Course Syllabus

I. General Information

Course name	Linear algebra with geometry II
Programme	mathematics
Level of studies (BA, BSc, MA, MSc, long-cycle MA)	BA
Form of studies (full-time, part-time)	full-time
Discipline	mathematics
Language of instruction	English

Course coordinator/person responsible	Dr Grzegorz Dymek

Type of class *(use only the types mentioned below)*	Number of teaching hours	Semester	ECTS Points
lecture	60	2	10
tutorial			
classes	60	2	
laboratory classes			
workshops			
seminar			
introductory seminar			
foreign language classes			
practical placement			
field work			
diploma laboratory			
translation classes			
study visit			

Course pre-requisites	1. Ability to do arithmetical calculations on real numbers. 2. Knowledge of basic formulas and functions.

II. Course Objectives

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. Course learning outcomes with reference to programme learning outcomes

Symbol	Description of course learning outcome	Reference to programme learning outcome
KNOWLEDGE		
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
SKILLS		
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_U16, K_U17, K_U20, K_U23
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_U16, K_U17, K_U20, K_U23
SOCIAL COMPETENCIES		
K_01	Student is able to evaluate his/her knowledge from linear algebra with geometry	K_K01, K_K05

IV. Course Content

1. Quadratic forms in real spaces.
2. Inner product spaces.
3. n-dimensional Cartesian space. Points and vectors.
4. Lines, planes and k-dimensional hyperplanes.
5. Affine maps.
6. Conics.
7. Quadrics.
8. Classifications of conics and quadrics.

V. Didactic methods used and forms of assessment of learning outcomes

Symbol	Didactic methods *(choose from the list)*	Forms of assessment *(choose from the list)*	Documentation type *(choose from the list)*
KNOWLEDGE			
W_01	conventional lecture, discussion, practical classes	test, written exam, oral exam	evaluated test, protocol
W_02	conventional lecture,	test, written exam, oral	evaluated test, protocol

	discussion, practical classes	exam	
SKILLS			
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
SOCIAL COMPETENCIES			
K_01	conventional lecture, discussion, practical classes	test, written exam, oral exam	evaluated test, protocol

VI. Grading criteria, weighting factors.....

91% – 100% excellent (5.0)
81% – 90% very good (4.5)
71% – 80% good (4.0)
61% – 70% satisfactory (3.5)
50% – 60% sufficient (3.0)
less than 50% 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. Student workload

Form of activity	Number of hours
Number of contact hours (with the teacher)	Lecture: 60 hrs. Classes: 60 hrs. Individual consultations: 30 hrs. In total: 150 hrs.
Number of hours of individual student work	Preparation for classes: 60 hrs. Studying books: 45 hrs. Preparation for tests and exams: 45 hrs In total: 150 hrs.

VIII. Literature

Basic literature
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
Additional literature
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.