

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Discrete mathematics and mathematical basics of computer</b>		Code <b>1010342611010347256</b>
Field of study <b>Mathematics</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>1 / 1</b>
Elective path/specialty <b>Modelling in applied sciences</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>Second-cycle studies</b>	Form of study (full-time, part-time) <b>full-time</b>	
No. of hours Lecture: <b>15</b> Classes: <b>15</b> Laboratory: <b>15</b> Project/seminars: <b>-</b>		No. of credits <b>4</b>
Status of the course in the study program (Basic, major, other) <b>(brak)</b>		(university-wide, from another field) <b>(brak)</b>
Education areas and fields of science and art <b>the sciences</b> <b>Mathematical sciences</b>		ECTS distribution (number and %) <b>4 100%</b> <b>4 100%</b>
<b>Responsible for subject / lecturer:</b>  dr Jacek Gruszka email: jacek.gruszka@put.poznan.pl tel. 61 665 33 20 Electrical Engineering ul. Piotrowo 3A, 60-965 Poznań		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	Basic knowledge of mathematical logic, abstract algebra and mathematical analysis
2	<b>Skills</b>	Array bill knows, knows how to develop a role in a number of the infinite, knows the concept of group
3	<b>Social competencies</b>	He sees the need to acquire new skills
<b>Assumptions and objectives of the course:</b> The aim of the course is to familiarize students with the basic concepts and methods of discrete mathematics and its applications		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b> 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]		
<b>Skills:</b> 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]		
<b>Social competencies:</b> 1. Able to critically assess their level of understanding of a given problem and the lack of elements of reasoning - [K_K01]		
<b>Assessment methods of study outcomes</b>		
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)
<b>Student's workload</b>		
Source of workload	hours	ECTS
Total workload	100	4
Contact hours	30	4
Practical activities	30	1