



Course Information

Course Code	2360366
Course Section	1
Course Title	ELEMENTARY NUMBER THEORY II
Course Credit	3
Course ECTS	6.0
Course Catalog Description	Arithmetic in quadratic fields. Factorization theory. Continued fractions, periodicity. Transcendental numbers.
Prerequisites	No prerequisites
Schedule	Tuesday , 11:40 - 12:30, M102 Thursday , 10:40 - 12:30, M102

Instructor Information

Name/Title	Assoc.Prof.Dr. TOLGA KARAYAYLA
Office Address	M-222
Email	tkarayay@metu.edu.tr
Office Phone	210 5362
Office Hours	To be announced

Course Objectives

This course is the second part of a sequel of a basic number theory courses which involves several types of Diophantine equations, factorization of elements and ideals in quadratic extensions. This course exhibits some historical and modern aspects of number theory focusing on algebraic structures.

Course Learning Outcomes

The students who succeed in this course

- will be able to solve several Diophantine equations,
- will be able to use the elliptic curve group structure,
- will be able to comprehend unique factorization in terms of elements and ideals,
- will be able to do some algebraic number theoretical computations in the case of degree two extension,
- will be able to identify some tools used in the proof of Fermat's Last Theorem.

Instructional Methods

In class lectures and discussions, assignment of exercise problems.

Tentative Weekly Outline

Week	Topic	Relevant Reading	Assignments
1	Linear equations		
2	Pythagorean triples		
3	Elliptic curves		
4	Fermat's infinite descent		
5	Representation of integers as sums of squares		



Week	Topic	Relevant Reading	Assignments
6	Pell's equation, continued fractions		
7	The Gaussian integers		
8	Algebraic numbers and integers		
9	Factorization into irreducibles		
10	Bachet and Ramanujan-Nagell equations		
11	The arithmetic of ideals. Class group and class number		
12	Primes of the form $p = x^2 + ny^2$. Fermat's last theorem		
13	Algebraic and transcendental numbers. Transcendence of e and pi.		

Course Textbook(s)

- W. W. Adams and L. J. Goldstein. Introduction to number theory.
- J. H. Silverman and J. Tate. Rational Points on Elliptic Curves.
- D. M. Burton. Elementary number theory.
- I. Stewart and D. Tall. Algebraic number theory and Fermat's last theorem.

Assessment of Student Learning

Assessment	Dates or deadlines
Midterm 1	Week 6 or 7
Midterm 2	Week 10 or 11
Final	Announced by Student Affairs Office
Quizes	Dates not announced
At least 4 quizzes (each about 10 Minutes long) will be given during class time in non-announced dates throughout the semester	
Attendance	
Students who attend at least 85% of all classes will be given 5 points as bonus.	
Students who attend less than 70% of classes will be given NA (Not Attended) grade at the end of the semester and will fail the course.	



Course Grading

Deliverable	Grade Points
Midterm 1	30
Midterm 2	30
Final	40
Quizzes	7
Attendance	5
Total	112

Course Policies

Class Attendance

For efficient learning, students are strongly suggested to attend all classes and participate in class discussions.

Attendance will be taken in all classes. Students who attend at least 85% of all classes will be given 5 points as bonus. Students who attend less than 70% of all classes will be given the NA (Not Attended) grade at the end of the semester and will fail the course. The students who are given the NA grade cannot take the Final Exam.

All students must attend the classes on time. Students who are late for class will not be allowed to join the class.

Make up for Exams and Assignments

Only one make-up examination will be offered. The excuse for not attending an examination must be proved with documents. The make-up examination will take place shortly after the final exam.

Final Exam Entrance Conditions

Attendance will be taken in all classes and if your attendance is less than 70%, you will not be allowed to take the final exam and your letter grade for this course will be NA.

Information for Students with Disabilities

To obtain disability related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the ODTÜ Disability Support Office as soon as possible. If you need any accommodation for this course because of your disabling condition, please contact me. For detailed information, please visit the website of Disability Support Office: <http://engelsiz.metu.edu.tr/>

Academic Honesty

The METU Honour Code is as follows: "Every member of METU community adopts the following honour code as one of the core principles of academic life and strives to develop an academic environment where continuous adherence to this code is promoted. The members of the METU community are reliable, responsible and honourable people who embrace only the success and recognition they deserve, and act with integrity in their use, evaluation and presentation of facts, data and documents."