O'ZBEKISTON RESPUBLIKASI OLIY TA'LIM, FAN VA INNOVATSIYALAR VAZIRLIGI
CHIRCHIQ DAVLAT PEDAGOGIKA UNIVERSITETI

B U Y R U Q D A N   K O' C H I R M A

2023-yil «_21_» _12_ № _01-288_ - son Chirchiq sh.

2023/2024-o'quv yilida bakalavriat
ta'lim yo'nalishlarida mutaxassislik
fanlarini ingliz tilida o'qitish to'g'risida

O'zbekiston Respublikasi Prezidentining 2017-yil 27-iyuldagi PQ-3151-sonli "Oliy ma'lumotli mutaxassislarni tayyorlash sifatini oshirishda iqtisodiy sohalari va tarmoqlarining ishtirokini yanada kengaytirish chora tadbirlari to'g'risida"gi qarorining 5-bandida belgilangan vazifalar ijrosini ta'minlash maqsadida

B U Y U R A M A N

1. O'zbekiston Respublikasi Prezidentining 2017-yil 27-iyuldagi PQ-3151-sonli "Oliy ma'lumotli mutaxassislarni tayyorlash sifatini oshirishda iqtisodiy sohalari va tarmoqlarining ishtirokini yanada kengaytirish chora tadbirlari to'g'risida"gi qarorining 5-bandi rahbarlik va ijro uchun qabul qilinsin.

2. O'quv ishlari bo'yicha prorektor D.B.Axmadjanov, O'quv-uslubiy boshqarma boshlig'i M.J.Boltayev va barcha fakultet dekanlariga:

2023/2024-o'quv yilida bakalavriat ta'lim yo'nalishlarining barcha kurslarida mutaxassislik fanlarini ingliz tilida o'qitishni bosqichma-bosqich tashkil etish, ingliz tilida dars o'tadigan professor-o'qituvchilarni maqsadli tayyorlash, ularning xorijda tegishli tayyorgarlikdan o'tishini tashkil etish, shuningdek, o'quv mashg'ulotlarini olib borishga xorijiy mutaxassislarda bugungi kunda foydalanilayotgan zamonaviy o'quv adabiyotlari asosida o'qitilishini yo'lga qo'yish vazifalari yuklatilsin.

3. 2023/2024-o'quv yilida bakalavriat ta'lim yo'nalishlarida mutaxassislik fanlarini ingliz tilida olib boruvchi professor-o'qutuvchilar tarkibi ilovaga muvofiq tasdiqlansin.

4. Ushbu buyruqni elektron shaklda tegishliligi bo'yicha mas'ullarga yetkazish devonxona mudiri I.Rajabova zimmasiga topshirilsin.

5. Mazkur buyruqning bajarilishini nazorat qilish o'quv ishlari bo'yicha prorektor D.B.Axmadjanov zimmasiga yuklatilsin.

Asos O'zbekiston Respublikasi Prezidentining 2017-yil 27-iyuldagi PQ-3151-sonli qarori

Rektor **G.I.Muxamedov**

Ko'chirma asliga to'g'ri *Nazoratchi*

Mutaxassislik fanlarini ingliz tilida o'qitish bo'yicha professor o'qituvchilari ro'yxati

№	Professor o'qituvchining F.I.SH	Ta'lim yo'nalishi	Dars beradigan kursi, guruhi	Fanining nomi (inglizcha)
1	Raupova Mohinur Haydar qizi	Matematika va informatika	2-kurs 22/8 guruh	Elementary mathematics (Algebra), Mathematical analysis, Algebra and theory numbers
2	Ibodullayev Doniyor Quvondiqovich	Matematika va informatika	1-kurs 23/6 guruh, 2-kurs 22/8 guruh	Computer support from science, Information security, Network technologies
3	Rajabov Oybek Tog'aymurod o'g'li	Matematika va informatika	2-kurs 22/8 guruh	Web technologies, Programming languages
4	Israilova Feruza Akbar qizi	Matematika va informatika	2-kurs 22/8 guruh, 1-kurs 23/6 guruh	Of differential equations, Of geometry
5	Quljonov Nodir Jonadil o'g'li	Matematika va informatika	2-kurs 22/8 guruh	Of elementary mathematics (geometry), Mathematical literacy
6	Mahkamov Doston Shokir o'g'li	Gid hamrohligi va tarjimonlik faoliyati	2-kurs 22/2 guruh	Legal basis of tourism
7	Kamoliddiunov Farrux Burxoniddin o'g'li	Tarix	4-kurs 20/3 guruh	World history (most recent period)
8	Yo'ldoshev Umrzoq Xamza o'g'li	Tarix	4-kurs 20/3 guruh	Cooperation of international organizations
9	Tillaboyeva Dono Nazm qizi	Biologiya	3-kurs 21/1	Plant physiology
10	Ramazanov Baxtiyor Ramazanovich	Biologiya	2-kurs 22/1	Enviromental security and sustainable development

**O'ZBEKISTON RESPUBLIKASI
VAZIRLAR MAHKAMASI HUZURIDAGI
DAVLAT TEST MARKAZI**

**STATE TEST CENTER UNDER THE
CABINET OF MINISTERS OF THE
REPUBLIC OF UZBEKISTAN**

CHET TILINI BILISH DARAJASI TO'G'RISIDA

SERTIFIKAT
CERTIFICATE

OF FOREIGN LANGUAGE PROFICIENCY

Sertifikat №	Reference Number	22DTM1020282RM

Talabgor to'g'risidagi ma'lumot | Candidate Details

Shaxsni tasdiqlovchi
hujjat seriyasi va raqami | ID series and number: **AA 9683408**

