INTRODUCTION TO ALGEBRAIC NUMBER THEORY

1	Course Title:	INTRODUCTION TO ALGEBRAIC NUMBER THEORY
2	Course Code:	MAT4079
3	Type of Course:	Optional
4	Level of Course:	First Cycle
5	Year of Study:	4
6	Semester:	7
7	ECTS Credits Allocated:	5.00
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:	Doç.Dr. BETÜL GEZER
15	Course Lecturers:	Öğr. Gör. Dr. Betül GEZER
16	Contact information of the Course Coordinator:	Uludağ Üniversitesi, Fen-Edebiyat Fakültesi Matematik Bölümü, Görükle Bursa-TÜRKİYE 0 224 294 17 70 / betulgezer@uludag.edu.tr
17	Website:	
18	Objective of the Course:	The algebraic number theory brings two important areas of mathematics such as algebra and numbery theory. Our first aim is to introduce fundamental ideas of algebraic numbers and the second 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. Then give an introduction to Fermat's last theorem. So students can see how basic ideas are used to solve problems in number theory.
19	Contribution of the Course to Professional Development:	
20	Learning Outcomes:	
	1	Learns basic concepts on symetric polynomials, modules, free abelian groups.
	2	Learns algebraic numbers, algebraic integers, integral bases, norms and traces.
	3	Learns factorization into irreducibles, trivial factorizations and Euclidean domains.
	4	Learns ideals, the decomposition of ideals, the norm and classes of ideals, factorization in cyclotomic fields and lattices.
	5	Learns Minkowski theorem, two and four square theorem.
	6	Learns class groups, finiteness of the class groups and number-theoric applications and some class number calculations.
	7	Learns elliptic curves and the group structure on elliptic curves, Fermat's last theorem.
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21	Course Content:	
	Course Content:	
Week	Theoretical	Practice
1	Basic concepts on groups, ring and fields and some elementary theorems.	
2	Symetric polynomials, modules, free abelian groups.	
3	Algebraic numbers, algebraic integers, integral bases, norms and traces.	
4	Rings of integers, quadratic and cyclotomic fields.	
5	Factorization into irreducibles, trivial factorizations and Euclidean domains.	
6	Ideals, the decomposition of ideals.	
7	The norm and classes of ideals.	
8	Factorization in cyclotomic fields and lattices.	
9	Minkowski theorem, two and four square theorem.	
10	Class groups, finiteness of the class group.	
11	Factorization of elements in an extension ring.	
12	Number-theoric applications and some class number calculations.	
13	Elliptic curves and the group structure on elliptic curves.	
14	Overview on Fermat's last theorem.	

22	Textbooks, References and/or Other Materials:	[1]Algebraic Number Theory and Fermat's Last Theorem, Ian Stewart, David Tall. [2]Algebraic Numbers, Paulo Ribenboim. [3]Introductory Algebraic Number Theory, Ş. Alaca, K.S. Williams.
23	Assesment	

TERM LEARNING ACTIVITIES	**NUMBER**	**WEIGHT**
Midterm Exam	1	40.00
Quiz	0	0.00
Home work-project	0	0.00
Final Exam	1	60.00
Total	2	100.00
Contribution of Term (Year) Learning Activities to Success Grade		40.00
Contribution of Final Exam to Success Grade		60.00
Total		100.00
Measurement and Evaluation Techniques Used in the Course		

24	**ECTS / WORK LOAD TABLE**

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	1	15.00	15.00
Others	14	1.00	14.00
Final Exams	1	9.00	9.00
Total Work Load			150.00
Total work load/ 30 hr			5.00
ECTS Credit of the Course			5.00

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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK7	0	0	0	0	0	0	0	0	0	0	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**