

NUMBER THEORY I

1	Course Title:	NUMBER THEORY I
2	Course Code:	MAT5203
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.İsmail Naci CANGÜL Prof.Dr.Osman BİZİM
16	Contact information of the Course Coordinator:	Uludağ Üniversitesi, Fen-Edebiyat Fakültesi Matematik Bölümü, 16059 Görükle Bursa-TÜRKİYE 0 224 294 17 51 tekcan@uludag.edu.tr
17	Website:	
18	Objective of the Course:	The aim of the course is to make the students gain the some algebraic properties on number theory
19	Contribution of the Course to Professional Development:	
20	Learning Outcomes:	
	1	Learn the some fundamental concepts on number theory.
	2	Learn the finite fields and algebra on these fields.
	3	Learn the Legendre symbol and the relationship between quadratic congruencies and Legendre symbol.
	4	Learn the Gauss sums and some properties of this sum.
	5	Learn the find the simple continued fraction expansion of rational and irrational numbers.
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21	Course Content:	
	Course Content:	
Week	Theoretical	Practice
1	Overview of basic concepts on lessons	
2	Algebraic numbers, algebraic groups and reduction theorems	
3	Finite fields and algebraic operations on them	

4	Prime numbers and the number of prime numbers	
5	Legendre symbol and the relationship between quadratic congruencies and Legendre symbol	
6	Ring of Gauss integers	
7	Gauss primes, Galois groups and sums	
8	Rings and units of rings	
9	The relationship between units of rings and the integer solutions of Pell equations	
10	Farey sequences	
11	Quadratic forms and their relationship between the groups $GL(2, \mathbb{Z})$ and $SL(2, \mathbb{Z})$	
12	Positive definite and indefinite quadratic forms	
13	Minkowski theorem and its application	
14	The ring $\mathbb{Z}[\exp(2\pi i/n)]$	

22	Textbooks, References and/or Other Materials:	[1] J. Buchmann and U. Vollmer. Binary Quadratic Forms: An Algorithmic Approach. Springer-Verlag, Berlin, Heidelberg, 2007. [2] D.A. Buell. Binary Quadratic Forms, Clasical Theory and Modern Computations. Springer-Verlag, New York, 1989. [3] H.M. Edward. Fermat's Last Theorem: A Genetic Introduction to Algebraic Number Theory. Graduate Texts in Mathematics, Springer-Verlag, New York, London, Tokyo, 1996. [6] R.A. Mollin. Fundamental Number Theory with
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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	7.00	98.00
22 Assessment				
Homeworks		0	0.00	0.00
Projects	R	14	5.00	70.00
Field Studies		0	0.00	0.00
Quiz	0	0.00	0.00	0.00
Midterm exams	0	0.00	0.00	0.00
Others		0	0.00	0.00
Final Exams	1	10.00	15.00	15.00
Total Work Load				225.00
Contribution of 10m (Year) Learning Activities to Success Grade		0.00		7.50
ECTS Credit of the Course				6.00
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	4	2	4	3	3	5	5	5	3	0	0	0	0	0	0
ÖK2	4	3	2	4	3	2	5	5	4	4	0	0	0	0	0	0

ÖK3	5	4	2	4	4	4	4	5	5	4	0	0	0	0	0	0
ÖK4	4	3	2	4	3	2	5	5	4	3	0	0	0	0	0	0
ÖK5	5	3	2	4	3	5	4	5	5	3	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							