Familiyasi | Surname **RAUPOVA**

Ismi | First Name **MOHINUR**

Otasining ismi | Patronymic Name: **HAYDAR QIZI**

Chet tili |
Foreign Language **INGLIZ TILI**

Daraja |
Level **B2**

Test sinovi
natijalari |
Test Results

Tinglab tushunish |
Listening **69**

O'qish |
Reading **55**

Umumiy ball |
Overall Score: **60**

Yozish |
Writing **57**

Gapirish |
Speaking **60**

Berilgan sanasi |
Date of Issue: **15.11.2022**

Amal qilish muddati |
Valid until: **14.11.2024**

Direktor |
Director

M.KARIMOV

MINISTRY OF HIGHER EDUCATION, SCIENCE AND INNOVATION

OF THE REPUBLIC OF UZBEKISTAN

CHIRCHIK STATE PEDAGOGICAL UNIVERSITY

"Approved by"
Acting vice-rector for
educational affairs
_____ D.B. Akhmadjanov
2023 year "___"_____

SYLLABUS
OF ALGEBRA AND NUMBER THEORY
(Form of education: full-time 1-course)

Fields of knowledge: 100000 – Education
Fields of education: 110000 – Education
Educational direction: 60110600 – Mathematics and informatics

Chirchik – 2023

Syllabus of subject

Academic year:	2023/2024
Subject name:	Algebra and number theory
Subject type:	Compulsory
Subject code:	ASNM 1129
Year:	4
Form of education:	Full-time
Type of education:	Bachelor degree

Course format and semester hours:	Total	1st semester	2nd semester
	300	150	150
Lecture	60	30	30
Practical lesson	60	30	30
Laboratory lesson	—	—	—
Seminar	—	—	—
Self-study	180	90	90
Amount of credit:	10	5	5
Evaluation form: Summative		Exam	Exam
Evaluation form: Final control		Exam	Exam
Responsible department for subject:	Algebra and Mathematical Analysis		

Information about the teacher of subject

The author:	Raupova Mohinur
E-mail:	rmokhinur @gmail.com
Phone number	(90) 3363711
Organization:	Department of "Algebra and Mathematical Analysis", Chirchik State Pedagogical University
Reviewers:	J. Adashev - V. Ramanovskiy Institute of Mathematics, Ph.D.-M.Ph.D. Professor. A.G. Abdurakhmanov - senior teacher of the "Algebra and Mathematical Analysis" department of the "Mathematics and Informatics" Faculty of Chirchik State Pedagogical University.

	The purpose of subject (PS)
PS1	The main purpose of the Algebra and Number Theory course is to provide students with general information about sets and operations on them, reflections, matrices and determinants, systems of linear equations and methods of solving them, EKUB, EKUK, prime numbers, comparisons and complex numbers, consists of studying groups, fields, rings, isomorphism, and applications of examples and problems related to these topics. Expand students' thinking skills through these given topics

	Basic knowledge necessary for learning subject
1.	Mathematics
2.	Algebra
3.	Geometry

	Educational results (ER)
	In terms of a knowledge perspective:
ER1	Demonstrate a deep understanding of the concepts and principles of algebra and number theory;
ER2	In-depth analysis of the essence of algebra and number theory methods;
ER3	In order to solve problems in his professional activity, he acquires knowledge, qualifications and skills in the fields of mathematical analysis, algebra and number theory, geometry, differential equations, probability theory, and participates in scientific research.
ER4	Algebra and number theory course problems (examples and problems) are presented and students are given the opportunity to practice applying the mathematical methods and techniques necessary to solve them.
	In terms of skills:
ER5	It is carried out through students' collective and individual implementation of given practical examples or problems.
ER6	The student studies the given problem and conducts research, understanding the goals and objectives and essence of the given examples or problems.
ER7	Analyzes the obtained results, prepares presentations with solutions and defends them.

Subject content		
Form of education: Lecture (L)		Hours
1st semester		
L1	Reflections.	2

L2	Rearrangements and replacements.	2
L3	Matrices and operations on them.	2
L4	Determinants and their properties.	2
L5	Minors and algebraic complements.	2
L6	Matrix rank theorem.	2
L7	Some methods of calculating n-order determinants. An upper triangle view, via a recursive relation.	2
L8	Some methods of calculating n-order determinants. An upper triangle view, via a recursive relation.	2
	Summative	
L9	Laplace's theorem.	2
L10	Additional properties of inverse matrix and determinant.	2
L11	Systems of linear equations and the Gaussian method of solving them.	2
L12	Cramer and inverse matrix methods of solving systems of linear equations.	2
L13	System of homogeneous equations. Kronecker-Capelli theorem.	2
L14	Complex numbers and operations on them.	2
L15	Geometric representation and trigonometric form of complex numbers. Muavr's formula, extraction of roots from a complex number. The roots of one.	2
	Final control	
Totally		**30**
Form of education: Practical lesson (P)		
1st semester		
P1	Reflections.	2
P2	Rearrangements and replacements.	2
P3	Matrices and operations on them.	2
P4	Determinants and their properties.	2
P5	Minors and algebraic complements.	2
P6	Matrix rank theorem.	2
P7	Some methods of calculating n-order determinants. An upper triangle view, via a recursive relation.	2
P8	Some methods of calculating n-order determinants. An upper triangle view, via a recursive relation.	2
P9	Laplace's theorem.	2
P10	Additional properties of inverse matrix and determinant.	2
P11	Systems of linear equations and the Gaussian method of solving them.	2
P12	Cramer and inverse matrix methods of solving systems of linear equations.	2
P13	System of homogeneous equations. Kronecker-Capelli theorem.	2
P14	Complex numbers and operations on them.	2
P15	Geometric representation and trigonometric form of complex	2

	numbers. Muavr's formula, extraction of roots from a complex number. The roots of one.	
	Total	**30**

