

FACULTY Computer Science & Management..... / DEPARTMENT.....

SUBJECT CARD**Name in Polish :...Logika i Matematyka Dyskretna****Name in English: Logics and Discrete Mathematics****Main field of study (if applicable): Computer Science.....****Specialization (if applicable):****Level and form of studies: 1st level, full-time****Kind of subject: obligatory****Subject code ...INZ0258W, INZ0258C****Group of courses : NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30	30			
Number of hours of total student workload (CNPS)	90	90			
Form of crediting	Examination	crediting with grade			
For group of courses mark (X) final course					
Number of ECTS points	3	3			
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	1,8	1,8			

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Has a basic knowledge of Linear Algebra
2. Has basic skills in manipulation of algebraic formulas

SUBJECT OBJECTIVES

- C1 Acquisition of knowledge about basic definitions of Propositional Calculus
- C2 Acquisition of knowledge about Logical Equivalences and Implications
- C3 Acquisition of knowledge about diverse Methods of Proofs
- C4 Acquisition of knowledge about Predicate Calculus and Infinite Sets
- C5 Acquisition of knowledge about Relations, especially Equivalence Relations and Ordering Relations
- C6 Acquisition of knowledge about selected Counting Methods
- C7 Acquisition of knowledge about Graphs and Trees
- C8 Acquisition of knowledge about Depth Search of Trees & Polish Notation
- C9 Acquisition of knowledge about Computational Complexity & Big-Oh Notation
- C10 Acquisition of knowledge about Permutations and Groups
- C11 Development of skill of manipulating Logic Formulas
- C12 Development of skill of proving Logic Theses
- C13 Development of skill of classifying Relations
- C14 Development of skill of applying various Counting Methods
- C15 Development of skill of using various Algorithms of Depth Search of Trees
- C16 Development of skill of using Big-Oh Notation in analysis of Computational Complexity
- C17 Development of skill of using and manipulating cyclic notation of Permutations

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

- PEK_W01 Knows basic definitions of Propositional Calculus
- PEK_W02 Knows basic Logic Equivalences and Implications
- PEK_W03 Knows basics of Predicate Calculus and Methods of Proofs
- PEK_W04 Knows basic definitions of Relations, Equivalence Classes and Orders
- PEK_W05 Knows basics of Counting Methods
- PEK_W06 Knows basic definitions of Graphs and Trees
- PEK_W07 Knows various algorithms for Depth Search of Trees and the idea of Polish Notation
- PEK_W08 Knows Big- Oh Notation and its application to analysis of Computational Complexity
- PEK_W09 Knows basics of Group Theory, exemplified by Permutation Groups

relating to skills:

- PEK_U01 Can manipulate formulas of Propositional Calculus
- PEK_U02 Can manipulate formulas of Predicate Calculus
- PEK_U03 Can prove Logic Theorems directly and indirectly
- PEK_U04 Can analyze various properties of Relations and classify them
- PEK_U05 Can apply various Counting Methods to find number of elements in sets
- PEK_U06 Can apply various algorithms for Depth Search of Trees
- PEK_U07 Can change formulas in Polish and Inverse Polish Notations to ordinary (infix) notation and vice versa
- PEK_U08 Can apply Big-Oh Notation to analyze Computational Complexity.
- PEK_U09 Can use cyclic notation in analysis of Permutation Groups

relating to social competences:

PEK_K01 Understands the importance of logic reasoning in everyday life and improves his/her skills in this field

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Propositions. Propositional Calculus	2
Lec 2	Logical Equivalences and Implications	2
Lec 3	Methods of Proofs: Direct & Indirect	2
Lec 4	Methods of Proofs: Gentzen Sequents	2
Lec 5	Predicate Calculus. Infinite Sets	2
Lec 6	Sets. Relations. Functions.	2
Lec 7	Equivalence Relations. Equivalence Classes	2
Lec 8	Ordering Relations. Special Orders.	2
Lec 9	Counting Methods	2
Lec 10	Introduction to Graphs and Trees	2
Lec 11	Depth Search of Trees. Polish Notation	2
Lec 12	Euler Problem. Hamilton Problem	2
Lec 13	Computational Complexity. Big-Oh Notation	2
Lec 14	Permutations	2
Lec 15	Algebraic Structures. Groups	2
	Total hours	30
Form of classes - class		Number of hours
Cl 1	Practical Formulation of Propositions and their Logic Notation	2
Cl 2	Exercises in Logical Equivalences and Implications	2

