencies
- Catalan numbers
- Stirling numbers first and second kind

Number theory:

- divisibility, GCD, LCM, primes numbers
- Euclid's algorithm

Modular arithmetic:

- Fermat theorem
- Euler's theorem
- Chinese theorem of rests
- solving equations of modular arithmetic

Graphs:

- basic concepts
- trees, cycles, tournaments
- Euler and Hamilton cycles
- bipartite graphs, associations and claim Hall
- planarity and Kuratowski theorem

Algebraic methods in graph theory:

- neighborhood matrix
- incidence matrix

Basic bibliography:

1. K.A.Ross, Ch.R.B.Wright, *Matematyka Dyskretna*, Państwowe Wydawnictwo Naukowe, Warszawa 1996.
2. W.Lipski, W.Marek, *Analiza kombinatoryczna*, Państwowe Wydawnictwo Naukowe, Warszawa 1986.
3. R.J.Wilson, *Wprowadzenie do teorii grafów*, Państwowe Wydawnictwo Naukowe, Warszawa 1985.

Additional bibliography:

1. V.Bryant, *Aspekty kombinatoryki*, Wydawnictwa Naukowo-Techniczne 1977.
2. R.L.Graham, D.E.Knuth, O.Patashnik, *Matematyka Konkretna*, Państwowe Wydawnictwo Naukowe, Warszawa 1996.

Result of average student's workload

Activity		Time (working hours)
Student's workload		
Source of workload	hours	ECTS
Total workload	180	4
Contact hours	30	4
Practical activities	30	0