Form of education: Lecture (L)		Hours
2nd semester		
L1	Polynomials and operations on them, Euclidean algorithm for polynomials.	2
L2	Bezou's theorem and Gorner's scheme. The fundamental theorem of algebra.	2
L3	Solving algebraic equations of the third and fourth degree.	2
L4	Root limits, Sturm's theorem.	2
L5	n-dimensional vector linear spaces. Vector space basis and dimension.	2
L6	Partial spaces, their intersection, sum, exact sum.	2
L7	Euclidean spaces. Orthogonal and orthonormal systems.	2
L8	Linear and square forms.	2
	Summative	
L9	The canonical form of the quadratic form. Lagrange and Jacobi methods.	2
L10	The law of inertia.	2
L11	Linear permutations and their matrices.	2
L12	Invariant part-spaces. Eigenvalues and eigenvectors of linear substitution.	2
L13	Joint Substitution to Linear Substitution. Self-adjoint, unitary and normal linear permutations.	2
L14	Linear permutations in real Euclidean space.	2
L15	Jordan normal form of linear substitution.	2
	Final control	
	Total	**30**
Form of education: Practical lesson (P)		
2nd semester		
P1	Polynomials and operations on them, Euclidean algorithm for polynomials.	2
P2	Bezou's theorem and Gorner's scheme. The fundamental theorem of algebra.	2
P3	Solving algebraic equations of the third and fourth degree.	2
P4	Root limits, Sturm's theorem.	2
P5	n-dimensional vector linear spaces. Vector space basis and dimension.	2
P6	Partial spaces, their intersection, sum, exact sum.	2
P7	Euclidean spaces. Orthogonal and orthonormal systems.	2

P8	Linear and square forms.	2
P9	The canonical form of the quadratic form. Lagrange and Jacobi methods.	2
P10	The law of inertia.	2
P11	Linear permutations and their matrices.	2
P12	Invariant part-spaces. Eigenvalues and eigenvectors of linear substitution.	2
P13	Joint Substitution to Linear Substitution. Self-adjoint, unitary and normal linear permutations.	2
P14	Linear permutations in real Euclidean space.	2
P15	Jordan normal form of linear substitution.	2
Total		**30**

Self-study (SS)
1st semester

SS1	Sets and operations on them.	4
SS2	Reflections.	4
SS3	Rearrangements and replacements.	4
SS4	Matrices and operations on them.	4
SS5	Determinants and their properties.	4
SS6	Minors and algebraic complements.	4
SS7	Matrix rank theorem.	4
SS8	Some methods of calculating n-order determinants.	4
SS9	An upper triangle view, via a recursive relation.	4
SS10	An upper triangle view, via a recursive relation.	4
SS11	Laplace's theorem.	4
SS12	Additional properties of the inverse matrix.	4
SS13	Additional properties of the determinant.	4
SS14	Systems of linear equations and the Gaussian method of solving them.	2
SS15	Cramer's method of solving systems of linear equations.	2
SS16	Inverse matrix method of solving systems of linear equations.	4
SS17	System of homogeneous equations.	4
SS18	Kronecker-Capelli theorem.	4
SS19	Complex numbers and operations on them.	4
SS20	Geometric representation of complex numbers.	4
SS21	Trigonometric form of complex numbers.	4
SS22	Muavr's formula, extraction of roots from a complex number.	4
SS23	The roots of one.	2
SS24	Linear permutations in real Euclidean space.	2
SS25	Jordan normal form of linear substitution.	2
Totally		**90**

Self-study (SS)

	2nd semester	
SS1	Polynomials and operations on them.	4
SS2	Euclidean algorithm for polynomials.	4
SS3	Bezu's theorem.	4
SS4	Horner scheme.	4
SS5	The fundamental theorem of algebra.	4
SS6	Solving algebraic equations of the third degree.	4
SS7	Solving algebraic equations of the fourth degree.	4
SS8	Root limits.	4
SS9	Sturm's theorem.	4
SS10	n-dimensional vector linear spaces.	4
SS11	Vector space basis and dimension.	4
SS12	Partial spaces, their intersection.	4
SS13	Partial spaces, their sum, proper sum.	4
SS14	Euclidean spaces.	2
SS15	Orthogonal and orthonormal systems.	2
SS16	Linear and square forms.	4
SS17	The canonical form of the quadratic form.	4
SS18	Lagrangian method.	4
SS19	Jacobi method	4
SS20	The law of inertia.	4
SS21	Linear permutations and their matrices.	4
SS22	Invariant part-spaces.	2
SS23	The eigenvalue of a linear permutation.	2
SS24	Eigenvectors of a linear permutation.	2
SS25	Joint Substitution to Linear Substitution.	2
SS26	Self-adjoint, unitary and normal linear permutations.	2
Total:		**90**

VIII. Requirements for obtaining a credit::

Full mastery of theoretical and practical concepts of science, ability to correctly reflect the results of analysis, independent observation of the studied processes, creation and current, intermediate control forms of tasks and assignments given in writing or orally execution, passing tests on final control.

