WROCŁAW UNIVERSITY OF TECHNOLOGY – PHD STUDIES

FACULTY OF …….
SUBJECT CARD
Course name in Polish **Podstawy teorii Galois**
Course name in English **Foundations of Galois Theory**
Course language
University-wide general course type:1) 1)basic course (mathematics, physics, chemistry, other) 2) humanity course 3) managerial skills 4) English language 5) other modern language Departmental course developing professional skills: 1) specialized course 2) interdisciplinary course 3) seminar (interdisciplinary, specialized, departmental)
Type of course (obligatory, optional)
Educational effects according to ZW 26/2017: P8S_WG, P8U_U, P8S_UW , P8S_UU, P8S_KK **……**
Subject code **MAP9030**

*delete as applicable

	Lecture	Laboratory	Seminar
Number of hours of organized classes in University (ZZU)	30		
Number of hours of total student workload (CNPS)	90		
Form of crediting	Exam **	Exam / crediting with grade*	Oral presentation
Number of ECTS points	3		
including number of ECTS points for practical (P) classes			
including number of ECTS points for direct teacher-student contact (BK) classes			

*delete as applicable **In case of didactic courses also inspections and evaluation classes

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of higher algebra - basic course

SUBJECT OBJECTIVES	
C1	Getting acquainted with the main ideas of the Galois theory, in particular the understanding of the relationship between gropup structure of authomorhismsof field and the field extension by radicals

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C2	The possibility of applying Galois theory to specific algebraic equations

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:

PEK_W01 – Student has knowledge of group theory
PEK_W02 – Student has knowledge of field theory
PEK_W03 – Student has knowledge of Galois theory

Relating to skills:

PEK_U01 – Student can to apply Galois theory to decide which algebraic equation can be solved by radicals
PEK_U02 – Student can aplpy methots of mathematical analysis ti determine group authomorphism of given conreete algebraic equation
…

Relating to social competences:

PEK_K01 Student understands the importance scientific research and didactics

PEK_K02 – Student can discuss the importance of solving equations and their methods at the popular science level
…

PROGRAM CONTENTS		
Form of classes – lecture		Number of hours
Lec 1	Group and subgroup notion, group rank, space of cosets, Lagrange theorem	2
Lec 2	Hommomorphism of groups, group of all automorhisms	2
Lec 3	Normal group, quotiont group, theorem on hommomorphisms of groups	2
Lec 4	Symmetric group, decomposition of the group onto cecles, Cayley theorem	2
Lec 5	Field and subfield notion, algebraicallyclosed field, algebraic closedness of the field of all complex numbers	2
Lec 6	Field extension, theorem on existance of algebraically closed field extension	2
Lec 7	Algebraic elements, transcendental real numbers and two proofs of their existance	2
Lec 8	Irreducible polynomials, the Eisenstein theorem, rank of the algebraic element	2
Lec 9	Field extension by the algebraic element, Abek theorem on primitive element	2

Lec 10	Basis and rank of the algebraic extension, minimal polynomial of algebraic element	2
Lec 11	Group of authomorphisms of field, Galois extension and their group	2
Lec 12	Normal extension. Galois theorems	2
Lec 13	Roots of polynomials of the second, third and fourth degree	2
Lec 14	Field extension by radicals and their relationship with the solvable groups	2
Lec 15	Solvability of S_4 group and unsolvability of S_5 group, algebraic equation which are not have solution by radicals	2
	Total hours	**30**

Form of classes – laboratory		Number of hours
Lab 1		
Lab 2		
Lab 3		
Lab 4		
…		
	Total hours	

Form of classes – seminar		Number of hours
Sem 1		
Sem 2		
Sem 3		
Sem 4		
…		
	Total hours	

TEACHING TOOLS USED	
N1	Blackboard
N2	Chalk
…	

EVALUATION OF ACHIEVED SUBJECT EDUCATIONAL EFFECTS		
Evaluation: F – forming (partial) C – concluding	Educational effect number	Way of evaluating achievement of educational effects
F1	PEK_W01,PEK_W02 PEK_W02,PEK_U01 PEK_U02,PEK_K01 PEK_K02	exam

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C

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] W. Narkiewicz, Teoria Galois dla nauczycieli, wyd. UWr 1993
[2] S. Lange, Algebra, PWN Warszawa, 1984
[3] A. Białynicki-Birula, Algebra, BM t. 40, PWN 1971, 2014
[4] A. Białynicki-Birula, Algebra, BM t. 40, PWN 1971, 2014

SECONDARY LITERATURE:

[1] M. Bryński, J. Jurkiewicz, Zbiór zadań z algebry, PWN 1978

SUBJECT SUPERVISOR
(NAME AND SURNAME, E-MAIL ADDRESS)

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