Bialystok University of Technology									
Field of study	**Computer Science**							**Degree level and programme type**	**Engineer's degree full-time programme**
Specialization/ diploma path	**---**							**Study profile**	academic
Course name	**Logic and Set Theory**							**Course code**	**FCS-00058**
								Course type	obligatory
Forms and number of hours of tuition	L	C	LC	P	SW	FW	S	**Semester**	1
	30	30						**No. of ECTS credits**	**6**
Entry requirements									
Course objectives	The aim of the lecture is to give the students a wide general view of the fundamental notions concerning algebra of sets, algebra of relations and basic deductive systems at the level of propositional and predicate logic. Students learn how to properly construct mathematical reasoning and develop the ability to provide mathematical proofs. Emphasis will be put on providing a context for the application of the presented notions within the computer science.								
Course content	Lecture: 1. Algebra of sets. 2. Propositional calculus and methods of proving. 3. First-order predicate calculus. 4. Relations and their properties. 5. Equivalence relations. Abstraction classes. 6. Ordering relations and their types. 7. Functions as unambiguous relations. Classes: 1. Determining the properties of sets. Performing operations on sets. 2. Examining of tautology and satisfiability of propositional calculus formulas. Verification of the correctness of selected reasoning. 3. Examining of tautology and satisfiability of predicate calculus formulas in selected models. 4. Determining the properties of relations. Performing operations on relations. 5. Determining classes of abstraction and division of a set for selected equivalence relations. 6. Finding special elements of posets (upper and lower bound, the largest, the smallest, a maximal, a minimal element). 7. Determining the properties of functions. Performing operations on functions.								
Teaching methods	informative lecture, lecture problem, subject exercises,								
Assessment method	Lectures: exam, problem sets. Classes: tests, quizzes, homework tasks.								

Symbol of learning outcome	**Learning outcomes**	**Reference to the learning outcomes for the field of study**
LO1	defines the notions of mathematical logic and set theory in range useful for information technology, in particular for analysis computational complexity and correctness of programs.	K_W01
LO2	examines propositional calculus formulas and simple formulas of the predicate calculus; tests their satisfiability and tautology; justifies the correctness of simple reasoning	K_U01
LO3	performs operations on sets, functions and relations; recognizes types of relations and discusses their properties; distinguishes classes of abstraction for equivalence relations	K_U01
LO4	verifies basic properties of functions and relations, including equivalence relations and order relations	K_U01

Symbol of learning outcome	**Methods of assessing the learning outcomes**	**Type of tuition during which the outcome is assessed**
LO1	tests, quizzes	L
LO2	tests, quizzes	C
LO3	tests, quizzes	C
LO4	tests, quizzes	C

Student workload (in hours)	**No. of hours**
1 - Attendance at lectures -	30
2 - Attendance at classes -	30
3 - Preparation for classes -	45
4 - Participation in student-teacher sessions -	20
6 - Preparation for exam -	23
7 - Participation in exam -	2
TOTAL:	**150**

Quantitative indicators	**HOURS**	**No. of ECTS credits**
Student workload – activities that require direct teacher participation	82 (7)+(4)+(2)+(1)	3.3
Student workload – practical activities	75 (3)+(2)	3.0

Basic references	1. K. A. Ross, C. R. B. Wright. Discrete Mathematics, Prentice Hall, 1988. 2. E. Mendelson, Introduction to Mathematical Logic, CRC Press, 1997. 3. K. Devlin, Sets, Functions, and Logic, An Introduction to Abstract Mathematics. Chapman & Hall/CRC Mathematics (3rd ed.), 2003. 4. N. Nissanke, Introductory logic and sets for computer scientists. Addison-Wesley, 1999.
Supplementary references	1. M. Ben-Ari, Mathematical Logic for Computer Science, Springer, 2001. 2. N. L. Biggs, Discrete Mathematics, Oxford University Press, 1989. 3. A. Hajnal, P. Hamburger, Set Theory, Cambridge University Press, 1999. 4. J. Matousek, J. Nesetril, Discrete Mathematics, Clarendon Press, Oxford, 2002. 3. J.L. Bell, M. Machover, A course in mathematical logic, North-Holland, Amsterdam 1977.
Organisational unit conducting the course	Department of Theoretical Computer Science — **Date of issuing the programme**
Author of the programme	dr Magdalena Kacprzak — Feb. 17, 2022

L – lecture, C – classes, LC – laboratory classes, P – project, SW – specialization workshop, FW – field work,S – seminar