IX. Criteria for evaluation and control of student knowledge in science

The educational results of students are evaluated in a 100-point rating system. The conversion of points for the educational results by students is carried out on the basis of the ECTS (European Credit Transfer System) system.

Points for evaluation of educational results are determined in the following order:

Auditorium lessons for the completion of assigned tasks - current assessment (CA); Assessment of self-study	For answers during the intermediate control - intermediate control assessment (ICA);	For answers during the final control - final control assessment (FCA)

on completing independent learning tasks (ASS);				
The maximum score of the current control 15+15=30 score: $\Sigma CC = CA + ASS$		*The maximum score of the intermediate control 20 score:* $\Sigma IC = ICA + ASS$		*The maximum score of the final control(FCA) 50 score.*

A student is allowed to pass the final exam when he has a score higher than $\Sigma CC + \Sigma IC > 30$

Mastery indicator from the module (subject).
(MI):
$$\Sigma MI = \Sigma CC + \Sigma IC + FCA$$
The module (subject) is considered mastered when a score higher than $\Sigma MI \geq 60$ score.

Criteria for assessing the educational results of students:

Level	5 score system (point)	Appropriation in percent	In traditional	Assessment criteria
For the education department		**For professors and teachers**		
A+	4,51 – 5	91 - 100	Excellent	The student quickly learns the material independently: he does not make mistakes; actively participates in training; answers questions completely and clearly.
A	4,26 – 4,5	86 – 90		the student learns the materials independently: does not make mistakes; answers questions completely and clearly.
B+	4,01–4,25	81 – 85	Good	the student has mastered the material well, can express it logically; actively participates in training; answers questions completely and accurately, but makes minor mistakes.
B	3,51 – 4,0	71 – 80		the student has mastered the material well, answers the questions fully and

				accurately, but makes minor mistakes.
C+	**3,26 – 3,5**	66 – 70	Satisfactory	knows basic material but struggles to express clearly; answers to questions lack accuracy and completeness; makes some mistakes in the presentation of materials; feels difficulty in the process of communication.
C	**3,0 – 3,25**	60 – 65		knows basic material but struggles to express clearly; answers to questions lack accuracy and completeness; makes some mistakes in the presentation of materials;
F	**Below 3,0**	Below 59	not satisfactory	did not master the materials; cannot answer questions; does not participate in training

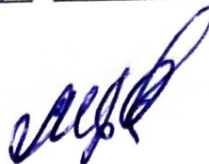## Basic and additional educational literature and information sources

	Basic literature
1.	Ayupov Sh.A., Omirov B.A., Khudoyberdiyev A.Kh., F.H. Haydarov, Algebra and number theory, Tashkent, Uzbekistan 2019. 319b.
2.	Ayupov Sh.A., Omirov B.A., Khudoyberdiyev A.Kh., Abstract Algebra, Tashkent, Uzbekistan 2022.
3.	Hajiyev J., Feinleib A.S. Algebra and number theory course, Tashkent, Uzbekistan 2001. 304b.
4.	Kurosh A.G. Higher algebra course. 2008. - 432 c.
5.	D. Yunusova, A. Yunusov "Algebra and number theory" Tashkent 2007
	Additional literature
1.	D.K. Fadeev, Lectures on algebra, St. Petersburg: Lan, 2005.
2.	A.L. Kostrikin, Collection of problems in algebra, M.: Fizmatlit, 2001.
3.	David C.L., Linear algebra and its applications, Addison-Wesley, 2012.
4.	N.D. Nikitin, Algebra, textbook, Penza 2012.
5.	Konstrikin A.I. Fundamentals of algebra.-M.: FIZMATLIT, 2000.
6.	Malik D.S., Mordeson J.N., Sen M.K. Fundamentals of abstract algebra.
	Internet sites
1.	www.cspi.uz
2.	www.ziyonet.uz
3.	www.edu.uz
4.	www.mathedu.ru

This Syllabus was approved by the "Algebra and mathematical analysis" department in the meeting No. 1 dated 28 - 08 2023.

This Syllabus was approved by the "Mathematics and informatics" faculty in the meeting No. 1 dated 28 - 08 2023.

This Syllabus was approved by the Council of Chirchik State Pedagogical University in the meeting No. 1 dated 29 - 08 2023.

**Head of the educational and
methodological department**   M.Boltayev

The dean of the faculty   D.M.Makhmudova

The head of the department   B.Z.Usmonov

Teacher   M.Raupova

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

CURRICULUM (SYLLABUS)

OF ELEMENTARY MATHEMATICS (ALGEBRA)

(2nd full-time course)

Fields of knowledge:	100000 – Education
Fields of education:	110000 – Education
Educational direction:	60110600 - Mathematics and informatics

Chirchik - 2023

The curriculum (syllabus) of the subject was approved by the Council of Chirchik State Pedagogical University dated " 1 " 29.08 2023 of the meeting of No. 1

Authors:
M.Raupova

Teacher at the Department of "Algebra and mathematical analysis", Faculty of "Mathematics and Informatics", Chirchik State Pedagogical University.

