KARTA PRZEDMIOTU

I. Dane podstawowe

Nazwa przedmiotu	Linear algebra with geometry I
Nazwa przedmiotu w języku angielskim	Linear algebra with geometry I
Kierunek studiów	matematyka - grupa w języku angielskim
Poziom studiów (I, II, jednolite magisterskie)	I
Forma studiów (stacjonarne, niestacjonarne)	stacjonarne
Dyscyplina	matematyka
Język wykładowy	angielski

Koordynator przedmiotu/osoba odpowiedzialna	Dr Grzegorz Dymek

Forma zajęć *(katalog zamknięty ze słownika)*	Liczba godzin	semestr	Punkty ECTS
wykład	60	1	11
konwersatorium			
ćwiczenia	60	1	
laboratorium			
warsztaty			
seminarium			
proseminarium			
lektorat			
praktyki			
zajęcia terenowe			
pracownia dyplomowa			
translatorium			
wizyta studyjna			

Wymagania wstępne	1. Ability to do arithmetical calculations on real numbers. 2. Knowledge of basic formulas and functions.

II. Cele kształcenia dla przedmiotu

1. Gaining knowledge of fundamental notions of linear algebra and geometry and mathematical methods used in them.
2. Gaining skills of formulate various problems in the languages of linear algebra and geometry.

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

Symbol	Opis efektu przedmiotowego	Odniesienie do efektu kierunkowego
WIEDZA		
W_01	Student knows fundamental notions and theorems of linear algebra with geometry	K_W01, K_W02, K_W03, K_W04, K_W05, K_W07
W_02	Student knows basic examples illustrating basic notions of linear algebra with geometry	K_W01, K_W02, K_W03, K_W04, K_W05, K_W07
UMIEJĘTNOŚCI		
U_01	Student presents correct mathematical reasoning, formulates theorems and definitions	K_U01, K_U02, K_U03, K_U04, K_U05, K_U06, K_U07, K_U08, K_U17, K_U18, K_U19, K_U36
U_02	Student has ability to find own methods of solving various problems	K_U01, K_U02, K_U03, K_U04, K_U05, K_U06, K_U07, K_U08, K_U17, K_U18, K_U19, K_U36
KOMPETENCJE SPOŁECZNE		
K_01	Student is able to evaluate his/her knowledge from linear algebra with geometry	K_K01, K_K05

IV. Opis przedmiotu/ treści programowe

1. Groups, rings and fields.
2. Field of complex numbers.
3. Matrices and determinants.
4. Systems of linear equations.
5. Polynomial rings.
6. Vector spaces.
7. Linear transformations.
8. Eigenvalues and eigenvectors of linear transformations and matrices.
9. Diagonalizable matrices.

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, discussion, practical classes	test, written exam, oral exam	evaluated test, protocol
W_02	conventional lecture, discussion, practical classes	test, written exam, oral exam	evaluated test, protocol
UMIEJĘTNOŚCI			
U_01	conventional lecture, discussion, practical classes	test, written exam, oral exam	evaluated test, protocol
U_02	conventional lecture, discussion, practical classes	test, written exam, oral exam	evaluated test, protocol
KOMPETENCJE SPOŁECZNE			
K_01	conventional lecture, discussion, practical classes	test, written exam, oral exam	evaluated test, protocol

VI. Kryteria oceny, wagi…

91% – 100% excellent (5.0)
81% – 90% very good (4.5)
71% – 80% good (4.0)
61% – 70% satisfactory (3.5)
51% – 60% sufficient (3.0)
less than 51% fail (2.0)

Grade insufficient
(W) - student does not know fundamental notions discussed on classes;
(U) - student cannot solve basic problems from linear algebra with geometry;
(K) - student is unconscientious, does not participate in classes, does not do notes.

Grade sufficient
(W) - student knows fundamental notions discussed on classes. He/She knows examples illustrating these notions;
(U) - student can solve basic problems from linear algebra with geometry. He/She can apply basic techniques of solving such problems;
(K) - student participates in classes, does notes.

Grade good
(W) - student knows well fundamental notions discussed on classes. He/She has a knowledge of basic properties of these notions and their proofs. He/She knows how use these properties to solve basic problems;
(U) - student can solve basic problems from linear algebra with geometry. He/She can apply more advanced techniques of solving such problems. He/She can use basic properties of notions;
(K) - student is prepared to classes. He/She has a knowledge of basic properties of these notions and their proofs.

Grade very good

(W) - student knows well fundamental notions discussed on classes. He/She has a knowledge of more advanced properties of these notions and their proofs. He/She knows how use these properties to solve more advanced problems. He/She knows more important techniques of proofs;
(U) - student can solve more advanced problems from linear algebra with geometry. He/She can apply more advanced techniques of solving such problems. He/She can use more advanced properties of notions. He/She can perform simple proofs;
(K) - student participates actively in classes, asks questions, proposes solutions.

VII. Obciążenie pracą studenta

Forma aktywności studenta	Liczba godzin
Liczba godzin kontaktowych z nauczycielem	Lecture: 60 hrs. Classes: 60 hrs. Individual consultations: 30 hrs. In total: 150 hrs.
Liczba godzin indywidualnej pracy studenta	Preparation for classes: 60 hrs. Studying books: 45 hrs. Preparation for tests and exams: 45 hrs In total: 150 hrs.

VIII. Literatura

Literatura podstawowa
1. S. I Grossman, Elementary linear algebra, Saunders College Publishing, Philadelphia, 1991. 2. O. Bretscher, Linear algebra with applications, Prentice Hall, New Jersey, 1997. 3. K. Borsuk, Multidimensional analytic geometry, PWN-Polish Scientific Publishers, Warszawa 1969. 4.R. A. Sharipov, Course of analytical geometry - https://arxiv.org/pdf/1111.6521.pdf
Literatura uzupełniająca
1. W. Ledermann, Complex Numbers, Library of Mathematics, Routledge and Kegan Paul, London, 1962. 2. T. Lawson, Linear algebra, John Wiley & Sons, New York, 1996. 3. I. Vaisman, Analytical Geometry, World Scientific, 1997. 4. W.H. McCrea, Analytical geometry of three dimensions, Dover Pub., 2006.