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| **Module card** |
| I. GENERAL INFORMATION |
| **Witelon Collegium State University****DEPARTMENT OF TECHNICAL AND ECONOMIC SCIENCE** |
| **Field** | Basic courses |
| **Module title** | Discrete mathematics (B.3) |
| **Language of lecture** | English |
| **ECTS points** | 4 |
| **Preliminary conditions:** | Mathematics I (B.2) |
| II. 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. |
| III. 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). |
| IV. EDUCATIONAL METHODS |
| **Assesment method:** Examination. |
| **Student workload:** 100 hours. |
| V. MODULE TYPE AND CONTENTS |
| Lecture: 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. 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. Classes: 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. |
| VII. ECTS POINT BALANCE SHEET - STUDENT'S WORKLOAD |
| **Category** | **Student’s workload** |
| ***Contact hours*** | 32 |
| Participation in lectures | 15 |
| Participation in classes, workshops | 15 |
| Exam | 2 |
| ***Independent student’s work*** | 68 |
| Preparation for the lecture | 20 |
| Preparation for the classes, workshops | 28 |
| Preparation for the test | - |
| Preparation for the exam | 20 |
| Preparing the project | - |
| Preparing multimedia presentation | - |
| ***Total numer of hours*** | 100 |
| ***ECTS points***  | 4 |
| VIII. Recommended literature |
| 1. K. A. Ross, C. R. B. Wright, *Discrete Mathematics,* Pearson, 2003.2. R. L. Graham, D. E. Knuth, O. Patashnik, *Concrete Mathematics: A Foundation for Computer Science,* Addison-Wesley Publishing Company, 1994.3. O. Levin, *Discrete Mathematics: An Open Introduction,* University of Northern Colorado, 2019. 4. R. J. Wilson, *Introduction to graph theory*,Addison-Wesley Longman Limited, 1998. |