Z.M.Murtozaqulov

Teacher at the Department of "Algebra and mathematical analysis", Faculty of "Mathematics and Informatics", Chirchik State Pedagogical University

Reviewers :

B.Sh.Radjabov

Professor of the Department of "Methodology of Teaching Mathematics and Geometry" of the Faculty of "Mathematics and Informatics" of Chirchik State Pedagogical University

The curriculum (syllabus) of the subject was approved and recommended to the council of the faculty "Mathematics and informatics" at a meeting of the department "Algebra and mathematical analysis" by protocol No. 1 of " 28.08 " 2023

The dean of the faculty   **D.M .Makhmudova**

The curriculum (syllabus) of the subject was discussed and recommended for use by the faculty council of the Faculty of Mathematics and Informatics of Chirchik State Pedagogical University from "29" 08 202, protocol No. 1

The head of the department   **B.Z.Usmonov**

CURRICULUM (SYLLABUS)

Mathematics and Informatics Faculty

60110600 – Mathematics and Informatics

General information		
Subject name: Elementary mathematics (algebra)		
Subject code: Math3144	**Amount of credit: 4**	**Semester: 3**
Department name: Algebra and mathematical analysis		
Teacher: Raupova Mokhinur Haydar kizi		
Email: rmokhinur@mail.ru		
Subject Type: Compulsory		
Form of education:	Full-time	
Evaluation form:	Exam	
Science language:	English	

Summary of science
The content of the subject "Elementary mathematics (Algebra)" is to provide complete information about polynomials and numbers, logarithmic equations, trigonometric equations, systematic numbers, algebraic equations and systems of equations, and general information about their role in professional activity.

Learning outcomes:

Students who completed the course:
- Demonstrates a deep understanding of the concepts and principles of elementary mathematics (Algebra);
- Deeply analyzes the essence of complex examples and methods of solving problems related to elementary mathematics;
- Knows how to use appropriate elementary mathematics tools to solve problems in professional activities.

Competencies to be acquired as a result of the course:
- Acquires knowledge, skills and abilities in the field of algebra in future professional activities;
- Participates in the implementation of research work.

Science content

3

Form of education: Lecture (L)

L1	Introduction to Elementary Mathematics. Number theory.
L2	Interesting logical problems.
L3	Theory of polynomials. Quotient polynomials.
L4	Algebraic equations and systems of equations.
L5	System of rational equations and inequalities.
L6	Levels and Roots.
L7	Irrational equation, inequalities and their systems.
L8	Modular equations and inequalities.
L9	Exponential and logarithmic functions.
L10	Introduction to Elementary Mathematics. Number theory.
L11	Interesting logical problems.
	Summative
L12	Exponential and logarithmic equation, inequality and their systems.
L13	Parametric equations and inequalities and their solution methods.
L14	Number sequences: Arithmetic and geometric progressions.
L15	Properties and graph of trigonometric functions.
	Final control

Form of education: practical lesson (P)

P1	Introduction to Elementary Mathematics. Number theory.
P2	Interesting logical problems.
P3	Theory of polynomials. Quotient polynomials.
P4	Algebraic equations and systems of equations.
P5	System of rational equations and inequalities.
P6	Degree and Roots.
P7	Irrational equation, inequalities and their systems.
P8	Modular equations and inequalities.
P9	Exponential and logarithmic functions.
P10	Exponential and logarithmic equation, inequality and their systems.
P11	Parametric equations and inequalities and their solution methods.
P12	Number sequences: Arithmetic and geometric progressions.
P13	Properties and graph of trigonometric functions.
P14	Trigonometric equation and inequalities.
P15	Trigonometric equation and inequalities.

Teaching and learning methods

It is organized through lectures and practical classroom training as well as independent learning activities of students. Lectures provide theoretical information necessary for the analysis of the topics of the elementary mathematics (arithmetic) course. In practical classroom sessions, problems (examples and problems) of the Elementary Mathematics (arithmetic) course are presented and students are given the opportunity to practice applying the necessary mathematical methods and techniques

to solve them. In independent learning activities, students should study the topics in depth and analyze the topics using literature and scientific journals and sources.

Type of training	A dedicated hour
Lecture	30
Practical training	30
Self-education	60
Total student hours of study and teaching	120

Criteria for assessment and control of student knowledge in science

Monitoring and evaluation of student knowledge is carried out through student activity, mid-term control, final control and assessment of independent learning.

• **Mid-term supervision** is an important stage of assessment by the teacher of the student's knowledge and practical skills acquired in the first part of the module, and is an indicator of future mastery of this subject. Assessment of students' knowledge in mid-term control is carried out through oral question-and-answer and written work. If the student does not pass the mid-term examination, he will be given the opportunity to retake it 2 more times. **20 percent of the total assessment .**

• **Assessment of independent learning** is carried out through students' completion of assigned practical projects in a group and individually. Each student is given one team project and two individual projects. The student studies the given issue and conducts research, understanding the goals and objectives of the given project. Analyzes the obtained results, prepares presentations with conclusions and defends them. The number, subject, content of the projects, methods of implementation and deadlines are fully disclosed in the working science program. **50 percent of the total evaluation.**

• **Final control is** a summative stage of evaluation of the student's knowledge and practical skills by the professor-teacher . Final control is conducted in the form of written work. **30 percent of the total evaluation.**

Assessment, intermediate and final control tasks (tasks) are developed by the course professors, pre-moderated and approved by the head of the department.

The content of the assignments for conducting the types of control should allow an objective, transparent and accurate assessment of the student's learning.

A student must not engage in any activity that may lead to academic misconduct (misconduct). For example, plagiarism, collusion, falsification of results, irregularities in the examination process, i.e. use of notes and handouts, telephone and other means of communication, communication with others inside or outside the examination room are prohibited. Students who are guilty of this will be excluded from the control or examination process, and their grade will be zero.

Depending on the characteristics of the subject (course), changes and additions may be made to the evaluation and control criteria.

