

Field: IT
Module title: Discrete Mathematics (B.4)
Preliminary conditions: none
Education aims: Familiarization with selected concepts and methods of discrete mathematics. Showing the ways and means of application of these methods in the field of computer science at the examples: the theory of algorithms and structures of data, information theory, relational databases, computer networks.
Education outcomes: The student has a basic knowledge of quantitative and descriptive methods used in discrete mathematics necessary to solve problems on a computer. For selected issues in the field of computer science the student is able to: identify, interpret and define the problems, find their solution and indicate possible application, using the concepts and tools of discrete mathematics (relations, recursion, graph, Boolean algebra, quantitative methods).
Module type and contents: <u>Lecture:</u> Elements of mathematical logic: logical sentence, tautology, sentential function, quantifiers. Techniques of proofs: direct proof, reductio ad absurdum. Mathematical induction. The algebra of sets: operations on sets, basic properties, Cartesian product. Relations: basic properties, order relations and equivalence relations. Functions: basic properties, operations on functions. Elements of combinatorics: basic notions, Newton's formula, counting methods: the principle of multiple-choice, additivity principle, Dirichlet's box principle, principle of inclusion-exclusion. Recursion theory: linear recurrences of first and higher orders, generating functions. Trees and graphs: basic notions, operations on graphs, planar graphs, directed graphs, coloring graphs. Introduction to Boolean algebra and its applications. <u>Classes:</u> During the classes students solve some problems from the following areas: mathematical logic, predicate logic, set theory, basic theory of relations and functions, mathematical induction, recursion, combinatorics and graph theory.
Educational methods: Lessons, classes.
Assessment methods: Examination.
ECTS credits: 6
Students workload (hs.): 150
Form Number of hours: 30
Author of a module: dr Karol Selwat
Module language: english