

# ALGEBRAIC NUMBER THEORY I

1	Course Title:	ALGEBRAIC NUMBER THEORY I
2	Course Code:	MAT5207
3	Type of Course:	Optional
4	Level of Course:	Second Cycle
5	Year of Study:	1
6	Semester:	1
7	ECTS Credits Allocated:	6.00
8	Theoretical (hour/week):	3.00
9	Practice (hour/week):	0.00
10	Laboratory (hour/week):	0
11	Prerequisites:	none
12	Language:	Turkish
13	Mode of Delivery:	Face to face
14	Course Coordinator:	Prof. Dr. İSMAİL NACİ CANGÜL
15	Course Lecturers:	Prof. Dr. Osman BİZİM
16	Contact information of the Course Coordinator:	Uludağ Üniversitesi, Fen-Edebiyat Fakültesi Matematik Bölümü, Görükle Bursa-TÜRKİYE 0 224 294 17 57 / obizim@uludag.edu.tr
17	Website:	
18	Objective of the Course:	The aim of this lecture is to illustrate how basic notions from the theory of algebraic numbers may be used to solve problems in number theory. The main focus is to extend properties of the integer numbers to more general number structures: algebraic number fields and their rings of algebraic integers. So students can So students have the ability conduct original research and independent publication.
19	Contribution of the Course to Professional Development:	
20	Learning Outcomes:	
	1	Learns the concepts, integral domains, irreducibles and primes in an integral domain.
	2	Learns Euclidean domains, examples of Euclidean domains, Noetherian domains, çarpanlara ayırma bölgeleri, unique factorization domains.
	3	Learns algebraic extensions of a field, conjugate elements, algebraic integers in a quadratic field, simple extensions.
	4	Learns algebraic number fields, conjugate fields of an algebraic number field, prime ideals in rings of integers.
	5	Learns class groups and and some class number calculations.
	6	Learns ideal class group and Minkowski theorem.
	7	Uses algebraic number theory to solve some Diophantine equations.
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21	Course Content:	
	Course Content:	

Week	Theoretical	Practice		
1	Integral domains, irreducibles and primes in an integral domain.			
2	Ideals, principal ideal domains, maximal and prime ideals, sums and products of ideals.			
3	Euclidean domains, examples of Euclidean domains, almost Euclidean domain.			
4	Noetherian domains, çarpanlara ayırma bölgeleri, unique factorization domains, modules, Noetherian modules.			
5	Algebraic numbers, algebraic integers, closure.			
6	Algebraic extensions of a field, conjugate elements, algebraic integers in a quadratic field, simple extensions.			
7	Algebraic number fields, conjugate fields of an algebraic number field, prime ideals in rings of integers.			
8	Dedekind domains, ideals in Dedekind domains and generator of an ideal.			
9	Norm of an ideal, norm and trace of an element, norm of a product of ideals			
10	Norm of a prime ideal, factoring in quadratic number fields, factoring in cyclotomic fields.			
11	Units in quadratic fields, the fundamental unit, calculating the fundamental unit.			
Activites		Number	Duration (hour)	Total Work Load (hour)
Theoretical	14	14	3.00	42.00
Practicals/Labs		0	0.00	0.00
Self study and preparation	14	14	5.00	70.00
Homeworks		0	0.00	0.00
Projects		0	0.00	0.00
Field Studies		0	0.00	0.00
Midterm exams		0	0.00	0.00
Others		14	5.00	70.00
Final Exams		1	43.00	43.00
TERM LEARNING ACTIVITIES		NUMBER	WEIGHT	
Total Work Load				225.00
Midterm Exam	0	0.00		7.50
ECTS Credit of the Course				6.00
Home work-project	0	0.00		
Final Exam	1	100.00		
Total	1	100.00		
Contribution of Term (Year) Learning Activities to Success Grade		0.00		
Contribution of Final Exam to Success Grade		100.00		
Total		100.00		
Measurement and Evaluation Techniques Used in the Course				
24	ECTS / WORK LOAD TABLE			

25	CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS															
	PQ1	PQ2	PQ3	PQ4	PQ5	PQ6	PQ7	PQ8	PQ9	PQ10	PQ11	PQ12	PQ13	PQ14	PQ15	PQ16
ÖK1	5	5	5	5	5	5	5	5	5	5	0	0	0	0	0	0
ÖK2	5	5	5	5	5	5	5	5	5	5	0	0	0	0	0	0
ÖK3	5	5	5	5	5	5	5	5	5	5	0	0	0	0	0	0
ÖK4	5	5	5	5	5	5	5	5	5	5	0	0	0	0	0	0
ÖK5	5	5	5	5	5	5	5	5	5	5	0	0	0	0	0	0
ÖK6	5	5	5	5	5	5	5	5	5	5	0	0	0	0	0	0
ÖK7	5	5	5	5	5	5	5	5	5	5	0	0	0	0	0	0
LO: Learning Objectives    PQ: Program Qualifications																
Contribution Level:	1 very low		2 low			3 Medium			4 High			5 Very High				