	Basic literature	
1.	Makhmudova D.M., Dosmurodova G.Kh. Interesting math and Olympiad problems, methodical guide. - Chirchik 2020. - 124 pages	
2.	Abduhamidov A., Nasimov H., Nosirov U., Khusanov J. A set of problems from the basics of algebra and mathematical analysis. Tashkent: 2002 y.	
3.	Ayupov Sh., Rihsiev B., Kuchkarov O. "Mathematical Olympiad problems" 1,2 parts. T.: Science	

	Additional literature
1.	Makhmudova D.M., Dosmurodova G.Kh. Interesting math and Olympiad problems, methodical guide. - Chirchik 2020. - 124 pages.
2.	Gorbachev N.V. Sbornik olympiadnykh zadach po matematike. - M.: MTsNMO, 2004.
3.	Shen A.Kh. List simple ingredients. ☐ M.: Izd-vo MTsNMO, 2008.
4.	Chulkov P.V. Arithmeticheskie zadachi. ☐ M.: Izd-vo MTsNMO, 2009.
5.	Problems and exercises from the basics of number theory. Methodical recommendations for practical exercises in "Algebra and number theory". Methodical guide. - Samarkand: SamDU publication, 2011. - 80 pages.

Internet addresses

1. www.cspi.uz
2. www.edu.uz
3. http://ziyonet.uz
4. www.pedagog.uz

MINISTRY OF HIGHER EDUCATION, SCIENCE AND INNOVATION

OF THE REPUBLIC OF UZBEKISTAN

CHIRCHIK STATE PEDAGOGICAL UNIVERSITY

SYLLABUS
OF MATHEMATICAL ANALYSIS
(Form of education: full-time 1-course)

Fields of knowledge:	100000 – Education
Fields of education:	110000 – Education
Educational direction:	60110600 – Mathematics and informatics

Chirchik – 2023

Syllabus of subject

Academic year:	2023/2024		
Subject name:	Mathematical analysis		
Subject type:	Compulsory		
Subject code:	MATA1128		
Year:	4		
Form of education:	Full-time		
Type of education:	Bachelor degree		
Course format and semester hours:	**Total**	**1st semester**	**2nd semester**
	270	150	120
Lecture	**60**	30	30
Practical lesson	**60**	30	30
Laboratory lesson	—	—	—
Seminar	—	—	—
Self-study	**150**	90	60
Amount of credit:	**9**	5	4
Evaluation form:	**Summative**	Exam	Exam
	Final control	Exam	Exam
Responsible department for subject:	**Algebra and Mathematical Analysis**		

Information about the teacher of subject

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<table>
<tr><td colspan="2" align="center">The purpose of subject (PS)</td></tr>
<tr><td>PS1</td><td>The main purpose of the mathematical analysis course is to familiarize students with the set of necessary information of mathematics (concepts, assertions and their proof, methods of solving practical problems, etc.). At the same time, it helps students to think logically, draw correct conclusions, increase mathematical culture, and at the same time introduce students to the foundations of modern mathematics, consciously research issues related to professional activity, explain the essence of the possibilities of mathematical analysis in finding solutions to problems, and use them.</td></tr>
</table>

Basic knowledge necessary for learning subject	
1.	Mathematics
2.	Algebra
3.	Geometry

Educational results (ER)	
In terms of a knowledge perspective:	
ER1	Demonstrate a thorough understanding of the concepts and principles of mathematical analysis;
ER2	Deep analysis of the essence of mathematical analysis methods;
ER3	In order to solve problems in his professional activity, he acquires knowledge, qualifications and skills in the fields of mathematical analysis, algebra and number theory, geometry, differential equations, probability theory, and participates in scientific research.
ER4	Mathematical Analysis course problems (examples and problems) are presented and students are given the opportunity to practice applying the mathematical methods and techniques necessary to solve them.
In terms of skills:	
ER5	It is carried out through students' collective and individual implementation of given practical examples or problems.
ER6	The student studies the given problem and conducts research, understanding the goals and objectives and essence of the given examples or problems.
ER7	Analyzes the obtained results, prepares presentations with solutions and defends them.

Subject content	
Form of education: Lecture (L)	**Hours**

1st semester

L1	Subject of mathematical analysis. A set of real numbers.	2
L2	Converging sequences are their properties.	2
L3	The principle of approximation.	2
L4	A function of one variable and its properties.	2
L5	Definitions of the limit of a function.	2
L6	Properties of a function with a limit.	2
L7	Continuous function and its properties.	2
L8	Properties of functions that are continuous on a section.	2
	Summative	
L9	Derivative of a function of one variable.	2
L10	Rules for calculating the product.	2
L11	The differential of a function.	2
L12	Higher order derivatives and differentials.	2
L13	Basic theorems of differential calculus.	2
L14	Applications of the derivative.	2
L15	Complete function verification using the derivation.	2
	Final control	
Total		**30**

Form of education: Practical lesson (P)

1st semester

P1	Subject of mathematical analysis. A set of real numbers.	2
P2	Converging sequences are their properties.	2
P3	The principle of approximation.	2
P4	A function of one variable and its properties.	2
P5	Definitions of the limit of a function.	2
P6	Properties of a function with a limit.	2
P7	Continuous function and its properties.	2
P8	Properties of functions that are continuous on a section.	2
P9	Derivative of a function of one variable.	2
P10	Rules for calculating the product.	2
P11	The differential of a function.	2
P12	Higher order derivatives and differentials.	2
P13	Basic theorems of differential calculus.	2
P14	Applications of the derivative.	2
P15	Complete function verification using the derivation.	2
Total		**30**

Form of education: Lecture (L)	Hours
2nd semester	
L1	Indefinite integral and simple methods of finding it.	2

