



Department of Mathematics

College of Education

Salahaddin University-Erbil

Subject: Number Theory

Course Book – Year 4

Lecturer's name: Dr. Sanhan M. S. Khasraw

Academic Year: 2022/2023

Course Book

1. Course name	Number Theory
2. Lecturer in charge	Dr. Sanhan Muhammad Salih Khasraw
3. Department/ Faculty	Mathematics/Basic Education
4. Contact	e-mail: sanhan.khasraw@su.edu.krd Tel: (optional)
5. Time (in hours) per week	Theory: 3
6. Office hours	By appointments
7. Course code	
8. Teacher's academic profile	1. PhD in Algebra, 2015, University of Birmingham, UK. 2. M.Sc. in Algebra, 2005, Salahaddin University-Erbil 3. B.Sc. in Mathematics, 1999, Salahaddin University-Erbil.
9. Keywords	Integer Numbers, Prime Numbers, Divisibility, Functions
10. Course overview:	This is an introductory course in Number Theory for students interested in mathematics and the teaching of mathematics. The course begins with the basic notions of integers and sequences, divisibility, and mathematical induction. It also covers standard topics such as Prime Numbers; the Fundamental Theorem of Arithmetic; Euclidean Algorithm; the Diophantine Equations; Congruence Equations and their Applications (e.g. Fermat's Little Theorem); Multiplicative Functions (e.g. Euler's Phi Function)
11. Course objective:	To present a rigorous development of Number Theory using axioms, definitions, examples, theorems and their proofs.
12. Student's obligation	1. Students have an obligation to arrive on time and remain in the classroom for the duration of scheduled classes and activities. 2. Students have an obligation to write, homeworks, tests and final examinations at the times scheduled by the teacher or the College. Students have an obligation to inform themselves of, and respect, College examination procedures. 3. Students have an obligation to show respectful behaviour and appropriate classroom deportment. Should a student be disruptive and/or disrespectful, the teacher has the right to exclude the disruptive student from learning activities (classes) and may refer the case to the Director of Student Services under the Student Code of Conduct. 4. Electronic/communication devices (including cell phones, mp3 players, etc.) have the effect of disturbing the teacher and other students. All these devices must be turned off and put away. Students who do not observe these rules will be asked to leave the classroom
13. Forms of teaching	Different forms of teaching will be used to reach the objectives of these courses to the students: power point presentation for the course outline, head titles, definition, discussion and conclusions. Also, we shall use the blackboard for solving and explaining

the examples.

14. Assessment scheme

The assessment is divided up as follows:

1. 30% from two 2-hour class tests during the year;
2. 10% from example classes.

15. Student learning outcome:

Students will be able to :

- 1) effectively express the concepts and results of Number Theory.
 - 2) construct mathematical proofs of statements and find counterexamples to false statements in Number Theory.
 - 3) collect and use numerical data to form conjectures about the integers.
 - 4) understand the logic and methods behind the major proofs in Number Theory.
- work effectively as part of a group to solve challenging problems in Number Theory.

16. Course Reading List and References:

1. Elementary Number Theory, David M. Burton(1980)
2. Elementary Number Theory, W. Edwin Clark, 2002.

17. The Topics:

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Week 1: Some preliminary considerations.

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Week 2: Divisibility theory in the integers(The division algorithm).

Week 3: Greatest common divisor.

Week 4: Euclidean algorithm.

Week 5: Diophantine Equation $ax+by=c$.

Week 6: The fundamental theorem of arithmetic.

Week 7: The theory of congruences(Basic properties of congruence).

Week 8: Special divisibility tests.

Week 9: Linear congruences.

<p>Week 10: Fermat's little theorem. Week 11: Wilson's theorem. Week 12: Number theoretic functions(The functions τ and σ). Week 13: The Mobius inversion formula.</p>	
<p>18. Practical Topics (If there is any)</p>	
<p>The practical of all topics in part-17 will be given during the academic year.</p>	<p>Dr. Sanhan</p>
<p>19. Examinations:</p> <p>1. Compositional: In this type of exam the questions usually starts with Explain how, What are the reasons for...?, Why...?, How....? With their typical answers Examples should be provided</p> <p>2. True or false type of exams:</p> <p>In this type of exam a short sentence about a specific subject will be provided, and then students will comment on the trueness or falseness of this particular sentence. Examples should be provided</p> <p>3. Multiple choices: In this type of exam there will be a number of phrases next or below a statement, students will match the correct phrase. Examples should be provided.</p> <p>Will do</p>	
<p>20. Extra notes: N/A</p>	
<p>21. Peer review</p>	<p>پیداچوونہوہی ھاوہل</p>