Course description

1. Course title: FINITE PERMUTATION GROUPS	**2. Course code:**
3. Validity of course description:: 2019/20	
4. Level of studies: first cycle of higher education	
5. Mode of studies: intramural studies	
6. Field of study: MATHEMATICS (RMS) FACULTY SYMBOL) RMS	
7. Profile of studies: general	
8. Programme: all	
9. Semester:	
10. Faculty teaching the course: Faculty of Applied Mathematics	
11. Course instructor: dr inż. Witold Tomaszewski	
12. Course classification: a limited selection of items (“blok przedmiotów ograniczonego wyboru”)	
13. Course status: elective	
14. Language of instruction: English	
15. Pre-requisite qualifications: Basic knowledge of English, courses of algebra I and II	
16. Course objectives: Developing students’ facility in reading and understanding mathematical literature in English. The course aims to acquaint the students with various aspects of the theory of finite permutation groups	
17. Description of learning outcomes: A student who completes the course successfully should be able to	

No	Learning outcomes description	Method of assessment	Teaching methods	Learning outcomes reference code
1	speak and write about mathematics in English	midterm test, oral answer	lecture, class	
2	find the conjugacy classes, centralizers and normalizers in permutation groups	midterm test	lecture, class	
3	find the Cayley embedding of a finite group into a symmetric group and the embedding into a group of matrices	midterm test	lecture, class	
4	find the number of orbits, using Burnside Lemma and Polya Theory and orbits and stabilizers	midterm test	lecture, class	
5	recognize properties of permutation groups: transitivity, primitivity, regularity	midterm test	lecture, class	

6	do constructions: direct products and wreath product	midterm test	lecture, class	
7	use in practise Lagrange, Cauchy and Sylow theorems	midterm test	lecture, class	

18. **Teaching modes and hours**

Lectures	Classes	Laboratory	Project	Seminar
30	30			

19. Syllabus description:

Lectures: The first classes will be devoted to the basics of mathematical English
Center, centralizer, normalizer. Theorems on the number of conjugated elements and conjugated subgroups. Homomorphisms, isomorphisms and autmorphisms. Inner and outer automoprhisms. Permutations. Symmetric, alternating and dihedral groups. Generators of permutation groups. Subgroup of symmetric groups. Cycle decomposition of a permutation. Cycle index. Conjugated permutations. Centralizers. Cayley Theorem and variations on it. Transitivity and multiply transitivity. Primitivity and imprimitivity. Group actions on sets. Orbits and stabilizers. Burnside Lemma. Foundations of Polya Theory. Direct and wreath product. Theorems of Cauchy and Sylow. Applications of Sylow theorem. Sylow subgroups in symmetric groups. Selected problems of the theory of permutation groups.

Classes: The content of the class work will correspond to the content of the lecture. The class will be devoted to solving problems illustrating the theory studied during the lecture. The list of problems for students will be announced at the platform.

20. Examination: no

21. Primary sources:

1. P. J. Cameron, Permutation Groups, Cambridge Univ. Press, Cambridge 1999.
2. J.D. Dixon, B. Mortimer, Permutation Groups, Springer,

22. Secondary sources:

1. Materiały internetowe.
2. Notatki z wykładów.

23. Total workload required to achieve learning outcomes

Lp.	Teaching mode	Contact hours / Student workload hours
1	Lecture	30/30
2	Classes	30/30
3	Laboratory	-
4	Projckt	-
5	Seminar	-
6	Other	-
	Total numer of hours	60/60

24.

Total hours	120

25.

Number of ECTS credits:	

26.

Number of ECTS credits allocated for contact hours:	

27.

Number of ECTS credits allocated for in-practice hours (laboratory classes, projects):	0

28. Comments:

Zatwierdzono:

…….
(data i podpis prowadzącego)

……
(*data i podpis dyrektora instytutu/kierownika katedry/ Dyrektora Kolegium Języków Obcych/kierownika lub dyrektora jednostki międzywydziałowej)*