

**MINISTRY OF HIGHER EDUCATION, SCIENCE AND INNOVATION**  
**TASHKENT UNIVERSITY OF INFORMATION TECHNOLOGIES**  
**NAMED AFTER MUHAMMAD AL-KHWARIZMI**



# **MODULE HANDBOOK**

**Educational Program**

**BA 60611100 – Television technologies  
(Audiovisual technologies)**

**Tashkent 2024**

**Table A – Curriculum of BA 6061110 – Television technologies (Audiovisual technologies)**

1 <sup>st</sup> semester	2 <sup>nd</sup> semester	3 <sup>rd</sup> semester	4 <sup>th</sup> semester	5 <sup>th</sup> semester	6 <sup>th</sup> semester	7 <sup>th</sup> semester	8 <sup>th</sup> semester
<b>PRG101</b> <b>Programming</b>  1 lectures 2/1 practical sessions  6 ECTS	<b>PRG102</b> <b>Programming</b>  1 lectures 2/1 practical sessions  6 ECTS	<b>DBM201</b> <b>Database</b>  2/1 lectures 1 practical sessions  6 ECTS	<b>CGP201</b> <b>Computer graphics</b>  2/1 lectures 1 practical sessions  6 ECTS	<b>3DM301</b> <b>3d modeling and visualization</b>  2/1 lectures 1 practical sessions  6 ECTS	<b>ADP301</b> <b>Audio data processing</b>  1 lectures 0/1 practical sessions  4 ECTS	<b>VSE401</b> <b>Visual special effects in media products</b> 2/1 lectures 1 practical sessions  6 ECTS	<b>QPR402</b> <b>Qualification Practice 2</b>   6 ECTS
<b>PHY101</b> <b>Physics I</b>  1 lectures 1 practical sessions and laboratory 6 ECTS	<b>PHY102</b> <b>Physics II</b>  1 lectures 0/1 practical sessions and laboratory 4 ECTS	<b>CSF201</b> <b>Fundamentals of Cyber Security</b>  2/1 lectures 1 practical sessions  6 ECTS	<b>AIF201</b> <b>Fundamentals of artificial intelligence</b>  2/1 lectures 1 practical sessions  6 ECTS	<b>TFA301</b> <b>Theoretical foundations of acoustics</b>  2 lectures 1 practical sessions  8 ECTS	<b>EMS301</b> <b>Embedded management systems</b>  2/1 lectures 1 practical sessions  6 ECTS	<i>Elective Subject</i> <b>ITS407/ITS408</b>  2/1 lectures 1 practical sessions  6 ECTS	<b>GQW403</b> <b>Graduation Qualification Work</b>   14 ECTS
<b>MTH101</b> <b>Calculus</b>  2/1 lectures 1 practical sessions  6 ECTS	<b>MTH102</b> <b>Differential equations</b>  1 lectures 0/1 practical sessions  4 ECTS	<b>DSA201</b> <b>Data structure and algorithms</b>  2/1 lectures 1 practical sessions  6 ECTS	<b>EFW201</b> <b>Electromagnetic fields and waves</b> 2/1 lectures 1 practical sessions  6 ECTS	<b>IMP301</b> <b>Image processing</b>  2/1 lectures 1 practical sessions  6 ECTS	<b>IDP301</b> <b>Individual project</b>  2/1 practical sessions  4 ECTS	<i>Elective Subject</i> <b>ITS409/ITS410</b>  2/1 lectures 1 practical sessions  6 ECTS	<i>Elective Subject</i> <b>ITS415/ITS416</b>  2/1 lectures 1 practical sessions  6 ECTS
<b>AWR101</b> <b>Academic writing</b>  2/1 practical sessions  4 ECTS	<b>MTH103</b> <b>Discrete structures</b>  1 lectures 0/1 practical sessions  4 ECTS	<b>EAC201</b> <b>Electronics and circuits I</b>  2/1 lectures 1 practical sessions  6 ECTS	<b>EAC202</b> <b>Electronics and circuits II</b>  2/1 lectures 1 practical sessions  6 ECTS	<i>Elective Subject</i> <b>ITS303/ITS304</b>  2/1 lectures 1 practical sessions  6 ECTS	<b>QPR301</b> <b>Qualification Practice 1</b>  6 ECTS	<i>Elective Subject</i> <b>ITS411/ITS412</b>  2/1 lectures 1 practical sessions  6 ECTS	<i>Elective Subject</i> <b>ITS417/ITS418</b>  1 lectures 0/1 practical sessions  4 ECTS
<b>FRL101</b> <b>Foreign language I</b>  2/1 practical sessions  4 ECTS	<b>FRL101</b> <b>Foreign language II</b>  2/1 practical sessions  4 ECTS	<b>MTH014</b> <b>Probability and Statistics</b>  2/1 lectures 1 practical sessions  6 ECTS	<i>Elective Subject</i> <b>ITS201/ITS202</b>  2/1 lectures 1 practical sessions  6 ECTS	<i>Elective Subject</i> <b>GEN301/GEN302</b>  1 lectures 0/1 practical sessions  4 ECTS	<i>Elective Subject</i> <b>GEN303/GEN304</b>  1 lectures 0/1 practical sessions  4 ECTS	<i>Elective Subject</i> <b>ITS413/ITS414</b>  2/1 lectures 1 practical sessions  6 ECTS	
<b>HUM101</b> <b>The newest History of Uzbekistan</b>  1 lectures 1 seminars  4 ECTS	<b>HUM102</b> <b>Religious studies</b>  1 lectures 1 seminars  4 ECTS				<i>Elective Subject</i> <b>ITS305/ITS306</b>  2/1 lectures 1 practical sessions  6 ECTS		
	<b>HUM103</b> <b>Philosophy</b>  1 lectures 1 seminars  4 ECTS						
6 exams	7 exams	5 exams	5 exams	5 exams	4 exams, Course project Practice Report	5 exams	2 exams, Practice Report, State Attestation
30 ECTS	30 ECTS	30 ECTS	30 ECTS	30 ECTS	30 ECTS	30 ECTS	30 ECTS

**TOTAL: 240 ECTS**

Subjects included in the curriculum of the educational program is divided into 6 main blocks, which are highlighted in the appropriate color:

Languages  
Humanities

General  
Fundamental

Math and Science  
Core



**Table B – Elective subjects for the Educational program BA 6061110 – Television technologies (Audiovisual technologies)**

<b>№</b>	<b>Code</b>	<b>1th subject</b>	<b>2nd subject</b>
1.	ITS201/ITS202	Photography	Audio recording and editing
2.	GEN301/GEN302	Power supply of information communication systems	Life safety
3.	GEN303/GEN304	Pedagogy. Psychology	Ecology
4.	ITS303/ITS304	Computer graphics packages	Film visualization
5.	ITS305/ITS306	Digital video cameras	UX/UI design
6.	ITS407/ITS408	Technologies for creating audio-video media products	Infographics
7.	ITS409/ITS410	Modern television studios	Audio post-production
8.	ITS411/ITS412	Design of audio studios	VR/AR technologies
9.	ITS413/ITS414	Experimental television	Introduction to computer vision
10.	ITS415/ITS416	Virtual reality visualization	Video post-production
11.	ITS417/ITS418	Artificial intelligence in audio and video processing	Hologram

## Syllabuses

<b>1. Humanities .....</b>	<b>6</b>
1.1. The newest history of Uzbekistan .....	6
1.2. Religious Studies .....	8
1.3. Philosophy .....	10
<b>2. Languages.....</b>	<b>12</b>
2.1. Foreign language I (English language) .....	12
2.2. Foreign language II (English language).....	14
2.3. Academic writing .....	16
<b>3. Math and Sciences.....</b>	<b>18</b>
3.1. Calculus .....	18
3.2. Physics I.....	20
3.3. Physics II .....	22
3.4. Differential Equations .....	24
3.5. Probability and Statistics .....	26
3.6. Discrete Structures .....	29
<b>4. General .....</b>	<b>31</b>
4.1. Ecology.....	31
4.2. Life safety .....	33
4.3. Pedagogy. Psychology.....	35
4.4. Power supply for infocommunication systems .....	37
<b>5. Fundamental .....</b>	<b>39</b>
5.1. Programming I .....	39
5.2. Programming II .....	41
5.4. Cybersecurity fundamentals.....	43
5.5. Data structures and algorithms .....	45
5.6. Electronics and circuits I .....	47
5.7. Electronics and circuits II .....	49
5.8. Electromagnetic fields and waves .....	51
5.9. Fundamentals of artificial intelligence .....	53
<b>6. Core .....</b>	<b>55</b>
6.1. Computer graphics .....	55
6.2. 3D modeling and visualization.....	57
6.3. Theoretical Foundations Of Acoustics .....	59
6.4. Audio data processing .....	61
6.5. Visual special effects in media products.....	63

6.6. Image processing.....	65
6.7. Embedded management systems.....	67
6.8. Photography .....	69
6.9. Audio recording and editing .....	71
6.10 Computer graphics packages .....	73
6.11. Film visualization .....	75
6.13. UX/UI design .....	79
6.14. Technologies for creating audio-video media products.....	81
6.15. Infographics .....	83
6.16. Modern television studios .....	85
6.17. Audio post production .....	87
6.18. Design of audio studios .....	89
6.19. VR/AR technologies.....	91
6.20. Experimental television .....	93
6.21. Introduction to Computer Vision .....	95
6.22. Virtual reality visualization.....	97
6.23. Video post-production .....	99
6.24. Artificial intelligence in audio and video processing .....	101
6.25. Hologram .....	103
6.26. Individual project .....	105
6.27. Qualification Practice 1 (Practical Training) .....	107
6.28. Qualification Practice 2 (Pre-Graduation Work Practice) .....	109
6.29. Graduation qualification work .....	111

## 1. Humanities

1.1. The newest history of Uzbekistan		
Semestr:	1	
Date of last modification:	31.08.2023	
Teachers:	Babadjanov Khasan Bakhtiyorovich	
Component:	Compulsory	
Cycle:	Secondary	
ECTS:	4	
Pre-requisites	-	
Workload:	Types of classes	Hours
	Total	120
	Lecture	30
	Seminars	30
	SAW (Student autonomous work)	60
	Form of final control	Exam
	Final assessment method	Testing
Control forms:	Current control, Mid-term control, Final control	
Assessment requirements	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
Final control	The final exam is taken in the form of a test, which contains 25 questions, worth 2 points each, tests are divided into 3 levels of difficulty. Total exam time 60 minutes	
Short content:	Understanding the essence and content of the historical path traversed by the state during the years of independence, the significance of the changes that have occurred in the modern history of Uzbekistan	
Goal:	reveal the essence and content of the fact that Uzbekistan is one of the regions that have made a great contribution to the development of world civilization, that the Uzbek people have a rich historical past and priceless cultural heritage, important changes in the Republic of Uzbekistan during the years of independence, to reveal the essence and content of fundamental reforms , as well as the study of the subject should contribute to students’ awareness of their place in society, social lifestyle, self-awareness of young people, awareness of such concepts as personality, citizen.	
Objective:	Make an excursion into the rich historical past, in particular into the history of Uzbek statehood, reveal the essence and content of the history of Uzbekistan at the end of the 20th – beginning of the 21st centuries, explain to students the difficult socio-political and economic situation that developed in Uzbekistan on the eve and in the first years of independence, reveal the essence of the state management, socio-economic, political reforms, transformations in the spiritual sphere, highlight the main directions of the foreign policy of the Republic of Uzbekistan during the years of independence, reveal the main essence of the Action Strategy and the Development Strategy of New Uzbekistan, educate students in the spirit of devotion and love for the Motherland, as well as form them national pride and spirit.	
Learning outcome:	After studying the discipline, students should be able to: LO 1. Know and understand the essence and content of the historical path traversed by the state during the years of independence, the significance of the changes that have occurred in the modern history of Uzbekistan LO 2. From the standpoint of historicism and objectivity, understand such processes as the integration of Uzbekistan into the world community, ensuring security, interethnic harmony and interreligious tolerance, the place and increase in the authority of the Republic of Uzbekistan in international rankings and indices LO 3. Have the skills to study the problems of the modern history of Uzbekistan, apply the idea of national independence in strengthening the worldview, be able to express your attitude to the processes taking place around you, understand the place of history in the development of the worldview of society and people and be able to connect the events of today with important events of history;	

	LO 4. Have a deep knowledge of the modern history of Uzbekistan, have your own scientific opinion on spiritual, national and universal issues and be able to substantiate them, have an active life position based on the ideas of national independence.				
Teaching methods:	<p>In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized:</p> <ul style="list-style-type: none"><li>- technology of problem- and project-based learning;</li><li>- technologies of educational and research activities;</li><li>- communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods);</li><li>- case-study method (analysis of situations);</li><li>- game technologies, in which students participate in business, role-playing, simulation games;</li><li>- information and communication (including distance learning) technologies.</li></ul> <p>In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "INSERT", "Fishbone" method, "I know, I found out, I want to know" hands-on activities, gamification and others are actively used during practical classes.</p>				
Assessment of the student's knowledge:	Type of task		Number of points (max)		Total
	Current control	Seminars	30	40	100
		Independent work	10		
	Mid-term control	Written work	10		
Final control	Exam (Testing)	50			
Topics of lectures:	<ul style="list-style-type: none"><li>• Introduction. Subject, goals and objectives of the academic discipline “Modern History of Uzbekistan”, its theoretical and methodological principles.</li><li>• Formation of Uzbek statehood and stages of its development.</li><li>• Socio-political processes in Uzbekistan on the eve of achieving independence.</li><li>• Historical significance of the formation of the independent Republic of Uzbekistan. A unique path of Uzbekistan to freedom and progress.</li><li>• Formation of the foundations of a democratic civil society in Uzbekistan, political reforms.</li><li>• Socio-economic changes in Uzbekistan during the years of independence.</li><li>• Spiritual and cultural progress in Uzbekistan during the years of independence.</li><li>• Republic of Karakalpakstan during the years of independence.</li><li>• Uzbekistan and the world community.</li><li>• From action strategy to development strategy.</li></ul>				
Literature:	1. Action strategy on five priority areas of development of the Republic of Uzbekistan in 2017-2021. - Tashkent: Spirituality, 2017. 2. History of independent Uzbekistan. Responsible editor A. Sabirov. - Tashkent: Academy, 2013. 3. New history of Uzbekistan. Project manager and editor. M.A. Rakhimov. - Tashkent: Literary sparks, 2018. 4. The latest history of Uzbekistan. Editors: R.H. Murtazayeva, A.A. Ermetov, A.A. Odilov. - Tashkent, 2023. 5. "Development Strategy". Decree of the Republic of Uzbekistan No. PF-60 dated 28.01.2022.				

1.2. Religious Studies		
Semestr:	2	
Date of last modification:	31.08.2023	
Teachers:	Tashkenbaeva Diyora Abdurashidovna	
Component:	Compulsory	
Cycle:	Secondary	
ECTS:	4	
Pre-requisites	-	
Workload:	<b>Types of classes</b>	
	<b>Hours</b>	
	Total	120
	Lecture	30
	Seminars	30
	SAW (Student autonomous work)	60
	Form of final control	Exam
	Final assessment method	Testing
Control forms:	Current control, Mid-term control, Final control	
Assessment requirements	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
Final control	The final exam is taken in the form of a test, which contains 25 questions, worth 2 points each, tests are divided into 3 levels of difficulty. Total exam time 60 minutes	
Short content:	Gives an idea of religion, helps students develop their worldview positions. By mastering this discipline, the student gains the skills to communicate with people of different ideological positions. Religious studies through its means contributes to the realization of freedom of conscience, that is, the choice of religion or free thought.	
Goal:	Is to form theoretical knowledge about the content and essence of religion in the minds of students and youth, about the religious image of the world, about the relationship of religious and philosophical views, about the process of globalization and modern religious movements, about the formation of skills in the fight against the negative consequences of such concepts as religious fanaticism , extremism and terrorism, the struggle for the security of the state and society	
Objective:	In accordance with the state educational standard of higher professional education are to form students’ ideas about: the subject and social functions of religion in their historical development; about the main historical types of religious worldviews; about the main directions of modern religion; about religious views on the crisis of modern civilization and ways out of it.	
Learning outcome:	After studying the discipline, students should be able to: LO 1. The student will learn to demonstrate knowledge of the main stages of the historical development of religion, its main directions and the trends of its functioning in the modern world; LO 2. Studying the history of the development of religious teachings, the formation of knowledge and the ability to distinguish the original content of religion from its false interpretations; LO 3. The ability to determine the causes of extremism and terrorism, and a socio-philosophical analysis of its consequences; LO 4. Formation of logical and critical thinking skills in relation to religious and secular processes; LO 5. Prevention of religious fanaticism and application of acquired theoretical knowledge in practical life; LO 6. Student will have the ability to form ideological immunity against various religious ideas, to express his free and fair attitude towards their evil intentions. LO 7. Formation of students’ skills in using acquired knowledge in independent learning. LO 8. The student will master the skills of perceiving and analyzing texts with philosophical and religious content, techniques for conducting discussion and polemics, skills of public speaking and written, reasoned presentation of one’s own point of view, skills of analyzing the modern religious situation in the world.	



<i>Teaching methods:</i>	In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized: - technology of problem- and project-based learning; - technologies of educational and research activities; - communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods); - case-study method (analysis of situations); - game technologies, in which students participate in business, role-playing, simulation games; - information and communication (including distance learning) technologies. In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "INSERT", "Fishbone" method, "I know, I found out, I want to know" hands-on activities, gamification and others are actively used during practical classes.				
<i>Assessment of the student's knowledge:</i>	<b>Type of task</b>		<b>Number of points (max)</b>		<b>Total</b>
	Current control	Seminars	30	40	100
		Independent work	10		
	Mid-term control	Written work	10		
	Final control	Exam (Testing)	50		
<i>Topics of lectures:</i>	<ul style="list-style-type: none"><li>• The importance of religion as a phenomenon of social culture</li><li>• National religions</li><li>• Zoroastrianism</li><li>• Buddhism</li><li>• Christianity</li><li>• Islam</li><li>• Dogmatic directions and schools of Islamic religion</li><li>• The role of the Hanafi madhhab in the history of Central Asia</li><li>• Religious organizations operating in Uzbekistan</li><li>• Modern religious movements and sects</li><li>• Social danger of spreading religious beliefs</li><li>• in cyberspace.</li><li>• Political and social danger of missionary and proselytism</li><li>• History and directions of religious fundamentalism,</li><li>• radicalism and terrorism</li><li>• The experience of the world community in the fight against extremism and terrorism</li><li>• The meaning of achieving the unity of secular knowledge and religious faith</li></ul>				
<i>Literature:</i>	1. Muratov D., Alimova M., Karimov J. Religious studies, textbook. - Tashkent, "Navroz" publishing house, 2019. - 264 p. 2. Rakhimdzhanov D., Ernazarov O. Introduction to religious studies. Study guide. - T.: Publishing House "National Society of Philosophers of Uzbekistan", 2018. - 304 p. 3. Isoqjanov R. Comparative religious studies. Study guide. - T.: OOO "Complex print", 2020. - 198 p. 4. Kamilov D. Religious studies. Study guide. - T.: Lesson Press, 2021. -128 p. Methodological manual of "Religious Studies"/Sh. Alimova. - T. 2018. -140 p.				

