KARTA PRZEDMIOTU

I. Dane podstawowe

Nazwa przedmiotu	Wstęp do matematyki
Nazwa przedmiotu w języku angielskim	Introduction to mathematics
Kierunek studiów	Matematyka (Mathematics)
Poziom studiów (I, II, jednolite magisterskie)	I
Forma studiów (stacjonarne, niestacjonarne)	Stacjonarne (Full-time studies)
Dyscyplina	Matematyka (Mathematics)
Język wykładowy	Angielski (English)

Koordynator przedmiotu/osoba odpowiedzialna	Dr hab. Dariusz Partyka

Forma zajęć *(katalog zamknięty ze słownika)*	Liczba godzin	semestr	Punkty ECTS
wykład	60	I	11
konwersatorium			
ćwiczenia	60	I	
laboratorium			
warsztaty			
seminarium			
proseminarium			
lektorat			
praktyki			
zajęcia terenowe			
pracownia dyplomowa			
translatorium			
wizyta studyjna			

Wymagania wstępne	No introductory requirements.

II. Cele kształcenia dla przedmiotu

C1. Presentation of basic concepts of mathematical logic.
C1. Presentation of basic concepts of set theory.
C3. Familiarize students with basic number structures.

III. Efekty uczenia się dla przedmiotu wraz z odniesieniem do efektów kierunkowych

Symbol	Opis efektu przedmiotowego	Odniesienie do efektu kierunkowego
WIEDZA		
W_01	The student knows how to construct and value logical formulas and quantifiers formulas. Is familiar with verification methods of logical tautologies. Understands what is an axiomatic system and what is the proving process. Knows basic axiomatic systems of sentential calculus.	K_W02, K_W03, K_W04, K_W05, K_W06
W_02	The student knows basic notions of the set theory and their properties. Understands what is an ordered pair and a relation. Distinguishes fundamental types of relations: Functions, order relations and equivalence relations. Knows their basic properties and examples.	K_W01, K_W04, K_W05, K_W06
W_03	The student knows what are equinumerous classes and what is the cardinality of a class. Is familiar with cardinal numbers, the operations on cardinal numbers and the order relation for cardinal numbers.	K_W04, K_W05, K_W06
W_04	The student is familiar with natural numbers. Knows the proving method by mathematical induction and the technique of defining functions by recurrence.	K_W04, K_W05
W_05	The student knows how to construct the structures of integer, rational and real numbers.	K_W01, K_W04
UMIEJĘTNOŚCI		
U_01	The student can construct and value logical formulas and quantifiers formulas. Is capable to prove logical tautologies and derive consequences from axiomatic systems of sentential calculus and quantifier calculus. Uses logical tautologies, in particular can find a normal form of a logical formula.	K_U01, K_U02, K_U04, K_U36
U_02	The student can do the standard set operations and derive their basic properties. Is capable to analyze the properties of relations and functions. Uses order relations and equivalence relations. Constructs quotient classes of an equivalence relation.	K_U02, K_U04, K_U05, K_U06, K_U07, K_U09, K_U11, K_U36
U_03	The student is able to study the equinumerosity of classes, to do arithmetic operations on cardinal numbers and to compare cardinal numbers.	K_U02, K_U05, K_U06, K_U07
U_04	The student can prove properties involving natural numbers by means of mathematical induction and can construct functions by the recurrence technique	K_U01, K_U02, K_U03, K_U06, K_U09, K_U11
U_05	The student uses the properties of arithmetical operations and order relation for integral numbers, rational numbers and real numbers.	K_U02, K_U04, K_U05, K_U06, K_U08, K_U09, K_U11, K_U17
KOMPETENCJE SPOŁECZNE		
K_01	The student understands the need to further develop his knowledge and skills in basic of mathematics. Can formulate questions in order to better understand the subject.	K_K01
K_02	The student can present issues dealing with basic of	K_K05

	mathematics in an understandable way.	

IV. Opis przedmiotu/ treści programowe

1. Logical sentences and logical formulas. Logical tautologies.
2. Logical functions and quantifiers formulas. Quantifiers tautologies.
3. The mathematical logic as a description language of mathematics.
4. Axiomatic systems. Mathematical deduction.
5. Classes of objects.
6. Basic operations on classes.
7. Ordered pairs. Cartesian product of classes. Relations. Structures.
8. Zermelo–Fraenkel set theory with the axiom of choice (ZFC structures).
9. Functions and types of functions.
10. Order relations. The greatest element, the least element, a maximal element, a minimal element of a class. The supremum and infimum of a class.
11. Equivalence relations. Abstract classes and quotient classes.
12. The equinumerosity of classes. Cardinal numbers. Operations on cardinal numbers. The order relation of cardinal numbers.
13. Natural numbers. Mathematical induction. Defining functions by recurrence. Sequences and finite sequences. Generalized sequences.
14. The Peano axioms for the natural numbers.
15. The structure of integers.
16. The structure of rational numbers.
17. The structure of real numbers.
18. The extended structure of real numbers.

