

NUMBER THEORY II

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| 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 | | |

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| 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: | <p>[1] J. Buchmann and U. Vollmer. Binary Quadratic Forms: An Algorithmic Approach. Springer-Verlag, Berlin, Heidelberg, 2007.</p> <p>[2] D.A. Buell. Binary Quadratic Forms, Classical Theory and Modern Computations. Springer-Verlag, New York, 1989.</p> <p>[3] H.M. Edward. Fermat's Last Theorem: A Genetic Introduction to Algebraic Number Theory. Graduate Texts in Mathematics, vol. 50, Springer-Verlag, 1977.</p> <p>[4] D.E. Flath. Introduction to Number Theory. Wiley, 1989.</p> <p>[5] R.A. Mollin. Quadratics. CRS Press, Boca Raton, New York, London, Tokyo, 1996.</p> <p>[6] R.A. Mollin. Fundamental Number Theory with Applications. Chapman&Hall/ CRC, 2008.</p> |
| 23 | Assesment | |
| TERM LEARNING ACTIVITIES | | NUMBE R |
| Midterm Exam | | 0 |
| Quiz | | 0 |
| Home work-project | | 0 |
| Final Exam | | 1 |
| Total | | 1 |
| 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 | |

| 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 |

| 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 | | | |