

# Geometria elementarna - opis przedmiotu

Informacje ogólne	
Nazwa przedmiotu	Geometria elementarna
Kod przedmiotu	11.1-WK-MATP-GE-W-S14_pNadGenKDOBI
Wydział	<a href="#">Wydział Matematyki, Informatyki i Ekonometrii</a>
Kierunek	Mathematics
Profil	ogólnoakademicki
Rodzaj studiów	pierwszego stopnia z tyt. licencjata
Semestr rozpoczęcia	semestr zimowy 2018/2019

Informacje o przedmiocie	
Semestr	6
Liczba punktów ECTS do zdobycia	5
Typ przedmiotu	obieralny
Język nauczania	polski
Sylabus opracował	<ul style="list-style-type: none"><li>• dr hab. Krzysztof Przesławski, prof. UZ</li><li>• dr Krystyna Białek</li></ul>

Formy zajęć					
Forma zajęć	Liczba godzin w semestrze (stacjonarne)	Liczba godzin w tygodniu (stacjonarne)	Liczba godzin w semestrze (niestacjonarne)	Liczba godzin w tygodniu (niestacjonarne)	Forma zaliczenia
Wykład	30	2	-	-	Egzamin
Ćwiczenia	30	2	-	-	Zaliczenie na ocenę

## Cel przedmiotu

Introduction with basic notions, methods of elementary geometry as well as the students' equipment in basic mathematical indispensable tools to formulating and solving typical, the straight lines of tasks and the problems with range of studied direction of studies.

## Wymagania wstępne

Elementary algebra, linear algebra, basic analytic geometry.

## Zakres tematyczny

### Lecture

1. Isometrics of Euclidean plane: definitions, examples, kinds, classification of isometrics of plane -2h.
2. The similarity of Euclidean plane: basic definitions, dilatations, classification of similarities of plane - 2h.
3. Affine transformation: basic definitions, property, the analytic figure of affine transformation, matrices criteria - 2h.
4. Points and lines associated with a triangle: Menelaus' and Ceva's theorems-2h.
5. The Euler line and the 9-point circle - 2h.
6. The power of point with respect to a circle-2h.
7. The Theorems of Euler. The power straight line of steam of circles. The power centre of three of circles. The Brianchon Theorems -2h.
8. Circle inversion. The Feuerbach's Theorems - 2h.
9. Geometric constructions. Constructional problems, methods of solving the constructional problems. Constructions using ruler and compass - 2h.
10. The impossibility of solving the tree Famous Problems of Antiquity with Euclidean Tools - 2h.
11. Constructions of regular polygons. The constructions of chosen of regular polygons - 2h.
12. Constructions unclassic centres. The Mohr- Marcheroni Construction Theorem. The Poncelet-Steiner Construction Theorem - 2h.
13. Convex Polyhedron, Euler's formula, Platonian clods -2h.
14. An axiomatic approach to Euclidean geometry, absolute geometry. Various formulations of the fifth postulate -2h.
15. Hyperbolic geometry and its models (Klein and Poincaré models). Basic theorems. Other non-Euclidean geometries -2h.

### Class

1. Geometric transformations of Euclidean plane: isometrics, method of building the groups of transformations, examples of groups - 2h.
2. Isometrics on plane: analytic formulas central symmetry, translation, axial symmetry, turn around point about directed angle; the group of Isometric of own figures; examples - 2h.
3. Similarity of Euclidean plane: characteristics, examples and classification - 2h.
4. Affine Transformation: analytic figure, matric criteria - 2h.
5. Points and lines associated with a triangle: the Theorems Menelaus and Ceva, Applications of the Theorem of Menelaus and Ceva - 2h.
6. The Euler line and the 9-point circle - geometrical interpretation-2h.
7. Power of a point with respect to a circle - 2.
8. Theorems concerning chords, secants and tangents of a circle. Radical axis of two circles - 2h.
9. Circle inversion. Orthogonal circles- 2h.
10. Interim control written test - 2h.

11. Geometric constructions. Constructional problems, methods of solving the constructional problems. Constructions using the ruler and compass - 2h.
12. The impossibility of solving the tree Famous Problems of Antiquity with Euclidean Tools - 2h.
13. Constructions of regular polygons. The constructions of chosen of regular polygons - 2h.
14. Convex Polyhedron, Euler's theorem, Platonian clods - 2h.
15. Written test -2h.

## Metody kształcenia

Lecture: conventional, problematic, introduction.

Practice: the classic problematic method, work in groups, the demonstration from explanation, the discussion, storm of brains, work with programme C and R. in computer laboratory.

