NUMBER THEORY II

1	Course Title:	NUMBER THEORY II	
2	Course Code:	MAT5204	
3	Type of Course:	Optional	
4	Level of Course:	Second Cycle	
5	Year of Study:	1	
6	Semester:	2	
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. AHMET TEKCAN	
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, Jacobi and Kronecker symbols.
		4	Learn the cycle and proper cycle of indefinite forms. Also compute the right and left neighbors of them and compute the simple finite continued fraction expansion of the base points of indefinite forms.
		5	Modules of indefinite quadratic forms, automorphisms of indefinite forms and their roles on finding the integer solutions of Pell equations.
		6	Learn the ambiguous classes and some properties of them.
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21	Course Content:		

Course Content:

Week	Theoretical	Practice
1	Overview of basic concepts on lessons	

2	Algebraic numbers, groups and reduction theorems	
3	Finite fields and the units of them	
4	Gauss sums	
5	Farey sequences	
6	Legendre symbol and the role of it on quadratic congruence	
7	Jacobi and Kronecker symbols	
8	Cycle and proper cycle of indefinite forms	
9	Right and left neighbors of indefinite forms	
10	Simple finite continued fraction expansion of base points of indefinite forms	
11	Quadratic ideals and the relationship between quadratic ideals and indefinite forms, cycles of quadratic ideals	
12	Pell forms and modules of indefinite forms	
13	Automorphisms of indefinite forms and the role of them on finding the integer solutions of Pell equations	
14	Ambiguous classes, class group and genera	

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: Classical Theory and Modern Computations. Springer-Verlag, 1989. [3] H. Cohen. A Course in Computational Algebraic Number Theory. Graduate Texts in Mathematics, vol. 50, Springer-Verlag, 1977. [4] H. Cohen. Advanced Topics in Computational Number Theory. Graduate Texts in Mathematics, vol. 193, Springer-Verlag, 2000. [5] R.A. Mollin. Quadratics. CRS Press, Boca Raton, New York, London, Tokyo, 1996. [6] R.A. Mollin. Fundamental Number Theory with Applications. Chapman&Hall/ CRC, 2008.

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
Homeworks	0	0.00	0.00
Projects	14	5.00	70.00
Field Studies	0	0.00	0.00
Midterm exams	0	0.00	0.00
Others	0	0.00	0.00
Final Exams	1	15.00	15.00
Total Work Load			225.00
Total work load/ 30 hr			7.50
ECTS Credit of the Course			6.00

TERM LEARNING ACTIVITIES	NUMBE	WEIGHT
Midterm Exam	0	0.00
Quiz	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	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
ÖK6	5	3	2	4	5	2	5	5	4	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**						