V. Metody realizacji i weryfikacji efektów uczenia się

Symbol efektu	Metody dydaktyczne *(lista wyboru)*	Metody weryfikacji *(lista wyboru)*	Sposoby dokumentacji *(lista wyboru)*
WIEDZA			
W_01	Conventional lecture, practical classes.	Test, written exam, oral exam.	Evaluated test, protocol.
W_02	Conventional lecture, practical classes.	Test, written exam, oral exam.	Evaluated test, protocol.
W_03	Conventional lecture, practical classes.	Test, written exam, oral exam.	Evaluated test, protocol.
W_04	Conventional lecture, practical classes.	Test, written exam, oral exam.	Evaluated test, protocol.
W_05	Conventional lecture, practical classes.	Test, written exam, oral exam.	Evaluated test, protocol.
UMIEJĘTNOŚCI			
U_01	Conventional lecture, practical classes.	Test, written exam, oral exam.	Evaluated test, protocol.
U_02	Conventional lecture, practical classes.	Test, written exam, oral exam.	Evaluated test, protocol.
U_03	Conventional lecture, practical classes.	Test, written exam, oral exam.	Evaluated test, protocol.

U_04	Conventional lecture, practical classes.	Test, written exam, oral exam.	Evaluated test, protocol.
U_05	Conventional lecture, practical classes.	Test, written exam, oral exam.	Evaluated test, protocol.
KOMPETENCJE SPOŁECZNE			
K_01	Discussion.	Observation.	Observation report.
K_02	Discussion.	Observation.	Observation report.

VI. Kryteria oceny, wagi…

LECTURE:
The completion of classes is required.
Written and oral exam together constitute the final grade:
91 – 100% (5,0)
81 – 90% (4,5)
71 – 80% (4,0)
61 – 70% (3,5)
51 – 60% (3,0)
Less than 51% (2,0)

CLASSES:
At least 80% of attendance is required.
Three tests together constitute the final grade:
91 – 100% (5,0)
81 – 90% (4,5)
71 – 80% (4,0)
61 – 70% (3,5)
51 – 60% (3,0)
Less than 51% (2,0)

Detailed rules of evaluation are given on lectures and classes.

VII. Obciążenie pracą studenta

Forma aktywności studenta	Liczba godzin
Liczba godzin kontaktowych z nauczycielem	180
Liczba godzin indywidualnej pracy studenta	150

VIII. Literatura

Literatura podstawowa

Lecture notes and lecture notes in electronic form as well as

1. R. R. Stoll, *Set Theory and Logic*, Dover Publications, Inc., New York.
2. K. Kuratowski, *Wstęp do teorii mnogości i topologii*, PWN, Warszawa.
3. H. Rasiowa, *Wstęp do matematyki współczesnej*, PWN, Warszawa.
4. J. Onyszkiewicz, W. Marek, *Elementy logiki i teorii mnogości w zadaniach*, PWN, Warszawa.
5. A. Rutkowski, *Elementy logiki matematycznej*, Wyd. Szkolne i Pedagogiczne, Warszawa.
6. W. Guzicki, P. Zakrzewski, *Wykłady ze wstępu do matematyki*, wprowadzenie do teorii mnogości, PWN, Warszawa.
7. W. Guzicki, P. Zakrzewski, *Wstęp do matematyki*, zbiór zadań, PWN, Warszawa.

Literatura uzupełniająca

1. M.L. O'Leary, *A First Course in Mathematical Logic and Set Theory*, Wiley.
2. C. C. Pinter, *A Book of Set Theory*, Dover Publications, Inc., Mineola, New York.
3. L. Borkowski, *Wprowadzenie do logiki i teorii mnogości*, Tow. Naukowe KUL, Lublin.
4. A. Grzegorczyk, *Zarys logiki matematycznej*, PWN, Warszawa.
5. I. A. Ławrow, Ł.L. Maksimowa, *Zadania z teorii mnogości, logiki matematycznej i teorii algorytmów*, PWN, Warszawa.
6. K. A. Ross, Ch. R. B. Wright, *Matematyka dyskretna*, Wyd. Naukowe PWN, Warszawa.
7. J. Słupecki, K. Hałkowska, K. Piróg-Rzepecka, *Logika matematyczna*, Wyd. Naukowe PWN, Warszawa.
8. B. Stanosz, *Wprowadzenie do logiki formalnej*, Wyd. Naukowe PWN, Warszawa.
9. B. Stanosz, *Ćwiczenia z logiki*, Wyd. Naukowe PWN, Warszawa.