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.
		8	
		9	
		10	
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, conju-gate 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.	
12	Applications to Diophantine equations and Fermat's last theorem.	

Activites	Number	Duration (hour)	Total Work Load (hour)
Theoretical	14	3.00	42.00
Practicals/Labs	0	0.00	0.00
Self study and preperation	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
Total Work Load			225.00
Total work load/ 30 hr			7.50
ECTS Credit of the Course			6.00

22 Textbooks, References and/or Other

[1]Algebraic Number Theory and Fermat's Last Theorem

[2] Algebraic Number Theory, J. Neukirch.

[3]Introductory Algebraic Number Theory, S. Alaca, K.S.

[4]Algebraic Numbers, Paula Ribenboim.

TERM LEARNING ACTIVITIES	**NUMBE**	**WEIGHT**
Midterm Exam	0	0.00
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**			