



Subject card

Subject name and code	Algebra II, PG_00021036						
Field of study	Mathematics						
Date of commencement of studies	October 2022	Academic year of realisation of subject			2023/2024		
Education level	second-cycle studies	Subject group			Obligatory subject group in the field of study Subject group related to scientific research in the field of study		
Mode of study	Full-time studies	Mode of delivery			blended-learning		
Year of study	2	Language of instruction			Polish		
Semester of study	3	ECTS credits			4.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Differential Equations and Mathematical Applications -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. Piotr Bartłomiejczyk					
	Teachers	dr hab. Piotr Bartłomiejczyk					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	30.0	0.0	0.0	0.0	60
	E-learning hours included: 30.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours		Self-study		SUM
	Number of study hours	60	5.0		35.0		100
Subject objectives	The aim of the subject is to introduce main facts and theorems in higher algebra, especially in Galois' theory and its algebraic and geometric applications.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K7_U01	Student can find normal subgroup, algebraic extension and solve algebraic equation.			[SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools		
	K7_W02	Student knows main facts and theorems of group, ring and fields theory and of Galois theory.			[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge		
	K7_U02	Student can find normal subgroup, algebraic extension and solve algebraic equation.			[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment		
	K7_W01	Student knows main facts and theorems of group, ring and fields theory and of Galois theory.			[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge		
	K7_U09	Student can find normal subgroup, algebraic extension and solve algebraic equation.			[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject		

Subject contents	<ol style="list-style-type: none"> 1. Groups, , cosets, normal subgroups. 2. Permutation group and its properties. 3. Rings and fields. 4. Field of complex numbers. Algebraic elements and their degrees. 5. Factorisation of polynomials, indecomposable polynomials, Eisenstein's criterion. 6. Algebraic extension of field. Base and degree of extension. 7. Algebraic and transcendental numbers. 8. Field of algebraic numbers. Field of polynomial's factorisation. 9. Primitive element of extension. Automorphism of fields. 10. Galois group of extension. Galois extension. 11. Galois theorems. 12. Solvable, cyclic and abelian extension. 13. Solving algebraic equations, solvable groups. 14. Equations unsolvable by roots. 15. Constructible extensions. Unfeasibility of some classic constructions. 											
Prerequisites and co-requisites	<p>Linear algebra.</p> <p>Algebra I.</p>											
Assessment methods and criteria	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 40%;">Subject passing criteria</th> <th style="width: 30%;">Passing threshold</th> <th style="width: 30%;">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td>Lecture</td> <td>50.0%</td> <td>40.0%</td> </tr> <tr> <td>Exercises</td> <td>50.0%</td> <td>60.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Lecture	50.0%	40.0%	Exercises	50.0%	60.0%
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Example issues/ example questions/ tasks being completed	<p>Find classes of conjugacy for permutation group.</p> <p>Find factorisation of polynomial in complex numbers field.</p> <p>Find algebraic extension of some field.</p>											
Work placement	Not applicable											