1.3. Philosophy		
Semestr:	2	
Date of last modification:	31.08.2023	
Teachers:	Makhkamova Nodira Rakhmanovna	
Component:	Compulsory	
Cycle:	Secondary	
ECTS:	4	
Pre-requisites	-	
Workload:	Types of classes	Hours
	Total	120
	Lecture	30
	Seminars	30
	SAW (Student autonomous work)	60
	Form of final control	Exam
	Final assessment method	Testing
Control forms:	Current control, Mid-term control, Final control	
Assessment requirements	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
Final control	The final exam is taken in the form of a test, which contains 25 questions, worth 2 points each, tests are divided into 3 levels of difficulty. Total exam time 60 minutes	
Short content:	Worldview and its historical forms, philosophical thoughts in the stages of development of Eastern and Western philosophical thinking, "Philosophy of Being", its philosophical analysis, philosophical understanding of the world, its problems, "Philosophy of Knowledge", forms and levels of knowledge, basic laws and categories of philosophy content, science of logic, its object of research, laws and forms of thinking, their structure and the foundations of its understanding, society, value, culture, human problem, moral categories, ideas about sophistication, globalization and global problems, etc. took place.	
Goal:	It is to create a generalized system of students' worldview and show a person's place in it, to form a person's cognition, socio-political, ethical, aesthetic and other relations to the world, and to teach the skill of correct thinking in the process of logical reasoning.	
Objective:	Is to equip young people with philosophical knowledge based on the achievements of modern science, and to develop self-awareness and correct thinking skills, skills and qualifications in them.	
Learning outcome:	After studying the discipline, students should be able to: students know the essence of philosophical knowledge, laws, and categories related to the development of nature, society, and human thinking; they can reveal the role and importance of a person in life by forming a personal attitude towards them; They will have information about the characteristics and laws of philosophical thinking; They study the leading ideas, scientific and spiritual heritage of Eastern and Western philosophy; They should be able to understand the methodological importance of philosophy in professional activity, the role of analytical and synthetic, logical thinking in global processes; They will have an idea about the essence of the reforms being carried out in Uzbekistan; By studying philosophy, they should understand the essence of social and political processes in the life of society; They should be able to evaluate socio-political processes from the point of view of philosophical and systematic thinking and should be able to collect, store and use information about the development of society; Logical analysis of information, observes information related to his professional activity based on analytical and synthetic thinking and should make independent decisions based on observational thinking; They should be able to independently acquire new knowledge, improve it and systematically organize their work on the basis of scientificity and creativity;	

	They should know how to express their thoughts and views in a constructive and logical manner based on the rules of the literary language orally and in writing.				
Teaching methods:	<p>In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized:</p> <ul style="list-style-type: none"><li>- technology of problem- and project-based learning;</li><li>- technologies of educational and research activities;</li><li>- communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods);</li><li>- case-study method (analysis of situations);</li><li>- game technologies, in which students participate in business, role-playing, simulation games;</li><li>- information and communication (including distance learning) technologies.</li></ul> <p>In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "INSERT", "Fishbone" method, "I know, I found out, I want to know" hands-on activities, gamification and others are actively used during practical classes.</p>				
Assessment of the student's knowledge:	<b>Type of task</b>		<b>Number of points (max)</b>		<b>Total</b>
	Current control	Seminars	30	40	100
		Independent work	10		
	Mid-term control	Written work	10		
	Final control	Exam (Testing)	50		
Topics of lectures:	<p><b>MODULE 1. PHILOSOPHY AND LOGIC</b></p> <ul style="list-style-type: none"><li>• Philosophy and its role in society</li><li>• Stages of development of philosophical thinking: Eastern philosophy</li><li>• Stages of development of philosophical thinking: Western philosophy</li><li>• Being (ontology) and the philosophy of development</li><li>• Philosophy of knowledge (epistemology)</li><li>• Logic.</li><li>• Forms of thought: understanding, judgment and conclusion.</li><li>• Philosophy of society</li><li>• Philosophy of Man (Philosophical Anthropology)</li><li>• Philosophy of values (axiology)</li></ul> <p><b>MODULE 2. THE PHILOSOPHY OF MORALS AND ELEGANCE. CORRUPTION IS A GLOBAL PROBLEM TODAY</b></p> <ul style="list-style-type: none"><li>• Moral philosophy (Ethics)</li><li>• Philosophy of elegance (Aesthetics)</li><li>• Philosophy of globalization and sustainable development</li><li>• World experience of fight against corruption</li><li>• Anti-corruption policy of Uzbekistan</li></ul>				
Literature:	<p>1. Davronov Z., Shermuhamedova N, Kahharova M, Nurmatova M, Husanov B, Sultonova A. Philosophy. - Tashkent: TMU, 2019. 2. Madaeva Sh. Shermuhamedova N. and others. Philosophy is a study guide. - Tashkent: 2019. 3. Muhammadjonova L.A. Abdulla Sher, Shodimetova G. Moral philosophy. - Tashkent: Vneshinvestprom, 2023. Saifnazarov I. Mukhtorov A., Sultanov T., Usmanov F. Philosophy. Textbook. - T.: Innovative development publishing house - printing house, 2021.- 424 p. 4. Saifnazarov I.S., Abdullakhanova G.S., Ernazarov D.Z. Philosophy (Logic, Ethics, Aesthetics). Textbook for higher educational institutions. LAMBERT Academic Publishing RU. 2019. -134 pages. 5. Shermuhamedova N. Philosophy. - Tashkent: Idris Abdurauf Nashr, 2021. p. 667</p>				

## 2. Languages

2.1. Foreign language I (English language)		
Semesters:	1	
Date of last modification:	31.08.2023	
Teachers:	Abdirazzakova Sadakat Alimbayevna, Daniyarova Sitara Qulmat qizi	
Component:	Compulsory	
Cycle:	Secondary	
ECTS:	4	
Pre-requisites	-	
Workload:	Types of classes	Hours
	Total	120
	Practical lessons	48
	SAW (Student autonomous work)	72
	Form of final control	Exam
	Final assessment method	Testing
Control forms:	Current control, Mid-term control, Final control	
Assessment requirements	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
Final control	The final exam is taken in the form of a test, which contains 25 questions, worth 2 points each, tests are divided into 3 levels of difficulty. Total exam time 60 minutes	
Short content:	English course will encourage students to improve their general English and learn to use English language according to their specialty. Moreover, they will learn IT terms a strong grammar syllabus with the specialist vocabulary students need to succeed in their area and the course includes tasks that covers 4 skills (listening, reading, speaking and writing) of learning language. The course includes topics such as Jobs and professions, IT acronyms, Computer hardware and computer software, websites, website development, database basics, data storage and back up, E- commerce, transactions, Network, its types, network range and speed, software repair, hard ware repair, security solutions.	
Goal:	The purpose of mastering the discipline is to give students systematized theoretical knowledge and practical skills in implementing English language in IT sphere.	
Objective:	The course forms the knowledge and skills necessary to understand and express ICT-related knowledge in a foreign language. This course prepares students to communicate in English in their future professional activities.	
	Expands vocabulary related to ICT and IT, in particular, develops listening comprehension, speaking, reading and writing skills.	
Learning outcome:	After studying the discipline, students should be able to: LO 1. understand and use familiar everyday expressions and simple expressions; LO 2. introduce himself and others, ask and answer questions about personal information such as address of residence, place of study and work, family, daily routine; LO 3. provide information about computer hardware and software; LO 4. know the lexicon of computer hardware and software; LO 5. distinguish between word groups and parts of speech; LO 6. make simple and complex sentences using present, past and future tenses; LO 7. read a simple text and understand its content;	
Teaching methods:	In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized: - technology of problem- and project-based learning; - technologies of educational and research activities; - communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods);	

	<ul style="list-style-type: none"><li>- case-study method (analysis of situations);</li><li>- game technologies, in which students participate in business, role-playing, simulation games;</li><li>- information and communication (including distance learning) technologies.</li></ul> <p>In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.</p>				
<i>Assessment of the student's knowledge:</i>	<b>Type of task</b>		<b>Number of points (max)</b>		<b>Total</b>
	Current control	Practical Assignments 1-2	20	<b>0-50</b>	100
		Independent work	30		
Final control	Exam (Testing)	<b>0-50</b>			
<i>Topics of practical lessons:</i>	<ul style="list-style-type: none"><li>• Jobs and professions. Working in the IT industry. Meeting people: Introducing yourself and others</li><li>• Jobs in IT: Describing your job.</li><li>• Schedules: Describing your daily routine.</li><li>• Spelling: IT acronyms</li><li>• Computer systems. Computer hardware:</li><li>• Computer software:</li><li>• Working with computers.</li><li>• Computer usage: Understand computer usage.</li><li>• Websites. Website purpose</li><li>• Website analytics</li><li>• Website development</li><li>• The best websites</li><li>• Databases. Database basic: Understanding database product.</li><li>• Data Processing: Describing data processing steps.</li><li>• Data storage and back up</li><li>• E-commerce. E-commerce Companies</li><li>• E-commerce feature</li><li>• Transaction security: Talking about security. Networks.</li><li>• Network system Types of network</li><li>• Network range and speed</li><li>• IT support. Fault diagnosis: Understanding faults.</li><li>• Hardware repair: Using toolkits and making repairs.</li><li>• Security solutions: Describing security solutions.</li><li>• Reporting incidents: Reporting a security incident.</li></ul>				
<i>Literature:</i>	Maja Olejniczak. "English for Information Technology" 1 Vocational English Course Book, <b>Pearson</b> , 2011.				

2.2. Foreign language II (English language)		
Semesters:	2	
Date of last modification:	31.08.2023	
Teachers:	Abdirazzakova Sadakat Alimbayevna, Daniyarova Sitora Qulmat qizi	
Component:	Compulsory	
Cycle:	Secondary	
ECTS:	4	
Pre-requisities	Foreign language I (English language)	
Workload:	Types of classes	Hours
	Total	120
	Practical lessons	48
	SAW (Student autonomous work)	72
	Form of final control	Exam
	Final assessment method	Testing
Control forms:	Current control, Mid-term control, Final control	
Assessment requirements	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
Final control	The final exam is taken in the form of a test, which contains 25 questions, worth 2 points each, tests are divided into 3 levels of difficulty. Total exam time 60 minutes	
Short content:	English course will encourage students to improve their general English and learn to use English language according to their specialty. Moreover, they will learn IT terms a strong grammar syllabus with the specialist vocabulary students need to succeed in their area and the course includes tasks that covers 4 skills (listening, reading, speaking and writing) of learning language. The course includes topics such as working in the it industry, it systems. data communication, databases, internet, web design, software development, IT solutions.	
Goal:	The purpose of mastering the discipline is to give students systematized theoretical knowledge and practical skills in implementing English language in IT sphere.	
Objective:	The course forms the knowledge and skills necessary to understand and express ICT-related knowledge in a foreign language. This course prepares students to communicate in English in their future professional activities. Expands vocabulary related to ICT and IT, in particular, develops listening comprehension, speaking, reading and writing skills.	
Learning outcome:	After studying the discipline, students should be able to: LO 1. understand and use familiar everyday expressions and simple expressions; LO 2. introduce himself and others, ask and answer questions about personal information such as address of residence, place of study and work, family, daily routine; LO 3. provide information about computer hardware and software; LO 4. know the lexicon of computer hardware and software; LO 5. distinguish between word groups and parts of speech; LO 6. make simple and complex sentences using present, past and future tenses; LO 7. read a simple text and understand its content;	
Teaching methods:	In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized: - technology of problem- and project-based learning; - technologies of educational and research activities; - communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods); - case-study method (analysis of situations); - game technologies, in which students participate in business, role-playing, simulation games; - information and communication (including distance learning) technologies.	

	In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.				
Assessment of the student's knowledge:	Type of task		Number of points (max)		Total
	Current control	Practical Assignments 1-2	20	50	100
		Independent work	30		
	Final control	Exam (Testing)	50		
Topics of practical lessons:	<ul style="list-style-type: none"><li>• Working in IT. IT jobs and duties.</li><li>• IT organisations.</li><li>• IT workplace rules. Meetings</li><li>• IT systems. System specifications</li><li>• GUI operations. Multimedia hardware</li><li>• Operating systems</li><li>• Data communication .Internet browsing</li><li>• Networks</li><li>• Mobile computing. Email</li><li>• Administration.Spreadsheets and formulae</li><li>• Data base and system administration</li><li>• Peripherals</li><li>• Choice.Web hosting</li><li>• IT costs</li><li>• Product research. Making recommendations</li><li>• Interactions.Enterprise social media</li><li>• Video conferencing</li><li>• E-commerce. Training users</li><li>• Development. Requirements analysis</li><li>• Website design and architecture</li><li>• Software development.Project management.</li><li>• IT solutions.Investigations</li><li>• Diagnosis</li><li>• Solutions. Your future in IT.</li></ul>				
Literature:	David Hill: “English for Information Technology” 2 Vocational English Course Book, Pearson 2012.				

2.3. Academic writing		
Semestr:	1	
Date of last modification:	31.08.2023	
Teachers:	Abdullaeva Simela Khristoforovna, Medenseva Natalya Petrovna	
Component:	Compulsory	
Cycle:	Secondary	
ECTS:	4	
Pre-requisities	-	
Workload:	<b>Types of classes</b>	
	<b>Hours</b>	
	Total	
	120	
	Practical works	
	48	
	SAW (Student autonomous work)	
	72	
	Form of final control	
	Exam	
	Final assessment method	
	Testing	
Control forms:	Current control, Mid-term control, Final control	
Assessment requirements	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
Final control	The final exam is taken in the form of a test, which contains 25 questions, worth 2 points each, tests are divided into 3 levels of difficulty. Total exam time 60 minutes	
Short content:	The course provides mastery of the main features of the scientific style of speech, the study of the most common genres of oral and written academic discourse, both educational and scientific, the formation of skills in creating written and oral educational academic texts based on an idea of their goals, structure, stylistic features, genre differences , mastery of the basic principles of communication in an academic environment. During the course, the features of such genres will be discussed: abstract, abstract, review, special attention will be paid to learning how to write a text, based on the existing rules for creating a thematic text	
Goal:	The purpose of teaching the subject “Academic writing “ is to apply specialist language knowledge – vocabulary and terms in students, correct and logical composition of sentences and texts, formation of speech etiquette and knowledge, skills and qualifications in the skills of eloquence, to prepare an educated, ingenious, oral and written literacy mature specialist in the specialty.	
Objective:	- to introduce the features of academic genres (abstract, analytical review, etc.); - increase the level of scientific communication (written and oral); - to teach the rules of structuring texts for presentation purposes; - to learn the rules for using graphic organizers.	
Learning outcome:	After studying the discipline, students should be able to: LO 1. Possession of skills in writing, editing and processing various types of texts and information. LO 2. Conducting a literature review on the topic. LO 3. Abstracting scientific and popular science texts. LO 4. Structuring presentations. LO 5.Writing analytical texts of various genres. LO 6.Transformation of information from one type to another (graphic, text, etc.) LO7. Able to distinguish the structure and content of an academic text	
Teaching methods:	In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized: - technology of problem- and project-based learning; - technologies of educational and research activities; - communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods); - case-study method (analysis of situations); - game technologies, in which students participate in business, role-playing, simulation games;	



	- information and communication (including distance learning) technologies. In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.				
Assessment of the student's knowledge:	Type of task		Number of points (max)		Total
	Current control	Practical Assignments 1-2	20	50	100
		Independent work	30		
	Final control	Exam (Testing)	50		
Topics of lectures:	<ul style="list-style-type: none"><li>• Academic writing and information. Types of information.</li><li>• Text and its types. Text-forming means of communication.</li><li>• Principles of text rubrication. Plan. Types of plan.</li><li>• Abstract. Types of notes. Note-taking methods.</li><li>• Functional speech styles.</li><li>• Annotation. Annotation Types. Lexico-grammatical cliches for annotation.</li><li>• Essay. Types of essays.</li><li>• Abstract as a genre of secondary text. Types of abstracts. Structure and language clichés for abstracts.</li><li>• Scientific review and course work. Coursework structure</li><li>• Report. Structure of the report.</li><li>• Project. Project characteristics.</li><li>• Theses. Types of theses.</li><li>• Review. Types of reviews. Review structure.</li><li>• Presentation speech as a type of public speech. Presentation structure.</li><li>• Representation of facts, objects, processes and conclusions in scientific text.</li><li>• Creation of research text. Selecting a topic. Citation. Paraphrase.</li></ul>				
Literature:	Literature 1. Korotkina I. B. Academic writing: process, product and practice Textbook for universities. Moscow: Yurayt, 2021 2. Kuvshinskaya Yu.M., Zevakhina N.A. , Akhapkina Ya.E., Gordienko E.I. Academic writing from research to text. Textbook and workshop for universities. Moscow: Yurayt 2022 3. Jerald Alred, Charles Brusaw, Walter Oliu. Hahdbbook of technical writing. New York, Copyright 2003. 4. Stephen Bailey. Akademic writing. Handbook for international student`s. London, 2015 5. Beaufort A. College writing and beyond: A new framework for university writing instruction. Logan, Utah: Utah State University Press, 2007. 6. Irvin L. What Is “Academic” Writing? // <a href="http://wac.colostate.edu/books/writingspaces1/irvin--what-is-academic-writing">http://wac.colostate.edu/books/writingspaces1/irvin--what-is-academic-writing</a> .				

