UNIVERSITY
OF WARMIA AND MAZURY
IN OLSZTYN

Faculty of Mathematics and Computer Science

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

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. Constructed numbers. Mascheroni Theorem. Golden ratio and regular pentagon. Elements of analytic geometry. Analytical description of isometrics and similarities. The use of complex numbers to describe the transformation of the plane.

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 isometrics and similarities. The use of complex numbers to describe the transformation of the plane. Inversion in solid geometry, sphere of 12 points.

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 consructable numbers. Application of circle inversion.
Knows sphere inversion in solid geometry and concept of sphere of 12 points

Skills:

The student knows how to solve basic types of differential equations of any order and systems of ordinary differential equations
Student is able to talk about mathematical problems using understandable, colloquial language.

Social Competencies:

The student knows the limits of his own knowledge and understands the need for further education. He works independently and in a team. Can formulate questions for understanding the subject or filling in the gaps in the 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,