Cl 3	Exercises in Direct and Indirect Proofs	2
Cl 4	Indirect Proofs by Gentzen Sequents	2
Cl 5	Exercises in Predicate Calculus. Distinguishing Countable and Not Countable Sets.	2
Cl 6	Investigation of Basic Properties of Relations and Functions	2
Cl 7	Identification of Equivalence Relations and their Equivalence Classes	2
Cl 8	Identification of Ordering Relations and Special Orders	2
Cl 9	Exercises in various techniques of Counting	2
Cl 10	Exercises in basic properties of Graphs and Trees	2
Cl 11	Procedures of Depth Search of Trees. Exercises in Polish Notation	2
Cl 12	Existence of Solutions to Euler & Hamilton Problems	2
Cl 13	Determination of Computational Complexity of Algorithms. Use of Big-Oh Notation	2
Cl 14	Exercises in presenting Permutations in Cyclic Notation	2
Cl 15	Properties of Groups (in case of Permutational Groups)	2
	Total hours	30

TEACHING TOOLS USED

N1. Traditional lecture using board/video projector
N2. Tutorial classes
N3. Consultations
N4. Student's home work

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end))	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01... PEK_U09	Oral answers, problem solving on board
F2	PEK_W01... PEK_W09	Attendance & activity during classes
F3	PEK_U01... PEK_U09	Written test
P1 (E)	PEK_W01... PEK_W09	Written Examination
$P2 = 0,3 * F1 + 0,1 * F2 + 0,6 * F3$ crediting for classes		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

- [1] Ross K. A., Wright C. R. B., Discrete Mathematics. Prentice Hall Inc.
- [2] Aho A.V., Hopcroft J.E., Ullman J.D., Design and Analysis of Computer Algorithms. Wiley and Sons.
- [3] Wilson, R.J., Introduction to Graph Theory. Wiley and Sons.

SECONDARY LITERATURE:

- [1] Lipski W. Combinatorics for Computer Programmers, WNT (in Polish)

SUBJECTS SUPERVISOR (NAME &SURNAME, E-MAIL ADDRESS)

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR
SUBJECT
Logics and Discrete Mathematics
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
...Computer Science.....

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K1INF_W02	C1	Lec1	N1, N3, N4
PEK_W02	K1INF_W02	C2	Lec2	N1, N3, N4
PEK_W03	K1INF_W02	C3,C4	Lec3,Lec4&5	N1, N3, N4
PEK_W04	K1INF_W02	C5	Lec6,Lec7&8	N1, N3, N4
PEK_W05	K1INF_W02	C6	Lec9	N1, N3, N4
PEK_W06	K1INF_W02	C7	Lec10,Lec11	N1, N3, N4
PEK_W07	K1INF_W02	C8	Lec11,Lec12	N1, N3, N4
PEK_W08	K1INF_W02	C9	Lec13	N1, N3, N4
PEK_W09	K1INF_W02	C10	Lec14,Lec15	N1, N3, N4
PEK_U01 (skills)	K1INF_W17	C11	CI1	N2, N3, N4
PEK_U02	K1INF_W17	C11	CI2	N2, N3, N4
PEK_U03	K1INF_W17	C12	CI3,CI4,CI5	N2, N3, N4
PEK_U04	K1INF_W17	C13	CI6,CI7.CI8	N2, N3, N4
PEK_U05	K1INF_W17	C14	CI9	N2, N3, N4
PEK_U06	K1INF_W17	C15	CI10, CI11	N2, N3, N4
PEK_U07	K1INF_W17	C15	CI11, CI12	N2, N3, N4
PEK_U08	K1INF_W17	C16	CI13	N2, N3, N4
PEK_U09	K1INF_W17	C17	CI14, CI15	N2, N3, N4
PEK_K01 (competences)	K1INF_W02	C1...C4	Lec1...Lec5	N1, N3, N4

** - enter symbols for main-field-of-study/specialization educational effects

*** - from table above