### 3. Math and Sciences

3.1. Calculus		
Semestr:	1	
Date of last modification:	31.08.2023	
Teachers:	Kalandarov Utkir Namozovich	
Component:	Compulsory	
Cycle:	Core	
ECTS:	6	
Pre-requisites	-	
Workload:	Types of classes	Hours
	Total	180
	Lecture	42
	Practical works	30
	SAW (Student autonomous work)	108
	Form of final control	Exam
	Final assessment method	Testing
Control forms:	Current control, Mid-term control, Final control	
Assessment requirements	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
Final control	The final exam is taken in the form of a test, which contains 25 questions, worth 2 points each, tests are divided into 3 levels of difficulty. Total exam time 60 minutes	
Short content:	Calculus is a branch of mathematics focused on the study of change and motion. It is divided into two main branches: differential calculus and integral calculus. Calculus is fundamental to many fields, including physics, engineering, economics, and biology, as it provides tools for modeling and analyzing dynamic systems.	
Goal:	The purpose of studying calculus is to develop a deep understanding of how quantities change and accumulate, providing essential tools for solving problems in science, engineering, economics, and beyond. Calculus forms the foundation for advanced study in mathematics and its applications in other disciplines, allowing students to model and solve complex problems involving dynamic systems.	
Objective:	To master the fundamental concepts of differential and integral calculus, including limits, derivatives, integrals, and their applications, for analyzing and understanding change and motion in various contexts.	
Learning outcome:	After studying the discipline, students should be able to: LO 1. Familiarization with the basic definitions and theorems of the subject “Calculus” LO 2. The study of the basic concepts and methods of the subject “Calculus” LO 3. Formation of problem-solving abilities based on theoretical knowledge. LO 4. Ability to solve mathematical problems in the main sections of higher mathematics. LO 5. The study of the basics of integral and differential calculus, complex numbers, functions of several variables, the theory of numerical and functional series, checking the convergence of a series, decomposition of functions into Taylor and Maclaurin series, Fourier series. LO 6. Obtaining skills in calculating multiples, curvilinear and surface integrals.	
Teaching methods:	In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized: - technology of problem- and project-based learning; - technologies of educational and research activities; - communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods); - case-study method (analysis of situations); - game technologies, in which students participate in business, role-playing, simulation games;	

	- information and communication (including distance learning) technologies. In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.				
Assessment of the student's knowledge:	Type of task		Number of points (max)		Total
	Current control	Practical works (1-3)	25	37	100
		Independent work	12		
	Mid-term control	Written work	13		
	Final control	Exam (Testing)	50		
Topics of lectures:	<ul style="list-style-type: none"><li>• Complex numbers: algebraic, trigonometric and exponential forms of a complex number, and actions on them.</li><li>• The concept of a numerical sequence. The limit of the sequence. The concept of a function. The limit of the function. Calculating the limit of the function.</li><li>• The 1st and 2nd are wonderful limits. The equivalence of infinitesimal functions. Comparison of infinitesimal functions.</li><li>• The continuity of the function. Classification of function breakpoints.</li><li>• The concept of a derivative function. Calculation of the derivative of the function. Higher-order derivatives.</li><li>• The Lopital rule. The differential of the function. The main theorems of differential calculus (Theorems of Rolle, Lagrange and Cauchy).</li><li>• The study of functions using a derivative and the construction of its graph (critical points, extremum, concavity and convexity, asymptotes).</li><li>• Primitive. The indefinite integral. Integration methods.</li><li>• Integration of fractional rational and irrational functions.</li><li>• Integration of trigonometric functions.</li><li>• The concept of a definite integral. The mean value theorem. The Newton-Leibniz formula. Applications of a certain integral.</li><li>• Improper integrals of the I and II kind. Convergence of improper integrals.</li><li>• Numerical series.</li><li>• Functional series. Power series. The radius and area of convergence of the power series.</li><li>• Fourier series and its applications.</li><li>• A function of two variables. The domain of definition, the graph, the limit and the continuity of the function of two variables. Partial derivatives.</li><li>• The complete differential of a function of many variables. Partial derivatives and differentials of higher orders.</li></ul>				
Literature:	Literature. 1. Robert Adams., Christopher Essex., Calculus: A Complete Course 9th edition. Pearson 2018. 2. George Thomas., Joel Hass., Christopher Heil., Przemyslaw Bogacki., Maurice Weir., José Zuleta Estrugo., Calculus Early Transcendentals 15th edition. Pearson 2024. 3. James Stewart., Stephen Kokoska., Calculus: Concepts and Contexts 5th edition. Cengage Learning 2023.				

3.2. Physics I		
Semestr:	1	
Date of last modification:	31.08.2023	
Teachers:	Ochilova Ozoda Odilovna, Ganiyev Abror Sattarovich	
Component:	Compulsory	
Cycle:	Core	
ECTS:	6	
Pre-requisities	-	
Workload:	<b>Types of classes</b>	
	<b>Hours</b>	
	Total	180
	Lecture	40
	Practical works	20
	Laboratory	10
	SAW (Student autonomous work)	110
	Form of final control	Exam
Final assessment method	Testing	
Control forms:	Current control, Mid-term control, Final control	
Assessment requirements	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
Final control	The final exam is taken in the form of a test, which contains 25 questions, worth 2 points each, tests are divided into 3 levels of difficulty. Total exam time 60 minutes	
Short content:	The content of basic physical phenomena and laws, the fundamental unity of the laws of physics, the importance of physical science in the development of technology, fundamental concepts, laws of physical science related to parts of mechanics, molecular physics, thermodynamics, electromagnetism, vibrations and waves are studied.	
Goal:	Training and familiarization of students with physical processes and laws, their scientific foundations, physical concepts and competitors necessary for solving theoretical and practical engineering problems.	
Objective:	- formation of a scientific approach and understanding of the world, theoretical knowledge, practical skills and physical processes; - learning to draw conclusions by analyzing the essence of physical laws; - train students to apply the acquired knowledge and skills in their professional activities.	
Learning outcome:	As a result of mastering the subject, the student must: • Have an idea and knowledge of the essence of basic physical phenomena and laws, the fundamental unity of the laws of physics, the possibility of their further development, the importance of physics in the development of technology; • Be able to logically approach the solution of physical problems, make theoretical calculations and evaluate numerical values when studying physical processes and phenomena; keep abreast of new discoveries in the field of physics, acquire theoretical knowledge that provides the ability to use the principles of physics in their field of specialization and have the skills to apply them; • Have the ability to analyze physical processes and make decisions based on theoretical and practical knowledge obtained from physics in future professional activities.	
Teaching methods:	In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized: - technology of problem- and project-based learning; - technologies of educational and research activities; - communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods); - case-study method (analysis of situations); - game technologies, in which students participate in business, role-playing, simulation games; - information and communication (including distance learning) technologies.	

	In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.				
Assessment of the student's knowledge:	Type of task		Number of points (max)		Total
	Current control	Practical works	15	41	100
		Laboratory work	8		
		Independent work	18		
	Mid-term control	Written work	9		
Final control	Exam (Testing)	50			
Topics of lectures:	<ul style="list-style-type: none"><li>- Subject of physics. Kinematics of translational and rotational motion of a material point.</li><li>- Dynamics of a material point.</li><li>- Rotational motion of a rigid body.</li><li>- Law of conservation of energy in mechanics</li><li>- Relativistic mechanics.</li><li>- Molecular physics</li><li>- Thermodynamics.</li><li>- Electrical interactions.</li><li>- Work of the electrostatic field during charge transfer</li><li>- Dielectrics and conductors in an electric field</li><li>- Electricity.</li><li>- A magnetic field. Biot-Savart-Laplace Law.</li><li>- Laws of Lorentz and Ampere. Hall effect.</li><li>- Magnetic properties of matter</li><li>- The phenomenon of electromagnetic induction.</li></ul>				
Literature:	Literature 1. Q.P.Abdurakhmanov, V.S.Xamidov, N.A.Akhmedova. "PHYSICS" Textbook. Tashkent. 2018. 2. Physics: Principles with Applications 6th Edition by Douglas C. Giancoli , 2014. 3. I.I.Savelev. The course is general physics. Roof 1,2,3. Moscow, 2018. 4. Serway R.A., Jewett J.W. Physics for Scientists and Engineers with Modern Physics, 8ed., Brooks Cole, 2010.5. Kh.M.Kholmedov, B.Ibragimov, Kh.N.Karimov. Methodical guide for practical training in physics. "Mechanics" part 1. TUIT, 2020.6.A.S.Ganiyev, Kh.N.Bakhronov, I.O.Jumaniyazov. Methodical guide for practical training in physics. " Electromagnetism " part 3. TUIT, 2020.				

3.3. Physics II		
Semestr:	2	
Date of last modification:	31.08.2023	
Teachers:	Ochilova Ozoda Odilovna, Ganiyev Abror Sattarovich	
Component:	Compulsory	
Cycle:	Core	
ECTS:	4	
Pre-requisities	Physics I	
Workload:	Types of classes	Hours
	Total	120
	Lecture	20
	Practical works	20
	Laboratory	10
	SAW (Student autonomous work)	70
	Form of final control	Exam
	Final assessment method	Testing
Control forms:	Current control, Mid-term control, Final control	
Assessment requirements	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
Final control	The final exam is taken in the form of a test, which contains 25 questions, worth 2 points each, tests are divided into 3 levels of difficulty. Total exam time 60 minutes	
Short content:	Creation of a theoretical base in physics for future engineers, formation of a scientific approach and worldview in explaining theoretical knowledge, practical skills and physical processes, physics of vibrations and waves, optics, fundamentals of quantum mechanics, solid state physics, contact phenomena, atomic and nuclear physics.	
Goal:	Training and familiarization of students with physical processes and laws, their scientific foundations, physical concepts and competitors necessary for solving theoretical and practical engineering problems.	
Objective:	-formation of a scientific approach and understanding of the world, theoretical knowledge, practical skills and physical processes; -learning to draw conclusions by analyzing the essence of physical laws; -train students to apply the acquired knowledge and skills in their professional activities.	
Learning outcome:	As a result of mastering the subject, the student must: LO 1. Have an idea and knowledge of the essence of basic physical phenomena and laws, the fundamental unity of the laws of physics, the possibility of their further development, the importance of physics in the development of technology; LO 2. Be able to logically approach the solution of physical problems, make theoretical calculations and evaluate numerical values when studying physical processes and phenomena; keep abreast of new discoveries in the field of physics, acquire theoretical knowledge that provides the ability to use the principles of physics in their field of specialization and have the skills to apply them; LO 3. Have the ability to analyze physical processes and make decisions based on theoretical and practical knowledge obtained from physics in future professional activities.	
Teaching methods:	In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized: - technology of problem- and project-based learning; - technologies of educational and research activities; - communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods); - case-study method (analysis of situations); - game technologies, in which students participate in business, role-playing, simulation games;	

	- information and communication (including distance learning) technologies. In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.			
<i>Assessment of the student's knowledge:</i>	<b>Type of task</b>		<b>Number of points (max)</b>	<b>Total</b>
	Current control	Practical works	15	41
		Laboratory work	8	
		Independent work	18	
	Mid-term control	Written work	9	
	Final control	Exam (Testing)	50	100
<i>Topics of lectures:</i>	<ul style="list-style-type: none"> <li>• Oscillatory movements.</li> <li>• Damped and forced mechanical vibrations. Electromagnetic vibrations.</li> <li>• Wave processes.</li> <li>• Superposition of waves.</li> <li>• Electromagnetic waves.</li> <li>• Light emission</li> <li>• Light diffraction</li> <li>• Dispersion and polarization of light</li> <li>• Quantum optics</li> <li>• Linear spectra of atoms</li> <li>• Solid state physics</li> <li>• Proprietary semiconductors</li> <li>• Impurity semiconductors</li> <li>• Contact phenomena</li> <li>• Physics of the atomic nucleus</li> </ul>			
<i>Literature:</i>	Literature 1. Q.P.Abdurakhmanov, V.S.Xamidov, N.A.Akhmedova. "PHYSICS" Textbook. Tashkent. 2018. 2. Physics: Principles with Applications 6th Edition by Douglas C. Giancoli, 2014. 3. I.I.Savelev. The course is general physics. Roof 1,2,3. Moscow, 2018. 4. Serway R.A., Jewett J.W. Physics for Scientists and Engineers with Modern Physics, 8ed., Brooks Cole, 2010.5. Abdurakhmanov K.P., Ochilova O., Tohirov U.H., Khaidarov K.B.. A methodological guide to practical classes in physics. Part 4. Harmonic vibrations, mechanical and electromagnetic vibrations, mechanical and electromagnetic waves. Tashkent, 2021.6. Imamov E., Rakhmatullayeva M., Mukhamedaminova L. and others, A methodological guide to practical classes in physics. Part 6. Solid state Physics. Atomic and nuclear physics. Tashkent, 2021.			



3.4. Differential Equations		
Semestr:	2	
Date of last modification:	31.08.2023	
Teachers:	Jurayeva Nodira Yunusovna, Mamatov Abdugani Ermamatovich	
Component:	Compulsory	
Cycle:	Core	
ECTS:	4	
Pre-requisites	Calculus	
Workload:	Types of classes	Hours
	Total	120
	Lecture	30
	Practical works	18
	SAW (Student autonomous work)	72
	Form of final control	Exam
	Final assessment method	Testing
Control forms:	Current control, Mid-term control, Final control	
Assessment requirements	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
Final control	The final exam is taken in the form of a test, which contains 25 questions, worth 2 points each, tests are divided into 3 levels of difficulty. Total exam time 60 minutes	
Short content:	Differential equations course involves solving mathematical equations that describe the relationship between a function and its derivatives. They are essential in modeling various physical systems and phenomena, including physics, engineering, biology, and economics. There are two main types of differential equations: ordinary differential equations (ODEs), which involve functions of a single variable and their derivatives, and partial differential equations (PDEs), which involve functions of multiple variables and their partial derivatives.	
Goal:	The purpose of studying differential equations is to equip students with the mathematical tools necessary to model, predict, and analyze the behavior of real-world systems that change over time. This knowledge is essential for understanding natural phenomena, designing engineering systems, and conducting scientific research.	
Objective:	To understand and solve equations that describe the relationship between a function and its derivatives, enabling the modeling and analysis of dynamic systems in various fields such as physics, engineering, biology, and economics.	
Learning outcome:	After studying the discipline, students should be able to: LO 1. Familiarization with the basic definitions and theorems of the subject “Differential equations” LO 2. Study of the basic concepts and methods of the subject “Differential equations” LO 3. Obtaining skills in the application of mathematical concepts and studied methods of analysis. LO 4. Ability to solve mathematical problems in the main sections of the differential equation. LO 5. Obtaining skills for solving an ordinary first-order differential equation and higher-order differential equations of various types. LO 6. Obtaining skills for solving differential equations and systems of linear differential equations by the Laplace transform method.	
Teaching methods:	In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized: - technology of problem- and project-based learning; - technologies of educational and research activities; - communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods); - case-study method (analysis of situations);	



	<p>- game technologies, in which students participate in business, role-playing, simulation games;</p> <p>- information and communication (including distance learning) technologies.</p> <p>In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.</p>				
<i>Assessment of the student's knowledge:</i>	<b>Type of task</b>		<b>Number of points (max)</b>		<b>Total</b>
	Current control	Practical works (1-3)	25	37	100
		Independent work (1-2)	12		
	Mid-term control	Written work	13		
	Final control	Exam (Testing)	50		
<i>Topics of lectures:</i>	<ul style="list-style-type: none"><li>• Introduction to the subject. Differential equations with separable variables.</li><li>• Homogeneous and reducible to homogeneous differential equations. Application to applied tasks.</li><li>• Linear differential equations. Solution of linear differential equations by Lagrange and Bernoulli methods. Application to applied tasks.</li><li>• Bernoulli's equations. Equations in full differentials. Integrating multipliers.</li><li>• The differential equation is unresolved with respect to the derivative. The Lagrange and Clerault equations.</li><li>• Higher-order differential equations admitting a decrease in order.</li><li>• Linear differential equations of higher orders. Vronskian. Fundamental solutions. Basic theorems.</li><li>• Linear homogeneous differential equations with constant coefficients. The characteristic equation.</li><li>• Linear inhomogeneous differential equations with constant coefficients with a special right-hand side.</li><li>• Differential equations of the second order and their solution using the method of variation of arbitrary constants. The Ostrogradsky-Liouville formula.</li><li>• Approximate methods for solving differential equations (using mathematical packages).</li><li>• A system of differential equations. Methods of solutions.</li><li>• Original and image. Laplace transformations.</li><li>• Basic properties of the Laplace transform.</li><li>• Solving differential equations and systems of differential equations by the method of operational calculus.</li></ul>				
<i>Literature:</i>	Literature 1. Khasanov Compiled A.B., An introduction to the theory of ordinary differential equations, Turan-Press 2019. 2. Yuzhov A.Q., Mirzakarimov E.M., Ordinary differential equations in the Maple system, Tashkent 2013. 3. Norbert Euler. A First Course in Ordinary Differential Equations. bookboon.com G. Black Mike, Mike Dunn, Programming Android with Kotlin, O'reilly Media, 2021.				

3.5. Probability and Statistics		
Semestr:	3	
Date of last modification:	31.08.2023	
Teachers:	Chay Zoya Sergeevna, Islamova Odila Abduraimovna	
Component:	Compulsory	
Cycle:	Core	
ECTS:	6	
Pre-requisities	Differential Equations	
Workload:	Types of classes	Hours
	Total	180
	Lecture	42
	Practical works	30
	SAW (Student autonomous work)	108
	Form of final control	Exam
	Final assessment method	Testing
Control forms:	Current control, Mid-term control, Final control	
Assessment requirements	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
Final control	The final exam is taken in the form of a test, which contains 25 questions, worth 2 points each, tests are divided into 3 levels of difficulty. Total exam time 60 minutes	
Short content:	Probability and statistics course is branch of mathematics dealing with data, uncertainty, and the analysis of random phenomena. Probability theory provides a mathematical framework for quantifying the likelihood of events and understanding random processes. Statistics involves collecting, analyzing, interpreting, and presenting data. The course is essential fundamentally for students.	
Goal:	The purpose of studying probability and statistics is to prepare students to handle data and uncertainty in scientific research, engineering, business, and everyday life. This subject provides the skills necessary to collect, analyze, and draw meaningful conclusions from data, enabling informed decision-making and effective problem-solving in a wide range of fields.	
Objective:	To learn the principles of probability theory and statistical methods for analyzing, interpreting, and making decisions based on data, with an emphasis on understanding randomness and variability in various contexts.	
Learning outcome:	After studying the discipline, students should be able to: LO 1. Familiarization with the basic definitions and theorems of the subject “Probability and statistics “ LO 2. The study of the basic concepts and methods of the subject “Probability and statistics“ LO 3. Obtaining skills in the application of mathematical concepts and studied methods of analysis. LO 4. Mastering the skills of representation and allocation of continuous and discrete models LO 5. Information-related process analysis skills. LO 6. Increases the giftedness of students, manifests the skills of logical and algorithmic thinking in students.	
Teaching methods:	In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized: - technology of problem- and project-based learning; - technologies of educational and research activities; - communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods); - case-study method (analysis of situations);	

	<p>- game technologies, in which students participate in business, role-playing, simulation games;</p> <p>- information and communication (including distance learning) technologies.</p> <p>In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.</p>				
<i>Assessment of the student's knowledge:</i>	<b>Type of task</b>		<b>Number of points (max)</b>		<b>Total</b>
	Current control	Practical works (1-3)	25	37	100
		Independent work (1-2)	12		
	Mid-term control	Written work	13		
	Final control	Exam (Testing)	50		
<i>Topics of lectures:</i>	<ul style="list-style-type: none"><li>• The subject and tasks of Probability and Statistics. Random events. The space of elementary events. Operations on events. Elements of combinatorics.</li><li>• Probability definitions. Statistical, classical, geometric definition of probability. Determination of probability when the space of elementary events is countable. Kolmogorov's axioms.</li><li>• Theorems of addition and multiplication of probabilities. Conditional probability. Theorems of addition of probabilities of joint and incompatible events. A complete group of events. Opposite events. The probability of occurrence of at least one event. Dependent and independent events. Theorems of multiplication of probabilities of dependent and independent events.</li><li>• Conditional probability. The formula of total probability. Probabilities of hypotheses (assumptions). The Bayes formula.</li><li>• A sequence of independent tests. Bernoulli's scheme. The Bernoulli formula. Poisson's theorem. Local and integral theorems of Moivre–Laplace. The most probable number of occurrences of an event in the Bernoulli scheme. Experience with multiple events in the Bernoulli scheme.</li><li>• Random variables. Types of random variables. Ways to set them.</li><li>• The main numerical characteristics of random variables. Mathematical expectation, variance, mean square deviation, initial and central moments of the kth order, mode, median.</li><li>• The most common distributions are of the discrete type. Bernoulli distribution. Binomial, geometric and Poisson distributions, negative binomial distribution, hypergeometric distribution.</li><li>• The most common distributions are of the continuous type. Uniform, exponential, and normal distributions. The law of three sigma. Asymmetry and excess. Chi square distribution.</li><li>• A system of two random variables. The law (matrix) of the probability distribution of a discrete two-dimensional random variable. The distribution function and its properties. The distribution density of a continuous two-dimensional random variable and its properties</li><li>• Numerical characteristics of a random vector. The coefficient of covariance. The correlation coefficient and its properties. Two-dimensional normal and uniform distributions.</li><li>• The law of large numbers. The central limit theorem. Chebyshev's inequality. The law of large numbers for a sequence of independent random variables. Chebyshev's theorem. Bernoulli's theorem. The central limit theorem for identically distributed random variables, Lyapunov's theorem, Laplace's theorem.</li></ul>				

