

**MINISTRY OF HIGHER EDUCATION, SCIENCE AND INNOVATION OF
THE REPUBLIC OF UZBEKISTAN
CHIRCHIQ STATE PEDAGOGICAL UNIVERSITY**



"Approved by"
Acting vice-rector for
educational affairs

D.B. Akhmadjanov

2024 year

07

**SYLLABUS FOR
ALGEBRA
(Form of Education: full-time 2-course)**

Field of knowledge	500 000 – Natural Sciences, Mathematics and Statistics
Field of education:	540 000 – Mathematics and Statistics
Direction of education:	60540100- Mathematics

CHIRCHIQ – 2025



SYLLABUS OF SUBJECT

Academic year:	2025/2026		
Course name:	Algebra		
Course type:	Compulsory		
Course code:	ALG 112318		
Year:	4 years		
Form of education:	Full-time		
Type of education:	Bachelor's degree		
Distribution of hours per semester:	Total	3-semester	4-semester
	180	180	—
Lectures	30	30	—
Practical classes	60	60	—
Laboratory classes	—	—	—
Seminars	—	—	—
Self-study	90	90	—
Credit units:	6	6	—
Assessment form:	Midterm examination	written	—
	Final examination	written	—
Department responsible for the course:	Algebra and mathematical analysis		

Information about the course instructor

Author(s):	Raupova Mohinur Haydar kizi
Email:	r.mokhinur@gmail.com
Phone number:	(90) 336 37 11
Organization:	Chirchiq State Pedagogical University, Department of "Algebra and Mathematical Analysis"
Reviewers:	B.O. Abayev - Chirchiq State Pedagogical University, Department of Algebra and Mathematical Analysis, PhD, Acting Associate Professor. J.Q. Adashev – V. Ramanovsky Institute of Mathematics, Senior Researcher, Doctor of Physical and Mathematical Sciences, Professor.

1. Course Objectives (CO)	
CO 1	The main objective of the Algebra course is to provide students with an understanding of sets and operations on them, mappings, matrices and determinants, systems of linear equations and methods for solving them, and applying these topics to examples.

2. Prerequisite knowledge required for the course	
1.	Mathematics
2.	Algebra

3. Learning Outcomes (LO)	
	<i>In terms of knowledge:</i>
LO1	Demonstrate a deep understanding of algebra and number theory concepts and principles;
LO2	Deeply analyze the essence of algebra and number theory methods;
LO3	Possess knowledge, skills and competencies in mathematical analysis, algebra and number theory, geometry, differential equations, probability theory to solve problems in professional activities, and participate in scientific research work.
LO4	Problems (examples and exercises) of the algebra and number theory course are presented, and students are given the opportunity to practice applying the necessary mathematical techniques and methods to solve them.
	<i>In terms of skills:</i>
LO5	Students perform given practical examples or problems both in teams and individually.
LO6	The student understands the goals, objectives, and essence of the given example or problem, studies the problem, and conducts research.
LO7	The student analyzes the results obtained, prepares presentations with solutions, and defends them.
LO8	Students perform given practical examples or problems both in teams and individually.

4. Course content		
Lecture format (L)		Hours
L1	Semigroups. Monoids. Groups.	2
L2	Symmetric and alternating groups.	2
L3	Subgroups. Cyclic groups.	2
L4	Right and left cosets. Lagrange's theorem.	2

L5	Normal subgroups and factor groups.	2
L6	Homomorphisms and isomorphisms of groups.	2
L7	Properties of homomorphisms and isomorphisms. Cayley's theorem.	2
L8	Dihedral and quaternion groups.	2
Midterm examination		
L9	Theorems on group homomorphisms.	2
L10	Automorphisms of a group and inner automorphisms.	2
L11	Group action on a set.	2
L12	Rings and their types. Ring characteristic. Boolean and regular rings.	2
L13	Subrings, subfields.	2
L14	Ideals of a ring. Factor rings. Principal ideal rings. Homomorphisms and isomorphisms of rings.	2
L15	Nilpotent and primary ideals. Maximal and prime ideals.	2
Total		30
Practical classes (P)		Hours
P1	Semigroups. Monoids. Groups.	4
P2	Symmetric and alternating groups.	4
P3	Subgroups. Cyclic groups.	4
P4	Right and left cosets. Lagrange's theorem.	4
P5	Normal subgroups and factor groups.	4
P6	Homomorphisms and isomorphisms of groups.	4
P7	Properties of homomorphisms and isomorphisms. Cayley's theorem.	4
P8	Dihedral and quaternion groups.	4
P9	Theorems on group homomorphisms.	4
P10	Automorphisms of a group and inner automorphisms.	4
P11	Group action on a set.	4
P12	Rings and their types. Ring characteristic. Boolean and regular rings.	4
P13	Subrings, subfields.	4
P14	Ideals of a ring. Factor rings. Principal ideal rings.	4
P15	Homomorphisms and isomorphisms of rings.	4
Total		60

5. Independent Study (IS)		
IS1	Theorems on isomorphism.	2
IS2	Direct and semidirect products of groups.	2
IS3	Finite abelian groups.	2
IS4	Group action on a set.	2
IS5	Sylow theorems.	2
IS6	Some applications of Sylow theorems.	2

IS7	Finite simple groups.	
IS8	Classification of groups of small order.	2
IS9	Solvable groups.	2
IS10	Nilpotent groups.	2
IS11	Rings.	2
IS12	Fields.	2
IS13	Fields (general).	2
IS14	Residue rings.	2
IS15	Finite fields.	2
IS16	Characteristic of a field.	2
IS17	Nilpotent and idempotent elements of a ring.	2
IS18	Boolean rings.	2
IS19	Regular rings.	4
IS20	Subrings and subfields.	4
IS21	Ideals of a ring.	4
IS22	Factor rings.	4
IS23	Homomorphisms and isomorphisms of rings.	4
IS24	Theorems on homomorphisms (for rings).	4
IS25	Principal ideal rings.	4
IS26	Types of ideals.	4
IS27	Nilpotent ideals.	4
IS28	Maximal ideals.	4
IS29	Prime ideals.	4
IS30	Prime and irreducible elements.	4
IS31	Maximal, prime and primary ideals.	4
	Total:	90

6. Educational Technologies and Methods:

Lectures - interactive case studies; seminars (logical thinking, quick Q&A); group work; presentations; individual projects; teamwork and defense of projects.

In practical classes - solving problems related to topics, practical observation, measurement, operations with astronomical tables are performed.

Independent work - the following types are recommended:

- Preparing reports;
- Preparing presentations;
- Solving problems;
- Individual and group educational projects;
- Working with information-analytical materials;
- Working with sources;
- Creating illustrative models (intellect maps, frames, logical graphs, etc.);
- Creating multimedia presentations;
- Preparing methodological developments for lessons;
- Preparing developments for extracurricular activities.

7. Requirements for obtaining credits: