Course title: **GEOMETRY**

ECTS credit allocation (and other scores): **4**

Semester: spring

Level of study: ISCED-6 - first-cycle programmes (EQF-6)

Branch of science: Natural sciences

Language: English /Polish

Number of hours per semester: 30 lectures + 30 classes = 60 hours

Course coordinator/ Department and e-mail: Erasmus coordinator Anna Szczepkowska/ WMiI,
erasmuswmii.uwm.edu.pl

Type of classes: classes and lectures

Substantive content

CLASSES:

Solving problems and issues relating to the content shown in the lecture. Tarski's axioms of Euclidean
geometry, information on absolute and hyperbolic geometry. Isometries and similarities of Euclidean plane and
space. The classification by theorem of reduction, properties. Some elements of geometry of triangles. Euler
circle. Theorems of Ceva and Menelaus. The power of the point with respect to the circle. Radical axis.
Inversion, Moebius planes. Geometric constructions. Constructible numbers. Mascheroni Theorem. Golden ratio
and regular pentagon. Elements of analytic geometry. Analytical description of isometries and similarities also with
complex numbers.
.

LECTURES:

Tarski's axioms of Euclidean geometry, information on absolute and hyperbolic geometry. Isometries and
similarities of Euclidean plane and space. The classification by theorem of reduction, properties. Some elements
of geometry of triangles. Euler circle. Theorems of Ceva and Menelaus. The power of the point with respect to
the circle. Radical axis. Inversion, Moebius planes. Geometric constructions. Constructable numbers.
Mascheroni Theorem. Golden ratio and regular pentagon. Elements of analytic geometry. Analytical description
of isometries and similarities. Analytical description of isometries and similarities also with complex numbers.

LEARNING PURPOSE

Extending the school knowledge of geometry. Acquainting with the axiomatic method of introducing geometry.
Extending the geometric intuition through information about non-Euclidean geometries. Acquainting with groups of
transformations of Euclidean plane and space.

On completion of the study programme the graduate will gain:

Knowledge:

The student knows the most important concepts and theorems of elementary geometry. Understands the
role and the importance of assumptions proof in geometry. It is understood axiomatic construction of the theory.
Can use mathematical formalism to describe mathematical models. Knows geometry of triangle, Ceva and Menelaus
theorems. Knows connections between triangles and circles, in particular circle of 9 points.
Idea and properties of constructible numbers. Application of circle inversion.

Skills:

The student can formulate theorems and definitions in geometry in a way that is understandable in speech and writing, is able to conduct easy and moderately difficult proofs of theorems.

Social Competencies:

The student is ready for lifelong learning, is able to precisely formulate questions to deepen one's understanding of a given topic or to find missing elements of reasoning.

BASIC LITERATURE
1) Jarosław Kosiorek, "Wykłady i zadania"; strona internetowa http://wmii.uwm.edu.pl/~kosiorek/Geometria/,;, wyd. Własne, 2017 ; 2) H..S.M Coxeter, Wstęp do geometrii dawnej i nowej , wyd. PWN, 1967 ; 3) R.Courant, H.Robbins, Co to jest matematyka, wyd. PWN, 1962 ; 4) M.Kordos, L.W.Szczerba, Geometria dla nauczycieli, wyd. PWN, 1976 ; 5) M.Stark, Geometria analityczna, wyd. PWN, 1974

SUPPLEMENTARY LITERATURE
1) S.J.Zetel, Geometria trójkąta, wyd. PZWS, 1964 ; 2) A.Tarski, What is elementary geometry in: The Axiomatic Method, wyd. North Holland, 1959

The allocated number of ECTS points consists of:

Contact hours with an academic teacher: 2,14 ECTS points,

Student's independent work: 1,86 ECTS points,