	<ul style="list-style-type: none"> <li>• The main tasks of mathematical statistics. The subject of mathematical statistics. Primary sampling analysis. The variation series. Graphs of the variation series. The empirical distribution function. Polygon, histogram. Numerical characteristics of the sample</li> <li>• Statistical estimates of unknown distribution parameters. The concept of statistics and statistical evaluation. Evaluation properties: non-bias, consistency, efficiency. Disadvantages of point estimates. Methods of finding estimates: the method of moments, the method of maximum likelihood.</li> <li>• Interval estimates. Confidence interval, confidence probability (reliability). Confidence intervals. The concept of confidence probability. The confidence interval and the accuracy of the estimate. The confidence interval for the mean value of the normal distribution for unknown and known cases of standard deviation <math>\sigma</math>. The confidence interval for the <math>\sigma^2</math> variance of the normal distribution. Determination of the sample size <math>n</math>.</li> <li>• Statistical hypotheses. Types of statistical hypotheses. Errors of the I and II kind. The power of the criterion. The critical area. The stages of testing statistical hypotheses. Testing hypotheses about the average value of the normal distribution with a known and unknown standard deviation <math>\sigma</math>, testing hypotheses about the variance of the normal distribution.</li> <li>• The criteria for Pearson and Kolmogorov's agreement. Verification of the statistical hypothesis about the type of unknown distribution using Pearson's <math>\chi^2</math> agreement criterion and Kolmogorov's agreement criterion</li> <li>• Correlation analysis. Tasks and types of correlation. The main tasks of correlation analysis. The linear correlation coefficient and its properties.</li> <li>• Regression analysis. The equation of paired regression. Types of regression. The least squares method. The average approximation error.. Coefficient of determination</li> <li>• Nonlinear regression equations. Multidimensional regression and correlation. Nonlinear regression equations. OLS for estimating the parameters of multidimensional regression. Regression equation at standardized scales. Average elasticity coefficients.</li> <li>• Analysis of variance. The problem statement and the essence of the analysis of variance. Models of univariate and multifactorial analysis of variance. Schemes of variance analysis.</li> </ul>
<i>Literature:</i>	1. Robert Hogg., Elliot Tanis., Dale Zimmerman., Probability and Statistical Inference, 10th edition. Pearson 2019. 2. Pappu Kousalya., Probability, Statistics and Random Processes Pearson 2013. 3. Richard A., Johnson., Probability and Statistics for Engineers 9th edition ( Global Edition ). Pearson 2017. 4. Morris DeGroot ., Mark Schervish ., Instructor's Solutions, Manual for Probability and Statistics 4th edition. Pearson 2012. 5. Michael Akritas., Probability & Statistics with R for Engineers and Scientists Pearson 2016.

3.6. Discrete Structures		
Semestr:	2	
Date of last modification:	31.08.2023	
Teachers:	Ismailova Lemara Rafatovna, Turgunov Abrorjon Maxamatsoliyevich	
Component:	Compulsory	
Cycle:	Core	
ECTS:	6	
Pre-requisities	-	
Workload:	<b>Types of classes</b>	
	<b>Hours</b>	
	Total	180
	Lecture	42
	Practical works	30
	SAW (Student autonomous work)	108
	Form of final control	Exam
	Final assessment method	Testing
Control forms:	Current control, Mid-term control, Final control	
Assessment requirements	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
Final control	The final exam is taken in the form of a test, which contains 25 questions, worth 2 points each, tests are divided into 3 levels of difficulty. Total exam time 60 minutes	
Short content:	Discrete structures course will encourage you to understand an introduction to discrete structures, sets, subsets, basic operations on sets, ordered sets, Cartesian product of sets, binary relations and relation matrices, types of relations, basic rules of combinatory, permutations without repetition, permutations and placements, Boolean algebra, the concept of reasoning, Boolean functions, generality and accessibility quantifiers, the laws of logic, construction of the truth table of logical functions, methods for minimizing logical networks, Carnot cards, basic concepts of graph theory, Euler and Hamilton graphs, forest, trees, tree properties, oriented graph, adjacency matrix of a directed graph, route, chain, cycle in directed graphs, algorithms for finding the shortest path.	
Goal:	The purpose of mastering the discipline is to give students theoretical knowledge and practical skills in learning Discrete structures.	
Objective:	-understanding the fundamentals of Discrete structures; -studying sets, subsets, basic operations on sets, ordered sets, Cartesian product of sets, binary relations and relation matrices, types of relations; -developing practical skills in basic rules of combinatory, permutations without repetition, permutations and placements; -analyzing Boolean functions, generality and accessibility quantifiers, the laws of logic, construction of the truth table of logical functions, methods for minimizing logical networks, Carnot cards; -studying basic concepts of graph theory, Euler and Hamilton graphs, forest, trees, tree properties, oriented graph; -exploring modern trends adjacency matrix of a directed graph, route, chain, cycle in directed graphs, algorithms for finding the shortest path	
Learning outcome:	After studying the discipline, students should be able to: LO 1. Understand fundamentals of Discrete structures. LO 2. Understand the sets, subsets, basic operations on sets, ordered sets, Cartesian product of sets, binary relations and relation matrices, types of relations LO 3. Possess skills in basic rules of combinatory, permutations without repetition, permutations and placements. LO 4. Use boolean functions, generality and accessibility quantifiers, the laws of logic, construction of the truth table of logical functions, methods for minimizing logical networks, Carnot cards. LO 5. Use basic concepts of graph theory, Euler and Hamilton graphs, forest, trees, tree properties, oriented graph. LO 6. Perform configuration of matrix of a directed graph, route, chain, cycle in directed graphs, algorithms for finding the shortest path.	

Teaching methods:	In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized: - technology of problem- and project-based learning; - technologies of educational and research activities; - communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods); - case-study method (analysis of situations); - game technologies, in which students participate in business, role-playing, simulation games; - information and communication (including distance learning) technologies. In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.				
Assessment of the student's knowledge:	Type of task		Number of points (max)		Total
	Current control	Practical assignment (PA1, PA2, PA3)	20	40	100
		Independent work	10		
		Personal assignment	10		
	Mid-term control	Written work	10		
	Final control	Exam (Testing)			
Topics of lectures:	<ul style="list-style-type: none"><li>• Introductions. Discrete structures and examples</li><li>• Sets. Operation on sets. Subsets.</li><li>• Sorted sets. Cartesian products. Properties of Cartesian products.</li><li>• Relations. Binary relations and their matrix. Types of relations. Equivalent relations.</li><li>• Mappings and functions. Originality, images and mapping in a limited set.</li><li>• Combinatory. Basic rules of combinatory. Permutations, placement, combinations.</li><li>• Boole's algebra. The concept of an utterance. Binary identities of propositional logic.</li><li>• Boole's functions. Equivalence of formulas. Community and existence quantifiers.</li><li>• The laws of logic. Building Truth Tables for Logic Functions. Normal forms. Maximum normal forms. Binary logic gates. Application of binary logic gates.</li><li>• Analysis and synthesis problems in logical circuits. Logical networks.</li><li>• Minimizing logical networks. Karnaugh map. Application of predicates as a mathematical model of feedback.</li><li>• Basic concepts of graph theory. Methods for defining graphs. Adjacency and Incident Matrices. Graph isomorphism.</li><li>• Routes, chains, cycles. Euler and Hamiltonian graphs. Planar graphs.</li><li>• Euler's formulas for plane graphs. Homeomorphism.</li><li>• Trees. Forest. Properties of trees. Spanning tree. Minimum spanning tree. Root tree.</li><li>• Directed graph. Digraph. Adjacency matrix for the digraph.</li><li>• Routes, chains, and loops for digraphs. Shortest Path Algorithms</li></ul>				
Literature:	Literature 1. Mathematical logic and discrete mathematics. T.: "Teacher", Toraev Kh, 2003. 2. Discrete mathematics for programmers, Tekhnosphere, M., Haggarty R., 2003. 3. Discrete mathematics - M.: "Lan", Shevelev Yu.P., 2008. 4. Discrete Math. "Phoenix", Aseev G.G., Abramov O.M., Sitnikov D.E., 2003 5. Discrete mathematics - Taganrog Radio Engineering University, Taganrog, Kulabukhov S.Yu., 2001. 6. Problems and exercises in discrete mathematics. M.: Nauka., Gavrilov G.P., Sapozhchenko A.A., 2005. 7. Discrete mathematics theory, problems, applications. - M. Erussalimsky Ya.M., 2002.				

## 4. General

4.1. Ecology		
<i>Semestr:</i>	6	
<i>Date of last modification:</i>	31.08.2023	
<i>Teachers:</i>	Borisova Elena Anatolyevna	
<i>Component:</i>	Elective	
<i>Cycle:</i>	Secondary	
<i>ECTS:</i>	4	
<i>Pre-requisites</i>	-	
<i>Workload:</i>	<b>Types of classes</b>	<b>Hours</b>
	Total	120
	Lecture	30
	Practical works	18
	SAW (Student autonomous work)	72
	Form of final control	Exam
	Final assessment method	Testing
<i>Control forms:</i>	Current control, Mid-term control, Final control	
<i>Assessment requirements</i>	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
<i>Final control</i>	The final exam is taken in the form of a test, which contains 25 questions, worth 2 points each, tests are divided into 3 levels of difficulty. Total exam time 60 minutes	
<i>Short content:</i>	<p>The main goal of environmental education is the formation of a conscious attitude to environmental problems among all segments of the population, including students of higher educational institutions.</p> <p>The course "Ecology", taught in universities, should serve to form the scientific worldview of students and direct them to practical activities.</p>	
<i>Goal:</i>	<p>Requirements for knowledge, skills and abilities of students in teaching this subject:</p> <ul style="list-style-type: none"> <li>- It is necessary to know the science of ecology and its tasks, the causes of environmental problems, environmental factors and their impact on organisms, ecosystems and the conditions for their sustainability, the current state of the natural environment and emerging environmental problems, the impact of scientific and technological progress on the environment:</li> <li>- based on our national beliefs and values, to have the skills of reasonable, economical use of land, water, air and natural resources, any damage to nature can have extremely dangerous consequences for human life.</li> </ul>	
<i>Objective:</i>	<p>Technical competence: understanding and applying the principles of rational environmental management, working with environmental legislation, modeling environmental situations; - Analytical competence: critical analysis and assessment of environmental systems, selection of the optimal resource saving strategy; - Communicative and collaborative competence: teamwork, effective communication and shared decision making in environmental projects.</p>	
<i>Learning outcome:</i>	<p>After studying the discipline, students should be able to:</p> <p>LO 1. Know the basic patterns of functioning of living organisms, ecosystems at various levels of organization, the biosphere as a whole and their.</p> <p>LO 2. Be able to analyze problems associated with anthropogenic (technogenic) impact on the environment.</p> <p>LO 3. Have knowledge and skills in the field of environmental protection.</p> <p>LO 4. Know the concepts, strategies and practical tasks of sustainable development in various countries and the Republic of Uzbekistan.</p> <p>LO 5. To form in students a comprehensive, objective and creative approach to discussing the most pressing and complex problems of ecology, environmental protection and sustainable development.</p>	

<i>Teaching methods:</i>	In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized: - technology of problem- and project-based learning; - technologies of educational and research activities; - communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods); - case-study method (analysis of situations); - game technologies, in which students participate in business, role-playing, simulation games; - information and communication (including distance learning) technologies. In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.				
<i>Assessment of the student's knowledge:</i>	<b>Type of task</b>		<b>Number of points (max)</b>		<b>Total</b>
	Current control	Practical works (1-10)	20	40	100
		Independent work	12		
		Oral presentation	8		
	Mid-term control	Written work	10		
	Final control	Exam (Testing)	50		
<i>Topics of lectures:</i>	<ul style="list-style-type: none"><li>• Ecology course, goal, task, structure and history</li><li>• The doctrine of the biosphere</li><li>• Ecology of ecosystems</li><li>• Environmental factors and their classification</li><li>• Atmosphere and its protection</li><li>• Protection of water resources</li><li>• Preservation of the lithosphere</li><li>• Natural resources and their rational use</li><li>• Pollution of the environment with various wastes</li><li>• Problems of environmental protection in the Republic of Uzbekistan.</li><li>• Pollution of industrial cities and their impact on the environment</li><li>• Negative impact of the Aral Sea tragedy on the environment.</li><li>• Universal environmental problems. Regional environmental problems.</li><li>• The main directions of environmental safety. Environmental assessment.</li><li>• The sphere of communication and its impact on the environment. Environmental monitoring.</li></ul>				
<i>Literature:</i>	1. Karimov I.A. Uzbekistan on the threshold of the 21st century: a threat to security. Conditions for stability and guarantees of development. Uzbekistan 1997. 2. Abirkulov K.N., Kurbonnietov R. Fundamentals of ecology. Urgench. UDU, 1999. 3. Rafikov A.A., Abirkulov K.N., Khodzhimatov A.N. Ecology, textbook-T. 2004. 4. Holliet I., Ikromov A. Ecology. Textbook.-T.2001. 5. Tokhtaev A.S. Ecology. Textbook.-T.1998. 6. Yormatova D.Yu. Industrial Ecology - T.2007. 7. Abirkulov K.N., Abdulkosimov A., Khamdamov Sh. Social ecology, textbook-T.2004.. 8. Nigmatov A. Ecological law of the Republic of Uzbekistan. Textbook-T.2004. 9. Environmental protection. Laws and rules. Justice 2002				



4.2. Life safety		
Semestr:	5	
Date of last modification:	31.08.2023	
Teachers:	Saidova Gulchekhra Erkinovna	
Component:	Elective	
Cycle:	Secondary	
ECTS:	4	
Pre-requisites	-	
Workload:	<b>Types of lessons</b>	
	<b>Hour</b>	
	Total	120
	Lecture	30
	Practical work	18
	SAW (Student Autonomous Work)	72
	Final control form	Exam
Final evaluation method	Test	
Control forms:	Current control, Mid-term control, Final control	
Assessment requirements	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
Final control	The final exam is taken in the form of a test, which contains 25 questions, worth 2 points each, tests are divided into 3 levels of difficulty. Total exam time 60 minutes	
Short content:	This course consists of lectures, practical classes and independent work of students aimed at in-depth study of theoretical knowledge with the help of practical skills. Life safety is the creation of normal human life conditions, protection of him and the environment (production, environment, everyday life) from dangerous and harmful factors of a natural and man-made nature.	
Goal:	The course "Life Safety" provides basic concepts and definitions in the production and performance of work in private life. Defines visual concepts in the field of electrical safety, fire safety, electromagnetic safety, and also provides the necessary basis for the application of various types of lighting and noise effects on the human body and the environment.	
Objective:	Distinguish ergonomic features of workplaces (light, noise, vibration, microclimate).	
Learning outcome:	After studying the discipline, students should be able to: LO 1. Have an idea of the harmful effects of radiation on the human body and the environment LO 2. Distinguish types, means of fire safety systems, as well as classify buildings by fire hazard LO 3. Distinguish between methods and means of human protection in emergency situations LO 4. He will get an idea of the main directions of the labor legislation of the Republic of Uzbekistan, protection of employees, current benefits LO 5. Learns about modern electrical safety systems and the mechanisms of the effect of electricity on the human body	
Teaching methods:	In the conditions of the credit system of education, lessons are mainly conducted in active and creative forms. Among the effective pedagogical methods and technologies that help students actively participate in the search and management of knowledge, it is worth noting the acquisition of independent problem-solving experience: - problem-based and project-based educational technology; - educational and scientific activity technologies; - communication technologies (discussion, press conference, brainstorming, educational debates and other active forms and methods); - case-study method (situation analysis); - game technologies in which students participate in business, role-playing, simulation games; - information and communication (including distance education) technologies.	

	In order to develop critical thinking among students, methods such as "Prediction with open questions", "Cluster", "Mutual discussion", "Know-I-want-to-learn", "INSERT", practical exercises, etc. gamification and others are actively used during practical training.				
Assessment of the student's knowledge:	Type of task		Number of points (max)		Total
	Current control	Practical works (1-10)	20	40	100
		Independent work	10		
		Oral presentation	10		
	Mid-term control	Written work	10		
Final control	Exam (Testing)	50			
Topics of lectures:	<p>-The main content, purpose and objectives of the science of safety of life activities.</p> <ul style="list-style-type: none"><li>• Ergonomics of production buildings.</li><li>• Types, systems and features of lighting.</li><li>• The effect of noise and vibrations on the human body.</li><li>• The effect of electromagnetic fields on the human body.</li><li>• Ionizing radiation in telecommunication enterprises.</li><li>• Electrical safety: the effect of electric current on the human body, the resistance of the human body to electric current.</li><li>• The main factors of damage to a person from electric current, methods of protection against exposure to electric current.</li><li>• Electrical device protection tools.</li><li>• First aid in case of emergency.</li><li>• First aid for injuries and wounds.</li><li>• Legal and organizational foundations of the safety of life activities.</li><li>• Fire safety.</li><li>• Emergencies, their types and characteristics.</li><li>• Negative impact of the production microclimate.</li></ul>				
Literature:	1. Ecology and life safety: A textbook for university students / ed. L. A. Muravey, 2016. 2. Safety and ecology of life activities. Sapaev M.S., Kadyrov F.M. Tutorial, Tashkent - "contact person" -2019, 276p. 3. O.D.Rakhimov, I.X.Siddikov, M.O.Murodov, Safety of life activities. Ecology. Textbook for Bachelor's degree courses in higher education. T.: "The liaison". 2017-332 p.				

<b>4.3. Pedagogy. Psychology</b>		
<i>Semestr:</i>	6	
<i>Date of last modification:</i>	31.08.2023	
<i>Teachers:</i>	Yusupova Zamira Zaripovna, Zakirova Madina Rinatovna	
<i>Component:</i>	Elective	
<i>Cycle:</i>	Secondary	
<i>ECTS:</i>	4	
<i>Pre-requisites</i>	-	
<i>Workload:</i>	<b>Types of classes</b>	<b>Hours</b>
	Total	120
	Lecture	30
	Practical works	18
	SAW (Student autonomous work)	72
	Form of final control	Exam
	Final assessment method	Testing
<i>Control forms:</i>	Current control, Mid-term control, Final control	
<i>Assessment requirements</i>	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
<i>Final control</i>	The final exam is taken in the form of a test, which contains 25 questions, worth 2 points each, tests are divided into 3 levels of difficulty. Total exam time 60 minutes	
<i>Short content:</i>	This training course is an analysis of the tasks specified in paragraph 14 of the decision of the President of the Republic of Uzbekistan № - 4851 of October 6, 2020 and the analysis and training of reforms being introduced to bring the education system of the Republic of Uzbekistan to the level of world standards. focused on the study of advanced strategic practices.	
<i>Goal:</i>	To be able to apply educational methods in the teaching of technical sciences and in-depth training of individual and psychological characteristics of a person.	
<i>Objective:</i>	- The maskur course consists of 2 parts; 1. In the pedagogy section, the development of pedagogy as a science, the methods used in the educational process, and the scientific foundations of advanced pedagogical technologies are covered. 2. The development of the science and its developed areas as a science are covered in the section of psychology. Motive as a driving force of the cognitive process, individual psychological characteristics of a person are scientifically explained. Purpose and strategy of engineering psychology. The tasks of engineering psychology are covered.	
<i>Learning outcome:</i>	<p>After studying the discipline, students should be able to:</p> <p>LO 1. Students will get an idea of the scientific research works of thinkers in Central Asia and Europe.</p> <p>LO 2. They will have knowledge about the "Strategy of actions for further development of the Republic of Uzbekistan" and reforms in the education system.</p> <p>LO 3. Students will be able to show their abilities in innovative activity during the educational process, in the correct qualitative assessment of the pedagogue.</p> <p>LO 4. They study the character, abilities and temperament of an IT specialist.</p> <p>LO 5. They can acquire the qualities of management and leadership in education and production.</p> <p>LO 6. Students learn the operator's activities in the "Man-machine" system in the educational process.</p> <p>LO 7. Information-psychological security studies the manifestations and sources of threats.</p>	

Teaching methods:	In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized: - application of pedagogical technologies in the process of education; - pedagogical scientific research methods; - study of personality and psychological methods (questionnaire, interview, observation, experiment, laboratory, test and sociometric methods) ; - case-study method (analysis of situations); - through the methods of psychotraining, students try themselves as holders of various professions; - information and communication (including distance learning) technologies. In order to develop logical thinking among students, methods such as "Brainstorming", "Cluster", "Problematic education", "Know-I-want-to-learn", "INSERT", practical exercises, gamification and others are actively used during practical training.																								
Assessment of the student's knowledge:	<table><tr><th colspan="2">Type of task</th><th>Number of points (max)</th><th>Total</th></tr><tr><td rowspan="3">Current control</td><td>Practical works (1-10)</td><td>20</td><td rowspan="3">40</td><td rowspan="7">100</td></tr><tr><td>Independent work</td><td>10</td></tr><tr><td>Oral presentation</td><td>10</td></tr><tr><td>Mid-term control</td><td>Written work</td><td>10</td><td colspan="2" rowspan="2">50</td></tr><tr><td>Final control</td><td>Exam (Testing)</td><td>50</td></tr></table>				Type of task		Number of points (max)	Total	Current control	Practical works (1-10)	20	40	100	Independent work	10	Oral presentation	10	Mid-term control	Written work	10	50		Final control	Exam (Testing)	50
Type of task		Number of points (max)	Total																						
Current control	Practical works (1-10)	20	40	100																					
	Independent work	10																							
	Oral presentation	10																							
Mid-term control	Written work	10	50																						
Final control	Exam (Testing)	50																							
Topics of lectures:	<ul style="list-style-type: none"><li>- History and theory of pedagogy.</li><li>- Person as an object and subject of education.</li><li>- Educational methodology and advanced pedagogical technologies.</li><li>- Psychology as a science. Tasks and research methods of psychology. Interrelationship and branches of psychology with other sciences.</li><li>- Cognitive processes. Activity and its types. The role of psychological knowledge in human activity. Motive and motivation. Motivation of social behavior. Conscious and unconscious motives.</li><li>- Individual psychological characteristics of a person (character, ability, temperament). Communication and its types. Psychology of interpersonal relations.</li><li>- Engineering psychology as a branch of labor psychology.</li><li>- Labor regime and its psychological essence. Quality of labor and psychotechnological issues of its provision.</li><li>- Subject of engineering psychology. Purpose and strategy of engineering psychology. Tasks of engineering psychology.</li><li>- Research methods and general features in engineering psychology. Psychological methods. Physiological methods. Mathematical methods. Imitation methods.</li><li>- Features of classification of "man-machine" system. Operator in the "man-machine" system.</li><li>- Human-Machine Collaboration. Sensorimotor requirements in work.</li><li>- Psychological information security and social development.</li><li>- Manifestations and sources of threats to the information and psychological security of the individual, society and the state.</li><li>- Psychological self-protection of a person in the conditions of open mass information systems.</li></ul>																								
Literature:	1. B.M. Umarov. Psychology. Textbook - T., 2012. 2. F. Mominov, Sh. Barotov and others. Information psychological security in open information systems. Textbook. - T.: "Science and technology", 2013. 3. S.K. Ganiyev, M.M. Karimov, K.A. Tashev. Information security. Textbook, Tashkent-2017.4. T.A. Fugelova. Engineering psychology. Textbook, Moscow-2019. 5. S.V. Andrievskaya. Engineering psychology, pedagogy and team management. Methodological recommendations for seminar classes, Novopolotsk, Belarus – 2022. 6. Oktam Shamsiyev. Labor and engineering psychology. Textbook, Tashkent-2024.																								

<b>4.4. Power supply for infocommunication systems</b>		
<i>Semestr:</i>	5	
<i>Date of last modification:</i>	31.08.2023	
<i>Teachers:</i>	Amurova Natalya Yurievna	
<i>Component:</i>	Elective	
<i>Cycle:</i>	Secondary	
<i>ECTS:</i>	4	
<i>Pre-requisities</i>	-	
<i>Workload:</i>	<b>Types of classes</b>	<b>Hours</b>
	Total	120
	Lecture	30
	Practical works	18
	SAW (Student autonomous work)	72
	Form of final control	Exam
	Final assessment method	Testing
<i>Control forms:</i>	Midterm control, Exam	
<i>Final control</i>	The final exam is taken in the form of a test, which contains 25 questions, worth 2 points each, tests are divided into 3 levels of difficulty. Total exam time 60 minutes	
<i>Short content:</i>	<p>The development of students' collaborative critical thinking in the context of power supply of infocommunication systems is ensured through the analysis of electrical power systems and the study of power equipment, which allows students to apply theoretical knowledge to analyze and optimize complex systems, identifying and solving technical problems in practice.</p> <p>Creative design of innovative energy solutions aimed at developing efficient and reliable energy systems and devices requires students to be able to apply engineering and design knowledge to create technically sound and innovative solutions.</p>	
<i>Goal:</i>	The acquisition of creative, design and engineering experience by students is achieved through practical work with power equipment, as well as analysis of technical documentation, which contributes to the deepening of their technical competencies and the development of professional skills necessary for effective work in the field of power supply of infocommunication systems.	
<i>Objective:</i>	- Technical competence: understanding and application of electrical power systems principles, working with technical documentation and modeling programs; - Analytical Competence: critical analysis and assessment of electrical power systems, selection of optimal technical solutions; - Communicative and collaborative competence: teamwork, effective communication and shared decision making in electrical projects.	
<i>Learning outcome:</i>	<p>After studying the discipline, students should be able to:</p> <p>LO 1. Analyze and evaluate the parameters of power supply of infocommunication facilities.</p> <p>LO 2. Design power supply system is taking into account the requirements of reliability and energy efficiency.</p> <p>LO 3. Use and interpret technical documentation and electrical standards.</p> <p>LO 4. Apply methods and technologies to reduce electricity losses in infocommunication systems.</p> <p>LO 5. Develop and implement solutions for integrating renewable energy sources into power supply systems.</p> <p>LO 6. Manage relay protection and automation systems for electrical power systems..</p>	

Teaching methods:	<p>In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized:</p> <ul style="list-style-type: none"><li>- technology of problem- and project-based learning;</li><li>- technologies of educational and research activities;</li><li>- communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods);</li><li>- case-study method (analysis of situations);</li><li>- game technologies, in which students participate in business, role-playing, simulation games;</li><li>- information and communication (including distance learning) technologies.</li></ul> <p>In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.</p>																											
Assessment of the student's knowledge:	<table><tr><th colspan="2">Type of task</th><th colspan="2">Number of points (max)</th><th>Total</th></tr><tr><td rowspan="3">Current control</td><td>Practical works (1-10)</td><td>20</td><td rowspan="3">40</td><td rowspan="5">100</td></tr><tr><td>Independent work</td><td>10</td></tr><tr><td>Oral presentation</td><td>10</td></tr><tr><td>Mid-term control</td><td>Written work</td><td colspan="2">10</td><td></td></tr><tr><td>Final control</td><td>Exam (Testing)</td><td colspan="2">50</td><td></td></tr></table>				Type of task		Number of points (max)		Total	Current control	Practical works (1-10)	20	40	100	Independent work	10	Oral presentation	10	Mid-term control	Written work	10			Final control	Exam (Testing)	50		
Type of task		Number of points (max)		Total																								
Current control	Practical works (1-10)	20	40	100																								
	Independent work	10																										
	Oral presentation	10																										
Mid-term control	Written work	10																										
Final control	Exam (Testing)	50																										
Topics of lectures:	<ul style="list-style-type: none"><li>- Organization of power supply in information and communication systems.</li><li>- Quantities and parameters characterizing electrical energy. Units. Basic laws. DC and AC power supply systems.</li><li>- Primary and secondary sources of power supply. Renewable and non-renewable energy sources.</li><li>- Solar energy. Information about solar energy. Types of solar devices. Solar collectors</li><li>- Analysis of the development of wind energy devices. Environmental aspect.</li><li>- Mechanisms and forms of organization and management of processes in electrical stations and substations of power supply systems of infocommunication facilities.</li><li>- The role of devices for transmitting and distributing electrical energy of infocommunication objects.</li><li>- Transformation and distribution of electrical energy. Essential elements. Single and three-phase transformers, structure and principle of their operation.</li><li>- Rectifiers and converters for power supply of infocommunication facilities.</li><li>- Uninterrupted power supply.</li><li>- Devices for controlling energy efficiency and resource efficiency in information and communication systems.</li><li>- Relay protection and automation of electrical power systems</li><li>- Methods and devices for reducing electrical energy losses at facilities and infocommunication devices.</li><li>- Accounting and control of production and consumption of electrical energy in infocommunication systems. ASKUE system.</li><li>- Climate control devices for infocommunication systems. Security of service and power supply</li></ul>																											
Literature:	<p>1. The Essential Guide to Power Supplies. Edited by Gary Bocock. Publisher: XP Power; First Edition (January 1, 2014). Language: English. Paperback: 156 pages. ISBN-10: 1634433432. ISBN-13: 978-1634433433. 2. Paul Scherz, Simon Monk. Practical Electronics for Inventors. Third Edition. p 1120. Copyright © 2013 by The McGraw-Hill Companies. ISBN: 978-0-07-177134-4. MHID: 0-07-177134-4. 3. David Cook. Robot Building for Beginners, Third Edition. Copyright © 2015 by David Cook. ISBN-13 (pbk): 978-1-4842-1360-5. ISBN-13 (electronic): 978-1-4842-1359-9. 4. Batteries in a Portable World - A Handbook on Rechargeable Batteries for Non-Engineers" Isidor Buchmann. Cadex Electronics Inc.; 4th edition (2016). ISBN-10: 0968211844, ISBN-13: 978-0968211847.</p>																											

## 5. Fundamental

<b>5.1. Programming I</b>		
<i>Semestr:</i>	1	
<i>Date of last modification:</i>	31.08.2023	
<i>Teachers:</i>	Abdullaeva Zamira Shamshaddinovna, Shobdarov Elbek	
<i>Component:</i>	Compulsory	
<i>Cycle:</i>	Core	
<i>ECTS:</i>	6	
<i>Pre-requisites</i>	Calculus	
<i>Workload:</i>	<b>Types of classes</b>	<b>Hours</b>
	Total	180
	Lecture	30
	Practical works	42
	SAW (Student autonomous work)	108
	Form of final control	Testing
	Final assessment method	Exam
<i>Control forms:</i>	Current control, Mid-term control, Final control	
<i>Assessment requirements</i>	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
<i>Final control</i>	The final exam is taken in the form of a test, which contains 25 questions, worth 2 points each, tests are divided into 3 levels of difficulty. Total exam time 60 minutes	
<i>Short content:</i>	The purpose of teaching science is to teach students the fundamental concepts of programming languages and algorithmic methods, to solve practical problems related to various fields, to teach logical thinking, to create applications in various programming environments and to develop their skills in practice.	
<i>Goal:</i>	The aim of training is to teach students fundamental concepts and methods of algorithmic programming languages, solving practical problems related to various fields, logical thinking, formation of skills to create applications in various programming environments and their application in practice.	
<i>Objective:</i>	- formation of optimization thinking; - development of mathematical and algorithmic intuition in solving problems encountered in practice; - formation of basic knowledge in the field of algorithmization and programming; - mastering analytical and numerical methods of solving applied problems.	
<i>Learning outcome:</i>	After studying the discipline, students should be able to: LO 1. Understand and use basic programming concepts, linear, branching and iterative structures, functions and properties of arrays, files and strings. LO 2. Will have the ability to critically analyze and evaluate the achievements of modern science, solve research and practical problems, including creating new ideas in interdisciplinary fields. LO 3. Must have the skills to develop a software product with a user-friendly interface based on a functional and object-oriented approach to programming using modern syntax of programming languages to solve specific problems.	
<i>Teaching methods:</i>	In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized: - technology of problem- and project-based learning; - technologies of educational and research activities; - communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods); - case-study method (analysis of situations); - game technologies, in which students participate in business, role-playing, simulation games;	

	- information and communication (including distance learning) technologies. In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.				
Assessment of the student's knowledge:	Type of task		Number of points (max)	Total	
	Current control	Practical works (1-15)	30	40	100
		Independent work	10		
	Mid-term control	Written work	10		
	Final control	Exam (Testing)	50		
Topics of lectures:	<ul style="list-style-type: none"><li>• Basic concepts of algorithms and programming. Algorithm properties and expression methods. Introduction to Programming. Compiler types. Identifier and their types.</li><li>• Structure of programming languages. Organization of linear algorithms and calculation of algebraic expressions using mathematical library functions.</li><li>• Branching and selection operators. Networking operators and their operation procedure. Ternary operator. Unconditional transition operator.</li><li>• Repetition operators. Parameterized repetition operator (for). Preconditional and postconditional repeating operators (while and do while)</li><li>• Functions. Function description. Recursive functions. Reload functions. Organization of user library.</li><li>• One-dimensional arrays. Static arrays. Methods for sorting and searching array elements. Methods of performing various operations on arrays.</li><li>• Multidimensional arrays. Static arrays. Methods for sorting and searching array elements. Methods of performing various operations on arrays.</li><li>• Working with pointers and dynamic memory. Dynamic arrays and their use as function parameters. Memory allocation functions.</li><li>• Strings and extended characters (in the Char category).</li><li>• String standard functions and manipulation of strings using them.</li><li>• Strings and extended characters (in the String category). String standard functions and manipulation of strings using them.</li><li>• Working with files. Files and streams. Text files, binary files. Special functions for working with files.</li><li>• Fundamentals of object-oriented programming. Class and object concepts. Constructors.</li><li>• An array of objects. Relationships between classes.</li><li>• Encapsulation and inheritance. Management of appeal to members of the basic class.</li><li>• Polymorphism. Virtual function. Abstract class.</li></ul>				
Literature:	1. Muminov B.B. Programming 1. Textbook. – T.: “Nihol print”, 2021. – 280 b. 2. Muminov B.B. Programming 2. Textbook. – T.: “Nihol print”, 2021. – 604 b. 3. Nazirov Sh.A., Qobulov R.V., Bobojanov M.R., Raxmanov Q.S. Language C and C++. – T.: “Successor- publishing house” LLC, 2013. – 488 p. 4. Abdullayeva Z. Sh., Ishniyazov O.O. Programming I and Programming II tutorial, 2022,141 p. 5. Xaydarova M.Y., Mallayev O.U., Abdullayeva Z.SH., Sattarov A. B. Methodological manual for performing laboratory work on the subject “Programming in C++ (1 part) TUIT, Tashkent 2017. 145 p.				



5.2. Programming II		
Semestr:	2	
Date of last modification:	31.08.2023	
Teachers:	Abdullaeva Zamira Shamshaddinovna, Shobdarov Elbek	
Component:	Compulsory	
Cycle:	Core	
ECTS:	6	
Pre-requisities	Programming I	
Workload:	Types of classes	Hours
	Total	180
	Lecture	30
	Practical works	42
	SAW (Student autonomous work)	108
	Form of final control	Testing
	Final assessment method	Exam
Control forms:	Current control, Mid-term control, Final control	
Assessment requirements	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
Final control	The final exam is taken in the form of a test, which contains 25 questions, worth 2 points each, tests are divided into 3 levels of difficulty. Total exam time 60 minutes	
Short content:	The purpose of teaching science is to teach students the fundamental concepts of programming languages and algorithmic methods, to solve practical problems related to various fields, to teach logical thinking, to create applications in various programming environments and to develop their skills in practice.	
Goal:	The purpose of teaching the subject is to teach students the concept of object-oriented programming principles of programming languages and the advanced capabilities of programming languages, user interface capabilities in a modern programming environment, and the ability to solve practical problems related to various fields.	
Objective:	The task of science is to accept technological innovations for student programmers, acquire theoretical knowledge, practical skills, a methodological approach to events and processes related to various fields, as well as form a scientific worldview, solve issues of technical knowledge using modern programming. languages and apply their methods in their professional activities.	
Learning outcome:	After studying the discipline, students should be able to: LO 1. Knowledge of concepts of classes and objects, containers, encapsulation, inheritance, polymorphism, abstract concepts, features of programming in a GUI environment and can use them. LO 2. will have the ability to critically analyze and evaluate the achievements of modern science, solve research and practical problems, including creating new ideas in interdisciplinary fields. LO 3. Must have the skills to analyze small projects used in industry and develop user-friendly software products based on simple and optimal solutions to complex problems.	
Teaching methods:	In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized: - technology of problem- and project-based learning; - technologies of educational and research activities; - communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods); - case-study method (analysis of situations); - game technologies, in which students participate in business, role-playing, simulation games;	

	- information and communication (including distance learning) technologies. In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.			
Assessment of the student's knowledge:	Type of task		Number of points (max)	Total
	Current control	Practical works (1-15)	30	100
		Independent work	10	
	Mid-term control	Written work	10	
	Final control	Exam (Testing)	50	
Topics of lectures:	<ul style="list-style-type: none"><li>• Working with templates in object-oriented programming. Template concept and their use. Methods of creating function templates, class templates and their use.</li><li>• Containers (Collections). STL libraries. Container classes. Linear containers (array, vector, deque, list, forward_list).</li><li>• Associative containers. Associative containers (set, map, multiset, multimap).</li><li>• Container adapters. Stack, queue, priority_queue. Algorithms for working with containers.</li><li>• Working with numeric classes. Numerical classes and working with them (complex, vllarray, slice, gslslice, etc.).</li><li>• Programming in the Visual Studio environment. Menus and toolbars in the Visual Studio environment.</li><li>• Programming in a GUI environment. Programming in a GUI environment. Menus and toolbars in a GUI environment.</li><li>• Working with components. Component concept and properties. Working with forms.</li><li>• Working with components. Component concept and properties. Data input and output components.</li><li>• Working with components. Components for branching and selection. Components for working with arrays.</li><li>• Graphical capabilities in a GUI environment. Components for drawing straight lines and various geometric figures.</li><li>• Graphical capabilities in a GUI environment. Graphical state, build images and function graphs (Chart) in GUI environment.</li><li>• Working with dialog boxes. Dialog windows and their configuration, control elements in the GUI environment.</li><li>• Working with dialog boxes. Connecting dialog boxes and creating message boxes in a GUI environment.</li><li>• User interface in GUI environment. Work with small projects</li></ul>			
Literature:	1. Muminov B.B. Programming 1. Textbook. – T.: "Nihol print", 2021. – 280 b. 2. Muminov B.B. Programming 2. Textbook. – T.: "Nihol print", 2021. – 604 b. 3. Nazirov Sh.A., Qobulov R.V., Bobojanov M.R., Raxmanov Q.S. Language C and C++. – T.: "Successor- publishing house" LLC, 2013. – 488 p. 4. Horton I.-Beginning Visual C++ 2012/ I.Horton. Published simultaneously in Canada.–2016. –P. 988. 5. Mallayev O.U., Qurbonov N.M., Xaydarova M.Yu. Creating small projects in Visual C++ // "Communicator". UzRO and OMTV, 2019, 224 p. 6. Bjarne Stroustrup. Programming: Principles and Practice Using C++ (2nd Edition). Person Education, Inc. 2014. second printing, January 2015. 7. J.Axmadaliev, R.Xoldorboev Methodical guide to learning C++ programming language (2015).			