## Efekty uczenia się i metody weryfikacji osiągnięcia efektów uczenia się

Opis efektu	Symbol efektyw	Metody weryfikacji	Forma zajęć
Student know basic theorems of Euclidean Plane Isometries and understand the presence of the group structure of the transformations and build a group structure of the transformations; basic of Euclidean Plane similarity and is able to see the presence of the group structure of the transformations and build a group structure of the transformations; know basic theorems of Euclidean Plane Isometries and understand the presence of the group structure of the transformations and build a group structure of the transformations	<ul style="list-style-type: none"> <li>• <a href="#">K_W04</a></li> <li>• <a href="#">K_U17</a></li> <li>• <a href="#">K_K07</a></li> </ul>	<ul style="list-style-type: none"> <li>• egzamin - ustny, opisowy, testowy i inne</li> <li>• obserwacja i ocena aktywności na zajęciach</li> <li>• test</li> </ul>	<ul style="list-style-type: none"> <li>• Wykład</li> <li>• Ćwiczenia</li> </ul>
Student know basic theorems of triangle geometry with their proves and is able to use concept of vector in proving the Menelaos and Cevy theorem. Deepen their knowledge and abilities relating to the scope of their interests; are able to obtain information from specialist literature independently, also in foreign languages.	<ul style="list-style-type: none"> <li>• <a href="#">K_U16</a></li> <li>• <a href="#">K_K06</a></li> </ul>	<ul style="list-style-type: none"> <li>• egzamin - ustny, opisowy, testowy i inne</li> <li>• obserwacja i ocena aktywności na zajęciach</li> <li>• test</li> </ul>	<ul style="list-style-type: none"> <li>• Wykład</li> <li>• Ćwiczenia</li> </ul>
Student understands relation between the algebraic and geometrical description of transformations and algebraic sets the first and second level and is able to formulate statements and definitions in the intelligible way in the speech and the letter, is able to formulate opinions about the description of transformations and algebraic sets at the first and second level.	<ul style="list-style-type: none"> <li>• <a href="#">K_W01</a></li> <li>• <a href="#">K_U01</a></li> <li>• <a href="#">K_K07</a></li> </ul>	<ul style="list-style-type: none"> <li>• egzamin - ustny, opisowy, testowy i inne</li> <li>• obserwacja i ocena aktywności na zajęciach</li> <li>• test</li> </ul>	<ul style="list-style-type: none"> <li>• Wykład</li> <li>• Ćwiczenia</li> </ul>
Student understands the role and meaning of proof in geometric structures, as well as significance of assumptions in solving structural problems and is able to build basic geometric structures with compasses and the ruler as well as in free access computer programs (e.g. C.a.R).	<ul style="list-style-type: none"> <li>• <a href="#">K_W01</a></li> <li>• <a href="#">K_U02</a></li> <li>• <a href="#">K_K01</a></li> </ul>	<ul style="list-style-type: none"> <li>• egzamin - ustny, opisowy, testowy i inne</li> <li>• obserwacja i ocena aktywności na zajęciach</li> <li>• test</li> </ul>	<ul style="list-style-type: none"> <li>• Wykład</li> <li>• Ćwiczenia</li> </ul>
Student know methods of axiomatic in geometry and is able to perceive the elementary geometry as the example of the axiomatic theory and the classic system of the deduction including the historical development of geometrical problems, he is able to formulate statements and definitions based on the contemporary system of axioms of the Euclidean plane geometry, is able to search independently for information in literature, also in foreign languages.	<ul style="list-style-type: none"> <li>• <a href="#">K_W03</a></li> <li>• <a href="#">K_U06</a></li> <li>• <a href="#">K_K07</a></li> </ul>	<ul style="list-style-type: none"> <li>• egzamin - ustny, opisowy, testowy i inne</li> <li>• obserwacja i ocena aktywności na zajęciach</li> <li>• test</li> </ul>	<ul style="list-style-type: none"> <li>• Wykład</li> <li>• Ćwiczenia</li> </ul>

## Warunki zaliczenia

Assessment form - the final written exam.

The final grades: average grade of tests and exam.

The condition of positive assessment of practices - the positive assessment of two tests as well as the activity on practices.

To pass the test you need to obtain settled (for given test / colloquium) the minimum number of points (50%).

The condition of positive assessment of examination - the positive assessment of multiple choice test (the examples illustrated the lecture) by obtaining the settled minimum number of points of test (50%).

Checking students' preparation to classes as well as their activity on the practices.

The tests (colloquia) include tasks of diverse level of difficulty, permitting to assess if a student has reached the learning outcomes on basic level.

## Literatura podstawowa

1. Aleksandrow I. I.: Zbiór geometrycznych zadań konstrukcyjnych, PZWS, Warszawa 1964

2. Borsuk K., Szmielew W.: Podstawy geometrii,. PWN, Warszawa 1970
3. Doman R.: Wykłady z geometrii elementarnej, Wyd. Naukowe UAM, Poznań 2001
4. Kordos,M. Szczerba L., W.: Geometria dla nauczycieli, PWN, Warszawa 1976
5. Coxeter S. M.: Wstęp do geometrii dawnej i nowej, PWN, Warszawa 1967
6. Kowalski E.: Geometria dla studentów, WSP, Zielona Góra 1990
7. Modenov P.: Parhomenko A.: Geometric Transformations. Acad. Press, New York, 1965
8. Szmielew W.: Od geometrii afinicznej do euklidesowej, PWN, 1983
9. Zetel S. I.: Geometria trójkąta, PZWS, Warszawa 1964

## Literatura uzupełniająca

1. Berger M.: Geometrie, Nathan, Paris 1977
2. Coxter H.S.,M, Greitzer S.,L.: Geometry revisited, Toronto New York 1967
3. Neugebauer A.: Wstęp do planimetrii, Wydawnictwo Naukowe US, Szczecin 2000

## Uwagi

Zmodyfikowane przez dr Alina Szelecka (ostatnia modyfikacja: 08-07-2018 08:26)

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