L2	Integration of rational functions.	2
L3	Integration of simple irrational and transcendental functions.	2
L4	Definition of definite integral. Necessary and sufficient conditions for the existence of a definite integral.	2
L5	A class of integrable functions. Properties of the definite integral.	2
L6	Methods of calculating the definite integral.	2
L7	Improper integrals with infinite limits.	2
L8	Improper integral of an unbounded function.	2
	Summative	
L9	Applications of the definite integral to the calculation of geometric quantities. Applications of the definite integral to mechanics and physics.	2
L10	Properties of numerical convergent series	2
L11	Positive term series	2
L12	Series with Arbitrary Terms	2
L13	Functional sequences. Properties of uniformly converging functional sequences.	2
L14	Functional lines. Properties of linearly converging functional series.	2
L15	Power series. Taylor series.	2
	Final control	
	Total	**30**
	Form of education: Practical lesson (P)	
	2nd semester	
P1	Indefinite integral and simple methods of finding it.	2
P2	Integration of rational functions.	2
P3	Integration of simple irrational and transcendental functions.	2
P4	Definition of definite integral. Necessary and sufficient conditions for the existence of a definite integral.	2
P5	A class of integrable functions. Properties of the definite integral.	2
P6	Methods of calculating the definite integral.	2
P7	Improper integrals with infinite limits.	2
P8	Improper integral of an unbounded function.	2
P9	Applications of the definite integral to the calculation of geometric quantities. Applications of the definite integral to mechanics and physics.	2
P10	Properties of numerical convergent series	2
P11	Positive term series	2
P12	Series with Arbitrary Terms	2
P13	Functional sequences. Properties of uniformly converging functional sequences.	2
P14	Functional lines. Properties of linearly converging functional series.	2
P15	Power series. Taylor series.	2

	Total	
		30

Self-study (SS)
1st semester

SS1	Concept of set and examples and problems.	4
SS2	The concept of a partial set. Studying examples and problems related to partial sets.	4
SS3	Definitions and concepts about sets. Studying examples and problems related to sets.	4
SS4	Decimal approximation to a real number with less and more. Real numbers and their comparison.	4
SS5	A set of real numbers. Exact limits of a bounded set and a theorem about them.	4
SS6	Concept of function. Definition and range of values of a function.	4
SS7	Coordinate system. The graph of the function.	4
SS8	Studying examples and problems related to function rate and definition and the field of values.	4
SS9	Concepts and theorems about even and odd functions. Studying examples and problems related to even and odd functions.	4
SS10	Concepts and rates of periodic and non-periodic functions.	4
SS11	Bounded and unbounded functions.	4
SS12	The concept of the inverse of a given function, the concept of bounded and unbounded functions.	4
SS13	Properties of functions $y=x^a$ and $y=\log_a x$, graphs of functions. $y=\sin x$, $y=\cos x$, $y=tgx$, $y=ctgx$ functions and their properties, graph.	4
SS14	Definition of numerical sequence limit. Examples.	2
SS15	Show by definition whether the given number is the limit of the sequence or not.	2
SS16	A necessary condition for sequence convergence. Theorems about limits.	4
SS17	Upper and lower limits. Learning the concepts of limits and giving examples of them.	4
SS18	The principle of nested segments. Concepts of approximation of bounded functions.	4
SS19	Studying examples and problems related to bounded functions.	4
SS20	Show that the given number is the limit of the given function by definition.	4
SS21	Concepts and tariffs regarding the limit of the function. Studying examples and problems related to them.	4
SS22	Limit in infinity. One-sided limits.	4
SS23	Infinitely small and infinitely large. Concepts and Tariffs of Uncertainties. Concepts of Limits. Studying examples and problems related to ambiguities	2
SS24	Types of interruptions, the concept of jumping. Performing	2

	arithmetic operations on continuous functions.	
SS25	Concepts of smooth continuity. Study and understand examples and problems related to Cantor's theorem.	2
	Total	**90**

Self-study (SS)
2nd semester

SS1	Studying examples and problems related to bounded functions.	2
SS2	Showing the given number is the limit of the given function by definition.	2
SS3	Concepts and definitions regarding the limit of the function. Studying examples and problems related to them.	2
SS4	Limit in infinity. One-sided limits.	2
SS5	Infinitely small and infinitely large. Concepts and definitions of Uncertainties. Concepts of Limits. Studying examples and problems related to ambiguities	2
SS6	Types of interruptions, the concept of jumping points. Performing arithmetic operations on continuous functions.	4
SS7	Concepts about the Weierstass theorem. Concept and information about smooth continuity. Study and understand examples and problems related to Cantor's theorem.	2
SS8	Functions with discontinuities, discontinuity points, types of discontinuities, one or more elements of a function are studied by matching a single element from a set based on a law or rule.	2
SS9	The differential of a function is the higher order derivative of the ratio of the derivative of the function to the derivative of the nth order argument of the function.	4
SS10	The derivative of a function is the differential of a function	2
SS11	Studying the ratio of the product of the differential function to the product of the argument of the nth order of the derivative function of higher order.	4
SS12	Studying the ratio of the product of the differential function to the product of the argument of the nth order of the derivative function of higher order.	2
SS13	Checking a function for monotonicity using the derivative. Extrema of a function, finding them using the derivative.	2
SS14	Convexity of the graph of the function. Concavity of the graph of the function. Asymptotes of the graph of the function.	4
SS15	Initial function. Definitions of indefinite integral.	2
SS16	Integration of trigonometric functions	2
SS17	Integration of some irrational functions.	2
SS18	Definitions of definite integral (Rieman integral).	2
SS19	Newton-Leibnitz formula.	2