5.4. Cybersecurity fundamentals		
Semestr:	3	
Date of last modification:	31.08.2023	
Teachers:	Imamaliyev Aybek Turapbayevich, Bozorov Suhrobjon Mumin ugli	
Component:	Compulsory	
Cycle:	Core	
ECTS:	6	
Pre-requisities	-	
Workload:	<b>Types of classes</b>	
	<b>Hours</b>	
	Total	180
	Lecture	42
	Practical works	30
	SAW (Student autonomous work)	108
	Form of final control	Exam
	Final assessment method	Testing
Control forms:	Current control, Mid-term control, Final control	
Assessment requirements	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
Final control	The final exam is taken in the form of a test, which contains 25 questions, worth 2 points each, tests are divided into 3 levels of difficulty. Total exam time 60 minutes	
Short content:	The Cybersecurity fundamentals course introduces students to the fundamentals of cyber security, fundamentals of cryptography, access control, network and computer security, information security threats and effective methods and tools to combat them. The course helps students understand the importance of the process of management and administration in the context of information security, social issues such as personal confidentiality, social engineering problems, cyber ethics, human security, etc.	
Goal:	The purpose of mastering the discipline is to provide students with with knowledge, skills and competence in solving issues related to cyber security of information systems and information resources in professional activities..	
Objective:	Have an idea about the legal, organizational and technical aspects of information security, the principles of information security; Perform simple “tie-butterfly” and rejection tree analysis methods; Possess skills in using threat analysis and prevention tools;	
Learning outcome:	After studying the discipline, students should be able to: LO.1 Describe the basic concepts of cyber security; LO.2 Explain the international, national and departmental regulatory framework in the field of cyber security; LO.3 Demonstrate an understanding of confidentiality, integrity, and usability; LO.4 Explain the main types of threats to cyber security and the methods and methods of combating them; LO.5 Analysis of methods of violation of confidentiality, integrity and usability of information; LO.6 To have the skills to use information protection methods and tools; LO.7 Implementation of cryptography, access control, network and computer security.	
Teaching methods:	In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized: - technology of problem- and project-based learning; - technologies of educational and research activities; - communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods); - case-study method (analysis of situations); - game technologies, in which students participate in business, role-playing, simulation games;	

	- information and communication (including distance learning) technologies. In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.				
Assessment of the student's knowledge:	Type of task		Number of points (max)		Total
			40		
	Current control	Practical works (1-10)		20	100
		Independent work		10	
		Oral presentation		10	
	Mid-term control	Written work		10	
Final control	Exam (Testing)		50		
Topics of lectures:	<ul style="list-style-type: none"><li>• Introduction, cybercrime, cyber law and cybersecurity.</li><li>• Human security, architecture, strategy and policy of cybersecurity.</li><li>• Basic concepts of cryptography and it's history.</li><li>• Symmetric cryptosystems, Asymmetric cryptosystems.</li><li>• Data Integrity Methods, Disk and file encryption. Methods of secure deletion of data.</li><li>• Identification and authentication tools, Logical access control to the data.</li><li>• Physical data protection, computer networks and network security issues.</li><li>• Network security tools, Wireless network security.</li><li>• Risk management, the concept of accessibility. Backup, restore and event logging.</li><li>• Software security issues, computer viruses and problems of protection from viruses.</li><li>• Account protection, protection against social engineering.</li><li>• Learn how to assess risks in cyber security.</li><li>• Learning how classic encryption algorithms work, how to encrypt data using the TrueCrypt program.</li><li>• Learn how to install and configure a password-based authentication mechanism in an operating system (Windows OS), conduct a reconnaissance attack.</li><li>• Building network security using the Network Screen tool, a secure Wi-Fi wireless network.</li><li>• Learning to restore data using special software tools, Installing virus protection on personal computers.</li><li>• Learn how to manage password usage, how to collect data from social networks.</li></ul>				
Literature:	Literature 1. S.K. Ganiyev, A.A. Ganiyev, Z.T. Xudoyqulov. Cybersecurity Fundamentals: methodical handbook, -T.: «Nihol print» OK, 2021. – 224 p. (Uz.) 2. S.K. Ganiyev, Z.T. Xudoyqulov, N.B. Nasrullayev. Cybersecurity Fundamentals: methodical handbook, -T.: «Mahalla va oila nashriyoti», 2021. -240 p. (Ru.) 3. S.K. Ganiyev, M.M. Karimov, K.A. Tashev. Information security. –T.: “FAN va texnologiya”, 2016, 372 p. (Uz.) 4. M.Stamp. Information security. Principles and Practice. Second Edition. ISBN 978-0-470-62639-9. 2011. 5. Shangin V.F. “Integrated information protection in corporate systems”. Tutorial. M.: FORUM - INFRA-M, 2019. 591 p. (Ru.)				

5.5. Data structures and algorithms		
Semester:	3	
Date of last modification:	31.08.2023	
Teachers:	Buriyev Yusuf Absamat ugli, Azizova Zarina Ildarovna	
Component:	Compulsory	
Cycle:	Core	
ECTS:	6	
Pre-requisities	Programming II	
Workload:	Types of classes	Hours
	Total	180
	Lecture	42
	Practical works	30
	SAW (Student autonomous work)	108
	Form of final control	Exam
	Final assessment method	Testing
Control forms:	Current control, Mid-term control, Final control	
Assessment requirements	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
Final control	The final exam is taken in the form of a test, which contains 25 questions, worth 2 points each, tests are divided into 3 levels of difficulty. Total exam time 60 minutes	
Short content:	Data Structures and Algorithms course is a fundamental subject in computer science that focuses on the study of organizing and manipulating data efficiently. Data structures are the way data is organized and stored in a computer's memory, while algorithms are the step-by-step instructions for solving a specific problem.	
Goal:	The purpose of "Data Structures and Algorithms" course is to provide a solid foundation in organizing, storing, and manipulating data efficiently in computer programs.	
Objective:	-Understanding the fundamental data structures and their properties to effectively store and organize data;-learning various algorithms for searching, sorting, and manipulating data to solve real-world problems;-analyzing the performance of algorithms and data structures to make informed choices for optimizing code efficiency;-developing problem-solving skills by applying data structures and algorithms to solve complex computational problems;-enhancing software development capabilities by writing efficient and scalable code that can handle large datasets and perform tasks quickly.	
Learning outcome:	After studying the discipline, students should be able to: LO 1. To be able to use data types correctly, to acquire the skills of using the technology of their creation. LO 2. Understand and apply properties of linear data structures. LO 3. Understand and apply the properties of static data structures. LO 4. Get an idea of List" type data structures. Ability to implement lists statically and dynamically. LO 5. To have an idea about the characteristics of dynamic data structures, to be able to use them LO 6. Be able to explain and apply the properties of non-linear data structure.	
Teaching methods:	In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized: - technology of problem- and project-based learning; - technologies of educational and research activities; - communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods); - case-study method (analysis of situations);	

	<ul style="list-style-type: none"><li>- game technologies, in which students participate in business, role-playing, simulation games;</li><li>- information and communication (including distance learning) technologies.</li></ul> <p>In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.</p>			
<i>Assessment of the student's knowledge:</i>	<b>Type of task</b>		<b>Number of points (max)</b>	<b>Total</b>
	Current control	Practical works (1-15)	24	34
		Independent work	10	
	Mid-term control	Written work	16	100
	Final control	Exam (Testing)	50	
<i>Topics of lectures:</i>	<ul style="list-style-type: none"><li>• Data types and algorithms. Abstract structures of information. Development and analysis of algorithms. Data and stages of their expression. Data structure classification.</li><li>• Overview of data structures. Configured data types: arrays, vectors, records, collections, and pointer types.</li><li>• Recursion and its application in programming. Recursive algorithms, their analysis. Examples of recursion.</li><li>• Data search algorithms. The concept of search and its function. Linear search. Binary search. Efficiency and optimization of search methods.</li><li>• Data sorting algorithms. The concept of sorting and its function. Strict sorting methods.</li><li>• Linear data structures. Linear containers. Iterators and their types</li><li>• Linearly linked lists. Understanding Linked Lists. Logical representation of linearly linked lists</li><li>• Stack, Queue and Dec. Represent stack, queue, and declaration using a linearly linked list.</li><li>• Priority queues. Dictionaries and their implementation</li><li>• Tree data structures. Definitions and properties of tree data structures. Classification of trees. Tree view.</li><li>• Binary search tree. Algorithms for adding elements, deleting elements and searching in a binary search tree.</li><li>• Balanced Binary Trees. Balancing algorithms: general and specific balancing algorithms. AVL tree.</li><li>• Binary trees in heap tree form. Description of heap tree structure. Heap tree execution algorithms. Heap training methods and efficiency</li><li>• Algorithms for working with graphs. Graph representation methods: joint matrix and relationship matrix. Adjacency list and arc list</li><li>• Graph visualization algorithms. Breadth first search (BFS) algorithm. Depth-first search (DFS) algorithm</li></ul>			
<i>Literature:</i>	Literature 1. Shukla, Rajesh K. Data Structures Using C and C++ : monograph - New Delhi : Wiley India, 2012. - 502 p. [45 ex.] 2. Kruse, Robert L. Data Structures and Program Design in C : monograph. - New Delhi: Dorling Kindersley (India) Pvt. Ltd., 2012. - 607 p. [25 ex.].3. Wirth, Niklaus. Algorithm and structure dannyx. Textbook - 2nd ed., ispr. - M.: DMK Press, 2012. - 272 p. [1 ex.]			

5.6. Electronics and circuits I		
Semestr:	3	
Date of last modification:	31.08.2023	
Teachers:	Sattarov Xurshid Abdishukurovich, Saidov Kamoladdin Nuraddinovich	
Component:	Compulsory	
Cycle:	Core	
ECTS:	6	
Pre-requisities	Physics II	
Workload:	Types of classes	Hours
	Total	180
	Lecture	42
	Practical works	30
	SAW (Student autonomous work)	108
	Form of final control	Exam
	Final assessment method	Testing
Control forms:	Current control, Mid-term control, Final control	
Assessment requirements	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
Final control	The final exam is taken in the form of a test, which contains 25 questions, worth 2 points each, tests are divided into 3 levels of difficulty. Total exam time 60 minutes	
Short content:	The theoretical concepts of the course are mainly learned through exercises and labs of increasing complexity to achieve all the concepts covered. Circuits and Electronics Science consists of Circuit Theory and Basic Topics of Electronics, which are the basic concepts that an ICT major should be familiar with.	
Goal:	Gaining a thorough understanding of the subject will enable students to construct circuits and electronics with systematic academic knowledge and circuit theory and fundamental electronic topics make up practical abilities.	
Objective:	Learning the principles of electronics and semiconductors; studying the foundational subjects of electronics; gaining hands-on experience with circuit and electronics theory; assessing and maximizing ICT performance; and investigating current integrated circuit trends and technologies.	
Learning outcome:	After studying the discipline, students should be able to: LO1. The relationship between an electric current and voltage in passive elements to determine and learning. LO2. Measuring instruments to learning and use various generators. LO3. Learns to calculate currents and voltages in passive and active elements in an electric circuit. LO4. The number of equations needed to analyze and learns to determine the topology of an electrical circuit and determine the minimum. LO5. Learn to find ways to analyze an electrical circuit. LO6. An explores the relationship between mathematical terms and understanding the first- and second-order circuit`s. LO7. Learns transient and steady-state electronic analysis of the Laplace transform. LO8. Learns to simulate system state in transient and steady state. LO9. We know how to connect semiconductor devices in electric circuits and how to use them depending on their function.	
Teaching methods:	In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized: - technology of problem- and project-based learning; - technologies of educational and research activities; - communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods); - case-study method (analysis of situations);	

	<div>- game technologies, in which students participate in business, role-playing, simulation games;</div> <div>- information and communication (including distance learning) technologies.</div> <div>In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.</div>				
Assessment of the student's knowledge:	Type of task		Number of points (max)		Total
	Current control	Practical works (1-10)	25	40	100
		Independent work	7		
		Oral presentation	8		
	Mid-term control	Written work	10		
	Final control	Exam (Testing)	50		
Topics of lectures:	<div><div>• Introduction to Electronics and Circuits 1. The purpose and tasks of science;</div><div>• Electronic circuit simulators.</div><div>• An analysis of direct current and electric circuits;</div><div>• Calculating electric circuits and direct current;</div><div>• The main quantities of sinusoidal current and characterizing it;</div><div>• Characteristics of electrical circuits under the influence of a sinusoidal signal;</div><div>• Mutual induction circuits;</div><div>• Quadrupoles and filters;</div><div>• Transient processes in the electric circuit;</div><div>• The device operation of semiconductor and physical foundations;</div><div>• Contact phenomena in semiconductors;</div><div>• Semiconductor diodes;</div><div>• Bipolar transistors;</div><div>• Multilayer semiconductor devices;</div><div>• Field transistors (FT);</div></div>				
Literatures:	<div>1. A.A. Tulyaganov, S.S. Parsiev, V.A. Tulyaganova, U.M. Abdullayev. Theory of electrical circuits. (tutorial), Communicator, 2018, 144 p. 2. X.K.Aripov, A.M. Abdullayev, N.B. Alimova, Electronics and circuit engineering (textbook) Tashkent.: « Communicator», 2017, 376 p. 3. Aripov X.K., Abdullaev A.M., Alimova N.B., “Schematic” (textbook), Tashkent. « The boston of thought», 2013, 447 p. 4. Ron Mancini, Amps For Everyone, 2002, Texas Instruments. 5. X.K. Aripov, A.M. Abdullayev, N.B. Alimova, Electronics (textbook) Tashkent, « Science and technology», 2011, 428 p. 6. Thomas F. Schubert, Jr., Ernest M. Kim. Fundamentals of Electronics Book 1: Electronic Devices and Circuit Applications. 2014.</div>				



5.7. Electronics and circuits II		
Semestr:	4	
Date of last modification:	31.08.2023	
Teachers:	Sattarov Xurshid Abdishukurovich, Saidov Kamoladdin Nuraddinovich	
Component:	Elactive	
Cycle:	Secondary	
ECTS:	6	
Pre-requisities	Electronics and circuits I	
Workload:	<b>Types of classes</b>	
	Total	180
	Lecture	42
	Practical works	30
	SAW (Student autonomous work)	108
	Form of final control	Exam
	Final assessment method	Testing
Control forms:	Current control, Mid-term control, Final control	
Assessment requirements	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
Final control	The final exam is taken in the form of a test, which contains 25 questions, worth 2 points each, tests are divided into 3 levels of difficulty. Total exam time 60 minutes	
Short content:	Computer networks course will encourage you to understand an computer network construction principles, technologies and devices, local, network design issues in computer programs, network management methods, basic network protocols, data routing processes, network software and hardware security.	
Goal:	The goal of teaching subject - modern information and communication technologies belong to a complex class of systems, which are made up of electrical circuits of different complexity.	
Objective:	The system is one of the important issues in the study of the form of electronic devices. This is the science of telecommunication technologies, computer engineering electronic devices used in the types, characteristics, their structure, properties and complex issues of technological devices, which they create using mexanizim work and study consists of removing sxemotexnik to include.	
Learning outcome:	After studying the discipline, students should be able to: LO1. Necessary to have knowledge about the current role of integrated circuits, the applications of integrated circuits in nanoelectronics, functional electronics, bioelectronics. LO2. Necessary to have knowledge of the stages, technologies, basic and passive elements of the preparation of integrated circuits performing various tasks. LO3. Necessary to have knowledge of amplifier circuits based on transistors of their basic characteristics and parameters. LO4. Necessary to have knowledge about the application of amplifiers and their types on radiotechnical devices, the determination of the technical parameters of integrated circuit amplifiers. LO5. Able to determine the parameters and characteristics of the amplifiers being used in radio equipment. LO6. Able to find the results of the transmission characteristic of integrated circuits by connecting measuring instruments. LO7. Able to electronically analyze the state of logical elements circuits; he is able to assemble circuits. LO8. Able to connect amplifiers, stable current generators, operation amplifier, optrons in electrical circuits, as well as apply them depending on the task.	
Teaching methods:	In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized: - technology of problem- and project-based learning;	

	<ul style="list-style-type: none"><li>- technologies of educational and research activities;</li><li>- communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods);</li><li>- case-study method (analysis of situations);</li><li>- game technologies, in which students participate in business, role-playing, simulation games;</li><li>- information and communication (including distance learning) technologies.</li></ul> <p>In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.</p>				
Assessment of the student's knowledge:	Type of task		Number of points (max)		Total
	Current control	Practical works (1-10)	25	40	100
		Independent work	7		
		Oral presentation	8		
	Mid-term control	Written work	10		
	Final control	Exam (Testing)	50		
Topics of lectures:	<ul style="list-style-type: none"><li>• Electronics and Scheme 2 subject, content and methods;</li><li>• Electrical signal amplifiers;</li><li>• The effect on the characteristics of feedback and its strengthening devices;</li><li>• Schemes for connecting bipolar transistors and modes of operation of transistors in amplifier stages;</li><li>• Schemes for connecting field transistors and modes of operation of transistors in amplifier stages;</li><li>• Multi-cascade amplifiers. Power amplifiers;</li><li>• Integrated circuit preparation technology. Active and passive elements of the integrated circuit;</li><li>• Darlington pair. Wilson current view scheme;</li><li>• Analog integrated circuits. Stable current generator (SCG) scheme;</li><li>• Constant voltage level shift device;</li><li>• Fixed current amplifiers (FCA);</li><li>• Operation amplifier;</li><li>• Logical elements. Transfer characteristics of logical elements;</li><li>• Simple inverter Transistor-transistor logic. Transistor-transistor logic with complex inverters and Schottky barriers;</li><li>• Integral injective logic. Connected emitters logic;</li><li>• Logical elements made in a metal dielectric semiconductor transistor;</li><li>• Complementary inverters. Optrons;</li></ul>				
Literature:	<p>1. H.K.Aripov, M.A.Abdullaev, N.B.Alimova, Electronics and schematics (Textbook) Tashkent.: "Communicator", 2017 y, 376 p. 2. H.K.Aripov, A.Abdullaev, N.B.Alimova, Toshmatov Sh.T. "Schematics" (textbook), Tashkent, "The boston of thought", 2013, 447 p. 3. K.Aripov, M.A.Abdullaev, N.B.Alimova, H.H.Bustanov, Sh.T. Toshmatov. Digital logic devices design. Textbooks. –T.: "Communicator", 2017, 396 p. 4. H.K.Aripov, A.M.Abdullaev, N.B.Alimova, H.H.Bustanov, It Doubles.V.Obyedkov, Sh.T. Toshmatov. Electronics (textbook) Tashkent.: "Science and technology", 2011, 428 p. 5. Multisim User Guide. National Instruments, 2007. 6. Robert L. Boylestad. Introductory Circuit analysis. 2014.Pearson Education Limited, 1091p. 7. Behzad Razavi. Fundamentals of Microelectronics.2nd edition.2014 John Wiley-Sons. 932 p.</p>				

5.8. Electromagnetic fields and waves		
Semestr:	4	
Date of last modification:	31.08.2023	
Teachers:	Kan Vitaliy Sergeyevich, Shakhobiddinov Alisher Shopatkhiddinovich	
Component:	Compulsory	
Cycle:	Core	
ECTS:	6	
Pre-requisites	Physics II	
Workload:	Types of classes	Hours
	Total	180
	Lecture	42
	Laboratory works	30
	SAW (Student autonomous work)	108
	Form of final control	Exam
	Final assessment method	Testing
Control forms:	Current control, Mid-term control, Final control	
Assessment requirements	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
Final control	The final exam is taken in the form of a test, which contains 25 questions, worth 2 points each, tests are divided into 3 levels of difficulty. Total exam time 60 minutes	
Short content:	The course “Electromagnetic fields and waves” studies the fundamentals of electrodynamics, the design and construction of transmission lines, microwave paths and units, and fiber-optic communication links, which are widely used in telecommunications systems today.	
Goal:	The purpose of the course is to give students the necessary level of knowledge on the devices of transmission lines, microwave paths and nodes, as well as initial knowledge in the field of fiber-optic communication lines used in modern telecommunications systems.	
Objective:	The course consists of the following main sections: fundamentals of the theory of the electromagnetic field, electrodynamics, radiation and propagation of electromagnetic waves, directional electromagnetic waves and guiding systems, linear microwave devices.	
Learning outcome:	After studying the discipline, students should be able to: LO 1. Formation of general concepts of electrodynamics. LO 2. Understanding the theory of Maxwell's equations. LO 3. Familiarization with solutions to problems using Maxwell's equations. LO 4. Gaining concepts about the purpose of transmission lines. LO 5. Studying the principles of operation of measuring lines, nodes and microwave paths. LO 6. Study of the design features of cavity resonators, bridges and other microwave devices. LO 7. Familiarization with measurements of parameters and characteristics of transmission lines, directional couplers and microwave paths. LO 8. Gaining knowledge in the field of solving problems when calculating the main parameters of transmission lines and microwave devices using the basic equations of electrodynamics.	
Teaching methods:	In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized: - technology of problem- and project-based learning; - technologies of educational and research activities; - communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods); - case-study method (analysis of situations);	

	<p>- game technologies, in which students participate in business, role-playing, simulation games;</p> <p>- information and communication (including distance learning) technologies.</p> <p>In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.</p>				
<i>Assessment of the student's knowledge:</i>	<b>Type of task</b>		<b>Number of points (max)</b>	<b>Total</b>	
	Current control	Practical works (1-10)	25	40	100
		Independent work	7		
		Oral presentation	8		
	Mid-term control	Written work	10		
	Final control	Exam (Testing)	50		
<i>Topics of lectures:</i>	<ul style="list-style-type: none"><li>• Introduction. EMF concepts. EMF vectors, media parameters, material equations.</li><li>• Boundary conditions at the interface between media. Boundary conditions on the surface of an ideal conductor.</li><li>• EMF operators. Maxwell's first, second, third and fourth equations.</li><li>• Maxwell's equation system for a monochromatic field. Dielectric loss tangent.</li><li>• Homogeneous and inhomogeneous wave equations.</li><li>• Energy and power of EMF. Flow and flux density. EMF energy balance. Umov–Poynting theorem.</li><li>• Plane wave. Parameters (characteristics) of a plane wave.</li><li>• Elementary electric emitter. Structure of the EI field.</li><li>• Characteristics of EI directionality. Power and radiation resistance.</li><li>• Types of polarization (linear, circular, elliptical, normal and parallel polarization)</li><li>• Brillouin's concept. Field structure under normal and parallel polarization. Biplanar waveguide</li><li>• Guided wave analysis. Characteristics (parameters) of directed waves.</li><li>• Rectangular waveguide and its main characteristics (parameters)</li><li>• Round waveguide and its main characteristics (parameters.)</li><li>• Coaxial waveguide and its main characteristics (parameters.)</li><li>• Symmetrical, unbalanced and strip transmission lines. Measuring transmission lines.</li><li>• Transmission line communication elements: pin, loop, hole.</li><li>• Directional coupler, its parameters</li><li>• Transmission line coordination. Matched loads.</li><li>• Elements of the microwave path: Kinks, bends, twists. Microwave bridges. Kinds.</li><li>• Volumetric resonator. Types of cavity resonators</li><li>• Dielectric waveguide and light guide. Methods for implementing fiber-optic communication elements</li></ul>				
<i>Literature:</i>	<p>1. Ю.В.Пименов, В.И.Вольман, Technical electrodynamics – M.Radio and Communications,2022. 2. Е.Р.Милютин, Основы Technical electrodynamics, St. Petersburg, Lan, 2022. 3. Pimenov Yu.V., Volman V.I. , Technical electrodynamics, - M: Radio and Communication, 2002. 4. O.I. Falkovsky, Technical electrodynamics, St. Petersburg, Lan, 2009. 5. Lebedev I.V. Equipment and devices of ultra-high frequencies in 2 volumes, vol. 1. - M.: Gosenergoizdat, 1970. 6. Sazonov D.M., Gridin A.N., Mishustin B.A. Microwave devices. / Ed. D.M. Sazonova. - M.: Higher School, 1981. 7. Volman V.I., Pimenov Yu.V., Technical electrodynamics, - M: Svyaz, 1971.</p>				

5.9. Fundamentals of artificial intelligence		
Semestr:	4	
Date of last modification:	31.08.2023	
Teachers:	Nurmurodov Javohir Nurmurod ugli	
Component:	Compulsory	
Cycle:	Core	
ECTS:	6	
Pre-requisities	Programming II, Probability and Statistics	
Workload:	Types of classes	Hours
	Total	180
	Lecture	42
	Practical works	30
	SAW (Student autonomous work)	108
	Form of final control	Exam
	Final assessment method	Testing
Control forms:	Current control, Mid-term control, Final control	
Assessment requirements	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
Final control	The final exam is taken in the form of a test, which contains 25 questions, worth 2 points each, tests are divided into 3 levels of difficulty. Total exam time 60 minutes	
Short content:	It is one of the main directions of modern programming and is designed to develop a set of algorithms that force computers and technical devices to think and act like humans. In this, students will study the basic concepts of artificial intelligence, their application in any field, game theory, search agents, object recognition and machine learning algorithms, and the application of artificial neural networks. acquires knowledge.	
Goal:	The purpose of teaching science is to develop the skills and abilities to develop artificial intelligence technologies and methods, the theoretical and practical foundations of the computational processes of machine learning algorithms, which are widely used today, and the development of algorithms that force machines to think like humans and make decisions like humans. .	
Objective:	-to have concepts of artificial intelligence; -mathematical and software support of automated and computer systems; -in higher education, retraining and professional education institutions; -in offices and organizations whose activities are related to information protection.	
Learning outcome:	After studying the discipline, students should be able to: LO 1. In the process of analyzing the subject area, in which areas to use artificial intelligence and to improve it in those areas. LO 2. Building software tools and artificial neural network algorithms for developing machine learning algorithms. LO 3. Gain skills in machine learning model development skills. LO 4. Must be proficient in applying common machine learning techniques and developing own reasoning algorithms.	
Teaching methods:	In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized: - technology of problem- and project-based learning; - technologies of educational and research activities; - communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods); - case-study method (analysis of situations); - game technologies, in which students participate in business, role-playing, simulation games;	

	<p>- Information and communication (including distance learning) technologies.</p> <p>In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.</p>				
<i>Assessment of the student's knowledge:</i>	<b>Type of task</b>		<b>Number of points (max)</b>	<b>Total</b>	
	Current control	Practical works (1-10)	20	40	100
		Independent work	10		
		Oral presentation	10		
	Mid-term control	Written work	10		
	Final control	Exam (Testing)	50		
<i>Topics of lectures:</i>	<ul style="list-style-type: none"><li>• Introduction to science: artificial intelligence basics and applications</li><li>• History of artificial intelligence</li><li>• Intelligent agents</li><li>• Solving problems in artificial intelligence</li><li>• Find solutions using classic search</li><li>• Theory of games</li><li>• Logical agents</li><li>• Knowledge presentation issues</li><li>• Definition of vague knowledge</li><li>• Probabilistic decision-making</li><li>• Development and use of expert systems</li><li>• Representation of knowledge in expert systems</li><li>• General recursion rule</li><li>• Types of machine learning</li><li>• Artificial neural networks</li></ul>				
<i>Literature:</i>	<p>1. Bekmuratov Q.A. Sun'iy intellekt [Text] : uquv qullanma Q. A. Bekmuratov.-T. : Aloqachi, 2019. - 312 b. - Adabiyotlar: 300 b.- 48 (adadi 100) экз.- ISBN 978-9943-5804-8-0 : 65150 sum ГРНТИ УДК 28.23004.8(075.8).</p> <p>2. O. Campesato. Artificial Intelligence, Machine Learning and Deep Learning. ISBN: 978-1-68392-467-8. 2020. – 339 c. 3. Sirojiddin Komolov, Sherzod Raxmatov: Sun'iy intellekt asoslari. Mashinaviy uqitish. Toshkent – 2019. 4.Хайкин С. Нейронные сети: полный курс. 22е изд. пер. с англ.- М. Изд. дом «Вильямс» 2006-452с. 5.Richard E. Neapolitan Xia Jiang. Artificial Intelligence: Chapman va Hall/CRC 2018 - 480 c. ISBN 13: 9781138502383. 6.Laurence Moroney. AI and Machine Learning for Coders: UReilly Media 2020-390c. ISBN 13: 9781492078197.</p>				

## 6. Core

6.1. Computer graphics		
Semestr:	4	
Date of last modification:	31.08.2023	
Teachers:	Kayumova Gulshan Asrorovna	
Component:	Compulsory	
Cycle:	Core	
ECTS:	6	
Pre-requisities	Programming II	
Workload:	Types of classes	Hours
	Total	180
	Lecture	42
	Practical works	30
	Laboratory work	0
	SAW (Student autonomous work)	108
	Form of final control	Exam
	Final assessment method	Testing
Control forms:	Current control, Final control	
Assessment requirements	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
Final control	The final exam is taken in the form of a test, which contains 25 questions, worth 2 points each, tests are divided into 3 levels of difficulty. Total exam time 60 minutes	
Short content:	The science of computer graphics includes general concepts and knowledge of computer graphics, information on visualizing and processing an image of arbitrary complexity on a computer screen, formation of thinking and thinking, training to express opinions and conclusions in a reasonable manner, and on acquired knowledge is the formation of skills and competencies	
Goal:	The goal of teaching science is to acquire general concepts and knowledge about computer graphics, to provide information about visualization and processing of an image of arbitrary complexity on a computer screen, to form thinking and thinking, to teach to clearly state opinions and conclusions in a reasonable manner, and to teach the acquired knowledge formation of skills and competencies.	
Objective:	Knowledge of the basics of mathematics, fundamentals of computing and programming languages.	
Learning outcome:	Students will be able to: LO 1. Learning 2D and 3D graphics algorithms. LO 2. Describe the object by polygonal model and splines. LO 3. Geometric transformations. LO 4. Geometric projections. LO 5. Raster algorithms. LO 6. Remove invisible lines and surfaces. LO 7. Learning methods and algorithms for working with painting, color and light, as well as graphic software tools (libraries).	
Teaching methods:	In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized: - technology of problem- and project-based learning; - technologies of educational and research activities; - communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods); - case-study method (analysis of situations); - game technologies, in which students participate in business, role-playing, simulation games;	

	- information and communication (including distance learning) technologies. In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.				
Assessment of the student's knowledge:	Type of task		Number of points (max)		Total
	Current control	Practical works (1–10)	25	40	100
		Independent work	7		
		Oral presentation	8		
	Mid-term control	Written work	10		
Final control	Exam (Testing)	50			
Topics of lectures:	<ul style="list-style-type: none"><li>• Introduction to Computer Graphics</li><li>• Raster and vector graphics</li><li>• Fractal graphics</li><li>• Graphic formats</li><li>• Transformations in the plane. Homogeneous coordinates</li><li>• Transformations in space. Platonic bodies</li><li>• Polygonal meshes and their properties.</li><li>• Geometric splines. Spline curves. Spline surfaces</li><li>• Projection. Parallel projection. Central projection</li><li>• Basics of raster algorithms. Brezenheim and Sutherland-Cohen algorithms</li><li>• Remove invisible lines and surfaces</li><li>• Algorithms of beam cutting of geometric objects</li><li>• Light. Basic models of beam direction</li><li>• Methods of painting in space. Guro, Fong painting methods.</li><li>• Color in computer graphics. Color models.</li><li>• Methods of tracing the direction of the light (trace - observation)</li><li>• Open Graphics Library (OpenGL)</li><li>• Drawing geometric objects using OpenGL</li><li>• Materials using OpenGL</li><li>• Lighting using OpenGL</li><li>• Ways to work with OpenGL</li><li>• Optimization of programs using OpenGL</li></ul>				
Literature:	1. David Salomon The Computer Graphics Manual Springer-Verlag London Limited New York, 2011. 2. Nuraliyev F.M. Computer graphics. Textbook. Tashkent. 2022. 3. Fabio Ganovelli, Massi Miliano Corsini, Sumanta Pattanaik, MarCo Di Benedetto. Introduction to Computer graphics A practical Learning Approach. 2014-07-14 y, CRC Press, USA.				



6.2. 3D modeling and visualization		
Semestr:	5	
Date of last modification:	31.08.2023	
Teachers:	Mukhamadiyev Abduvali Shukurovich	
Component:	Compulsory	
Cycle:	Core	
Credit point:	6	
Pre-requisities	Computer graphics	
Workload:	Types of classes	Hours
	Total	180
	Lecture	42
	Practical works	30
	SAW (Student autonomous work)	108
	Form of final control	Exam
	Final assessment method	Testing
Control forms:	Midterm control, Exam	
Assessment requirements	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
Final control	The final exam is taken in the form of a test, which contains 25 questions, worth 2 points each, tests are divided into 3 levels of difficulty. Total exam time 60 minutes	
Short content:	The goal of teaching science is to develop skills for analyzing information about visual images, processing information and drawing conclusions.	
Goal:	The purpose of the science of 3D modeling and digital animation, taking into account the needs of the technical education areas, within the hours allocated to the education areas, is to help students model three-dimensional objects, visualize and measure the object in various types of training of the science. It consists of creating image information for learning, giving concepts about its digital processing, forming students' creative-formal thinking and compositional-exploratory professional knowledge and practical skills in design projects.	
Objective:	The science of "3D modeling and digital animation" belongs to the complex of specialized disciplines and is inextricably linked with higher mathematics, applied software tools of computer graphics and design, programming technologies, digital television, mass media communication and other disciplines taught in higher educational institutions.	
Learning outcome:	After studying the discipline, students should be able to: LO 1. teaching the theoretical foundations, mathematical apparatus, methods and methodologies of three-dimensional modeling. LO 2. visual representation of three-dimensional real existence with the help of mathematical and software equipment and teaching them digital processing methods. LO 3. to develop the skills of analyzing real objects through visual images. LO 4. to set practical problems and develop their skills to find solutions using modern practical software tools. LO 5. to know and be able to use the possibilities of modern practical software tools of computer animation. LO 6. must have skills in video and audio signals, animation processing of video files.	
Teaching methods:	In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized: - technology of problem- and project-based learning; - technologies of educational and research activities; - communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods); - case-study method (analysis of situations);	

	<p>- game technologies, in which students participate in business, role-playing, simulation games;</p> <p>- information and communication (including distance learning) technologies.</p> <p>In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.</p>						
<i>Assessment of the student's knowledge:</i>	<b>Type of task</b>		<b>Number of points (max)</b>		<b>Total</b>		
			Current control	Practical works (1–10)		25	40
				Independent work		7	
		Oral presentation	8	100			
	Mid-term control	Written work	10				
	Final control	Exam (Testing)	50				
<i>Topics of lectures:</i>	<ul style="list-style-type: none"><li>• Enter</li><li>• Basics of 3D graphics</li><li>• Classification of the geometric shape of a three-dimensional object</li><li>• Three-dimensional object surface representation methods.</li><li>• Surface approximation and restoration</li><li>• Construction of standard simple graphic objects</li><li>• Three-dimensional object image synthesis</li><li>• Synthesis of realistic images</li><li>• Use of 3D graphics in various fields</li><li>• Basics of computer animation</li><li>• Mathematical aspects of computer animation</li><li>• 3D graphics and animation algorithms</li><li>• Automatic camera control. Hierarchical kinematic modeling</li><li>• Solid modeling</li><li>• Creating three-dimensional objects</li><li>• Edit objects at the level of points and polygons</li><li>• NURBS modeling. 3D primitives</li><li>• Grids and custom objects</li><li>• Advanced Modifiers (Mesh Select, Edit Mesh, Edit Poly)</li><li>• Scene visualization methods</li><li>• Using special effects in 3DS Max</li><li>• V-Ray Visualizer. Work with the material editor</li></ul>						
<i>Literature:</i>	<p>1. Nazirov Sh.A., Nuraliyev F.M., Tillayeva M.A., Uch o'Ichovli modellashirish, Ilm ziyo, Toshkent, 2012.</p> <p>2. Марк Джамбруно. Трехмерная графика и аниматсия. 2-е изд. – М.: Издательство Вилиямс, 2002. – 624 с.</p> <p>3. Ратнер П. Трехмерное моделирование и аниматсия человека. 2-е изд. – М.: Диалектика, Вилиям: 2005. – 277 с.</p> <p>4. Прахов А. Блендер. 3Д-моделирование и аниматсия. Руководство для начинающих. – М., Изд.: Библиотека ГНУ/Линуксцентра, 2009. — 256 с.</p>						