SS20	Existence of definite integral. A class of integrable functions.	2
SS21	Number series. Real and complex number series.	2
SS22	Properties of converging series.	2
SS23	Affirmative and Subjunctive series and their convergence signs.	2
SS24	Properties of absolute and conditionally convergent series. .	2
SS25	Signs of smooth convergence of functional sequences (series). Approximation of functional series according to Dalamber's sign	2
SS26	Functional properties of functional sequences (series).	2
Total:		**60**

VIII. Requirements for obtaining a credit::

Full mastery of theoretical and practical concepts of science, ability to correctly reflect the results of analysis, independent observation of the studied processes, creation and current, intermediate control forms of tasks and assignments given in writing or orally execution, passing tests on final control.

IX. Criteria for evaluation and control of student knowledge in science

The educational results of students are evaluated in a 100-point rating system. The conversion of points for the educational results by students is carried out on the basis of the ECTS (European Credit Transfer System) system.

Points for evaluation of educational results are determined in the following order:

Auditorium lessons for the completion of assigned tasks - current assessment (CA); Assessment of self-study on completing independent learning tasks (ASS);	For answers during the intermediate control - intermediate control assessment (ICA);	For answers during the final control - final control assessment (FCA)
The maximum score of the current control 15+15=*30 score:* $\Sigma CC = CA + ASS$	*The maximum score of the intermediate control* *20 score:* $\Sigma IC = ICA + ASS$	*The maximum score of the final control(FCA) 50 score.*
A student is allowed to pass the final exam when he has a score higher than $\Sigma CC + \Sigma IC > 30$		
Mastery indicator from the module (subject). (MI): $\Sigma MI = \Sigma CC + \Sigma IC + FCA$ The module (subject) is considered mastered when a score higher than $\Sigma MI \geq 60$ score.		

Criteria for assessing the educational results of students:

Level	5 score system	Appropriation in percent	In traditional	Assessment criteria

	(point)	For professors and teachers		
For the education department				
A+	4,51 – 5	91 - 100	Excellent	The student quickly learns the material independently: he does not make mistakes; actively participates in training; answers questions completely and clearly.
A	4,26 – 4,5	86 – 90		the student learns the materials independently: does not make mistakes; answers questions completely and clearly.
B+	4,01–4,25	81 – 85	Good	the student has mastered the material well, can express it logically; actively participates in training; answers questions completely and accurately, but makes minor mistakes.
B	3,51 – 4,0	71 – 80		the student has mastered the material well, answers the questions fully and accurately, but makes minor mistakes.
C+	3,26 – 3,5	66 – 70	Satisfactory	knows basic material but struggles to express clearly; answers to questions lack accuracy and completeness; makes some mistakes in the presentation of materials; feels difficulty in the process of communication.
C	3,0 – 3,25	60 – 65		knows basic material but struggles to express clearly; answers to questions lack accuracy and completeness; makes some mistakes in the presentation of materials;
F	Below 3,0	Below 59	not satisfactory	did not master the materials; cannot answer questions; does not participate in

				training

Basic and additional educational literature and information sources
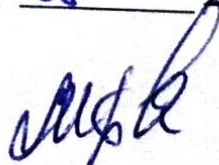
	Basic literature
1.	Azlarov T., Mansurov H. Mathematical analysis, volumes 1, 2, Tashkent, "Uzbekistan", 1994, 1995.
2.	Khudoyberganov G., Vorisov A.K., Mansurov H.T., Shoimkulov B.A. Mathematical analysis, volumes 1, 2, Tashkent, "Uzbekistan", 2010.
3.	Arkhipov G., Sadovnichiy V., Chubarikov V. Leksii po matematicheskomu analizu, Moscow, "Visshaya shkola", 1999.
4.	Khudoyberganov G., Vorisov A., Mansurov H. Complex analysis lecture. Tashkent "University" 1998.
5.	A. Sadullayev, G. Khudoyberganov, H. Mansurov, A. Vorisov, T. Toychiyev, a collection of examples and problems from the course of mathematical analysis. Part 3 (Complex analysis). Tashkent "Uzbekistan" 2000.
6.	Ghaziyev A., Israilov I., Yakhaboev M. Collection of example problems from mathematical analysis. Part 1, 2, 3. Tashkent 2012
	Additional literature
1.	Ilin V., Sadovnichiy V., Sendov B. Matematicheskiy analiz, Moskva «Nauka», 1979.
2.	Kudryavsev L. Kurs matematicheskogo analiza TT, 1, 1973.
3.	Fixtengols G. Kurs differensialnogo i integralnogo ischisleniya, TT, I, II, Moskva "fizmat-lit", 2001.
4.	Demidovich B. Sbornik zadach i uprajneniy po matematicheskomu analizu, Moskva, «Nauka», 1990.
	Internet sites
1.	www.cspi.uz
2.	www.ziyonet.uz
3.	www.edu.uz
4.	www.mathedu.ru

This Syllabus was approved by the "Algebra and mathematical analysis" department in the meeting No. 1 dated 28 - 08 2023.

This Syllabus was approved by the "Mathematics and informatics" faculty in the meeting No. 1 dated 28 - 08 2023.

This Syllabus was approved by the Council of Chirchik State Pedagogical University in the meeting No. 1 dated 29 - 08 2023.

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The dean of the faculty   **D.M.Makhmudova**

The head of the department   **B.Z.Usmonov**

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