<b>6.3. Theoretical Foundations Of Acoustics</b>		
<i>Semestr:</i>	5	
<i>Date of last modification:</i>	31.08.2023	
<i>Teachers:</i>	Boymurodov Bobir Elmurodovich	
<i>Component:</i>	Elective	
<i>Cycle:</i>	Core	
<i>Credit point:</i>	6	
<i>Pre-requisites</i>	Programming II, Computer graphics	
<i>Workload:</i>	<b>Types of classes</b>	<b>Hours</b>
	Total	180
	Lecture	42
	Practical works	30
	SAW (Student autonomous work)	108
	Form of final control	Exam
	Final assessment method	Testing
<i>Control forms:</i>	Midterm control, Exam	
<i>Assessment requirements</i>	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
<i>Final control</i>	The final exam is taken in the form of a test, which contains 25 questions, worth 2 points each, tests are divided into 3 levels of difficulty. Total exam time 60 minutes	
<i>Short content:</i>	The theoretical basis of acoustics teaches students the basics of sound distribution in rooms, works with sound in acoustically different rooms and sound studios of television and movies, and forms practical skills.	
<i>Goal:</i>	Students will have an idea about the physical parameters of sound, the propagation of sound in different environments, methods of sound generation, modern means of influencing sound vibrations, as well as techniques and technologies. They will have knowledge of the principles of working in various sound studios, the basics of sound reception and processing, the characteristics of speech and music signals, and the distribution of sound in the room.	
<i>Objective:</i>	- The purpose of the course is to learn about the physical and psychological properties of sound, the acoustics of different buildings, to gain experience in the production of audio and video products in various formats in different acoustic conditions, and to reveal the role and importance of acoustics in the field of media.	
<i>Learning outcome:</i>	<p>After studying the discipline, students should be able to:</p> <p>LO 1. To have an idea about the propagation of sound in different environments, methods of sound generation, modern means of influencing sound vibrations, and techniques and technologies</p> <p>LO 2. To have knowledge about sound distribution in the room, sound absorbing devices;</p> <p>LO 3. Selection of rooms in the production of film and television productions, in the preparation of sound phonograms;</p> <p>LO 4. They will have the skills to select the necessary microphones and devices to realize the director's creative ideas.;</p> <p>LO 5. Know and be able to use audio and video recording and processing technology when working with audio and video production;</p> <p>LO 6. Able to perform practical work with professional sound recording and reproduction equipment;</p>	
<i>Teaching methods:</i>	<p>In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized:</p> <ul style="list-style-type: none"> <li>- technology of problem- and project-based learning;</li> <li>- technologies of educational and research activities;</li> <li>- communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods);</li> <li>- case-study method (analysis of situations);</li> </ul>	

	<p>- game technologies, in which students participate in business, role-playing, simulation games;</p> <p>- information and communication (including distance learning) technologies.</p> <p>In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.</p>							
<i>Assessment of the student's knowledge:</i>	<b>Type of task</b>		<b>Number of points (max)</b>		<b>Total</b>			
			Current control	Practical works (1–10)			25	40
				Independent work			7	
		Oral presentation	8					
	Mid-term control	Written work	10					
	Final control	Exam (Testing)	50					
<i>Topics of lectures:</i>	<ul style="list-style-type: none"><li>•Enter. The purpose and tasks of science. Acoustics and the concept of sound. Acoustics in terms and fields..</li><li>•History of the development of acoustics. The origin of acoustic sounds, the importance of sounds in the fields and the main stages.</li><li>•Basic concepts of acoustics. Theory of propagation of acoustic sounds in different conditions.</li><li>•The main features of hearing. Human perception of sound. Characteristics of the hearing organ.</li><li>•Sound physics. Physical characteristics of acoustic sounds.</li><li>•The main properties of holograms.</li><li>•The most important requirements for creating audio design.</li><li>•Ergonomic rules in radio studios.</li><li>•Radio studios and their interior design.</li><li>•Modern methods of sound recording in an audio studio.</li><li>•Technical means of sound recording in the process of sound recording.</li><li>•Stages of development of audio-video data recording devices and carriers.</li><li>•Microphones and their types.</li><li>•Software tools for voice recording during voice recording.</li><li>• Adobe Audition software and its capabilities.</li></ul>							
	<i>Literature:</i>							
	1. Efimova N.N. Zvuk v efire. 2 izd. M.: Institut povyshenia qualifikasii rabotnikov television i radioveshchaniya, 2015. 145 p. 2. Literature 2 Klyuchkova E.Yu. Theater. Answer. Cinema. Music. 2016. 3. Ефимова Н.Н. Звук в эфире. 2 изд. М.: Институт повышения квалификации работников телевидения и радиовещания, 2015. 145 с. 4. Вахитов Ш.Я., Ковалгин Ю.А., Фадеев А.А., Щевьев Ю.П. Акустика. Москва.Телеком.2016г 660с 5. М.Zuparov. Elektroakustika va arxitektura akustikasi. Toshkent “Voriz nashriyot”. 2014 yil.							

6.4. Audio data processing		
Semestr:	6	
Date of last modification:	31.08.2023	
Teachers:	Boymurodov Bobir Elmurodovich	
Component:	Elective	
Cycle:	Core	
ECTS:	6	
Workload:	Types of classes	Hours
	Total	180
	Lecture	42
	Practical works	30
	SAW (Student autonomous work)	108
	Form of final control	Exam
	Final assessment method	Testing
Control forms:	Midterm control, Exam	
Assessment requirements	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
Final control	The final exam is taken in the form of a test, which contains 25 questions, worth 2 points each, tests are divided into 3 levels of difficulty. Total exam time 60 minutes	
Short content:	"Processing of sound and images" provides students with general concepts of digital processing of sound signals and images, digital models of signals, distortion, processing of sound signals in the time and frequency domains, filtering, coding, digitization methods, compression, segmentation, characteristic count the marks.	
Goal:	The purpose of this course is to form the concept of montage in theoretical and practical ways, to form and develop graphic thinking, to teach students to clearly state their opinions and conclusions in a reasonable manner, and to develop skills and competencies based on the acquired knowledge. formation.	
Objective:	- Knowledge of the basics of computer graphics, physics.	
Learning outcome:	After studying the discipline, students should be able to: LO 1. Basic programming knowledge and skills; LO 2. learn the most important requirements for creating audio design; LO 3. know and be able to use audio and video recording and processing technology when working with audio and video production. LO 4. Knowing the distribution of light and the placement of lighting devices in the shooting areas; LO 5. Adobe Audition explores sound editing processes in Cubase programs; LO 6. able to perform practical work with professional sound recording and reproduction equipment; LO 7. being able to use microphones to create soundtracks in film and television; LO 8. distinguish between the necessary cameras and formats for recording and processing video data.	
Teaching methods:	In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized: - technology of problem- and project-based learning; - technologies of educational and research activities; - communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods); - case-study method (analysis of situations); - game technologies, in which students participate in business, role-playing, simulation games; - information and communication (including distance learning) technologies. In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned"	

	"INSERT", hands-on activities, gamification and others are actively used during practical classes.				
Assessment of the student's knowledge:	Type of task		Number of points (max)		Total
	Current control	Practical works (1–10)	25	40	100
		Independent work	7		
		Oral presentation	8		
Mid-term control	Written work	10			
Final control	Exam (Testing)	50			
Topics of lectures:	<ul style="list-style-type: none"><li>•Enter. The concept of information processing. The main directions of development of modern information processing technologies.</li><li>•Basics of sound processing. Sound theory. Digitization. Discretization. The concept of noise.</li><li>•Systems, selection and quantization. Principles of digital audio rendering. Continuous time systems. Choice theorem. Discrete-time spectral representations. Discrete-time systems. Transfer from a continuous-time system to a discrete-time system. Quantization.</li><li>•Delays and effects. Delays in audio and video and their causes. Linear and non-linear sound effect delays.</li><li>•Digital filters. Sound and image filters. MP3-audio, JPEG-image filters and additional filter packs.</li><li>•Sound analysis. Sound modeling. Short-time Fourier transform. Linear coding. Spectral modeling. Time models. Non-linear models. physical models.</li><li>•Sound analysis. Sound modeling. Short-time Fourier transform. Linear coding. Spectral modeling. Time models. Non-linear models. physical models.</li><li>•Sound recording and processing devices. Microphones (Line, Shure, Behringer), mixers and amplifiers (Yamaha, Samsung, Sony).</li><li>•Sound recording and processing devices. Microphones (Line, Shure, Behringer), mixers and amplifiers (Yamaha, Samsung, Sony).</li><li>•Use of software tools in sound and image processing and editing. Linear and non-linear editing. Adobe Audition program.</li><li>•Operations on image elements. Change image intensity. Contrast and brightness. Automatic control of image brightness. Auto Contrast.</li><li>•Ribs and contours. Filter qualities. Rib operations. Prewitt i Sobel, Roberts, Compass Actions. In the picture there are actions with ribs. Cannes proceedings.</li><li>•Binary image fields. Determining image boundaries. External and internal contours. Contouring of defined boundaries.</li><li>•Working with image colors. Organize color images. Color images in ImageJ. Change color space and colors. Change to gray gloss. Decolorize color images.</li><li>• Introduction to Spectral Technology. Fourier transforms. Sine and cosine functions. Fourier series for periodic functions. Fourier integral. Fourier spectrum and modifications. Important properties of Fourier transformations</li></ul>				
Literature:	<p>1. Шлыков Василий Анатольевич - Звуковой образ в современных музыкальных фонограммах 2010г.</p> <p>2. Ш.Т.Касимова, Ш.Чуллиев, Б.Боймуродов. Методическое пособие по выполнению лабораторных работ по предмету «Обработка звука и изображений» Ташкент 2021. 3. А.Д. Бунькова, С.Н. Мещеряков “Студийная звукозаписи и основы звукорежиссуры” Екатеринбург – 2014. 4. Бекназарова С.С. Обработка видео// Учебное пособие. -Т.: “IMPRESS MEDIA”. 2023. - 288 с.</p>				



<b>6.5. Visual special effects in media products</b>																							
<i>Semestr:</i>	7																						
<i>Date of last modification:</i>	31.08.2023																						
<i>Teachers:</i>	Modullayev Jahongir Sobir ugli																						
<i>Component:</i>	Compulsory																						
<i>Cycle:</i>	Core																						
<i>ECTS:</i>	6																						
<i>Pre-requisities</i>	Programming II, Computer graphics																						
<i>Workload:</i>	<table> <tr> <th colspan="2">Types of classes</th><th>Hours</th></tr> <tr> <td>Total</td><td></td><td>180</td></tr> <tr> <td>Lecture</td><td></td><td>42</td></tr> <tr> <td>Practical works</td><td></td><td>30</td></tr> <tr> <td>SAW (Student autonomous work)</td><td></td><td>108</td></tr> <tr> <td>Form of final control</td><td></td><td>Exam</td></tr> <tr> <td>Final assessment method</td><td></td><td>Testing</td></tr> </table>	Types of classes		Hours	Total		180	Lecture		42	Practical works		30	SAW (Student autonomous work)		108	Form of final control		Exam	Final assessment method		Testing	
Types of classes		Hours																					
Total		180																					
Lecture		42																					
Practical works		30																					
SAW (Student autonomous work)		108																					
Form of final control		Exam																					
Final assessment method		Testing																					
<i>Control forms:</i>	Midterm control, Exam																						
<i>Assessment requirements</i>	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control																						
<i>Final control</i>	The final exam is taken in the form of a test, which contains 25 questions, worth 2 points each, tests are divided into 3 levels of difficulty. Total exam time 60 minutes																						
<i>Short content:</i>	The science of visual special effects in media products consists in introducing students to the visualization of objects and effects that appear in natural phenomena and human thinking, their importance in creating audio and video products, and practical software tools designed for the production of special effects.																						
<i>Goal:</i>	The task of the subject is to teach students to acquire and apply experience in special effects sufficient to solve theoretical and practical issues of the development of the film and advertising industry, as well as to create, edit and analyze special effects using additional plug-ins.																						
<i>Objective:</i>	Acquired knowledge, experience and skills in the study of general engineering and special technical sciences and the ability to apply them to future activities.																						
<i>Learning outcome:</i>	<p>After studying the discipline, students should be able to:</p> <p>LO 1. Gaining skills in managing digital audio video editing process.</p> <p>LO 2. To acquire the skills of using special effects in the process of editing digital audio and video information.</p> <p>LO 3. Gaining practical skills in audio-video and interactive content processing.</p> <p>LO 4. Know how to apply special effects to audio and video data.</p> <p>LO 5. To color, to know how to combine font, photography, art graphics to create polygraphic products and to be able to use them.</p> <p>LO 6. You will have the skills to choose the right method of a large number of special effects technologies.</p>																						
<i>Teaching methods:</i>	<p>In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized:</p> <ul style="list-style-type: none"> <li>- technology of problem- and project-based learning;</li> <li>- technologies of educational and research activities;</li> <li>- communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods);</li> <li>- case-study method (analysis of situations);</li> <li>- game technologies, in which students participate in business, role-playing, simulation games;</li> <li>- information and communication (including distance learning) technologies.</li> </ul> <p>In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.</p>																						

Assessment of the student's knowledge:	Type of task		Number of points (max)		Total
	Current control	Practical works (1–10)	25	40	
		Independent work	7		
		Oral presentation	8		
	Mid-term control	Written work	10		
Final control	Exam (Testing)	50			
Topics of lectures:	<ul style="list-style-type: none"> <li>• Subject and tasks of "Special effects" science. The role of special effects in computer graphics and in the development of society.</li> <li>• Basic concepts of digital video. Basic concepts of digital audio and video. Main directions of audio and video information processing.</li> <li>• Modern multimedia technologies in creating special effects. Their types and their place.</li> <li>• Issues of optimization and configuration of the working environment in practical graphic software packages. Optimizing and configuring the working environment in Adobe After Effects. Basic methods of working with the environment. Set the main frame of the composition.</li> <li>• In practical graphic software packages (composition). Timeline Palette. TimeControls Palette. Composition Palette (composition) in Adobe After Effects. Timeline Palette. Time Controls Palette.</li> <li>• Working with layers and their characteristics. Basic information about layers in Adobe After Effects. Browse through the Layers palette. Timescale and Layer. Display numerical parameters of editing.</li> <li>• Key personnel interpolation. Key Staff Interpolation in Adobe After Effects. View more information in GraphEdit.</li> <li>• Working with masks. Comparison of methods of organizing masks in Adobe After Effects. Change the shape of the mask. Isolation of anchor points and space.</li> <li>• Using the palette of effects in practical graphics software packages. Using the effects palette &amp; Presets in Adobe After Effects (Effects and presets).</li> <li>• Working with expressions in practical graphic software packages. Organizing expressions in Adobe After Effects. Organization and use of expressions. Organization of personal expressions. Use the Expression Language menu.</li> <li>• Use of personalization in practical graphic software packages. Types of adding layer properties. Brightness enhancement modes. Using personalization in Adobe After Effects. Types of adding layer properties. Brightness enhancement modes.</li> <li>• Color manipulation in practical graphics software packages. Color Manipulation in Adobe After Effects, Mattes for the Lazy (and Diligent) Procedures. Linear Keers and Hi-Con Mattes, Color Keying: Greenscreen</li> <li>• Special effects in audio montage. Computer programs in audio editing.</li> <li>• Adobe Audition software and its interface. Working in Adobe Audition</li> <li>• Adobe Audition software to use special effects. Rendering in Adobe Audition</li> </ul>				
Literature:	<p>Literature 1.Порев В. Компьютерная графика. Учебное пособие. – СПб.: БХВ-Петербург, 2004. – 432 с. ИСБН: 5-94157-139-9</p> <p>2. Медведев Г.С., Пташинский В.С. Адобе Афтер Эффестс СС3 с нуля. Видеомонтаж, аниматсия, спесефффекты. – М.: Триумф, 2008. – 272 с.</p> <p>3. Mark Christiansen. Adobe After Effects CS5 Visual Effects and Compositing Studio Techniques. – Adobe, 2010. – 568 p.</p> <p>4. Adobe After Effects 7.0. Спесефффекты и создание видеокомползитсий / Энтони Боланте. – М.: Триумф, 2007. - 832 с</p>				



6.6. Image processing		
Semestr:	5	
Date of last modification:	31.08.2023	
Teachers:	Mirzayev Namoz	
Component:	Compulsory	
Cycle:	Core	
ECTS:	6	
Pre-requisities	Computer graphics	
Workload:	<b>Types of classes</b>	
	<b>Hours</b>	
	Total	180
	Lecture	42
	Practical works	30
	SAW (Student autonomous work)	108
	Form of final control	Exam
Final assessment method	Testing	
Control forms:	Midterm control, Exam	
Assessment requirements	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
Final control	The final exam is taken in the form of a test, which contains 25 questions, worth 2 points each, tests are divided into 3 levels of difficulty. Total exam time 60 minutes	
Short content:	This module covers the fundamentals of signal processing and perception: investigating how sounds, images and videos can be processed and analysed alongside the fundamentals of how the human auditory and visual perception system functions (e.g., how your eyes and ears work with your brain). Concepts such as data encoding and compression are provided with practical application of understanding signals in terms of their frequency components, relating to their time and spatial components (e.g., audio frequency components or the spatial frequency of an image).	
Goal:	The purpose of the subject is to form in students general concepts of digital processing of audio signals and images, digital signal models, distortions, processing of audio signals in the time and frequency domains, filtering, coding, digitalization methods, compression, segmentation, calculation of characteristic features, recognition, formation of information on the practical application of methods and algorithms for digital processing of audio signals and images.	
Objective:	-Knowledge of technologies and processes of digital processing of audio and video; -Knowledge of processes and methods of digital processing of images and sound; -Ability to analyze the current state of IT applications; -Ability to analyze the main models used in voice and image recognition.	
Learning outcome:	On successful completion of this module, the student should: -Be familiar with various signal processing concepts, such as frequency analysis using Fourier Transforms; -Have gained experience in programmatically processing signals (including both signals and images); -Have gained an understanding of how humans perceive signals and how this affects the computational signal processing we perform; -Understand the issues that arise when designing and building signal processing pipelines.	
Teaching methods:	In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized: - technology of problem- and project-based learning; - technologies of educational and research activities; - communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods); - case-study method (analysis of situations);	

	<p>- game technologies, in which students participate in business, role-playing, simulation games;</p> <p>- information and communication (including distance learning) technologies.</p> <p>In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.</p>				
<i>Assessment of the student's knowledge:</i>	<b>Type of task</b>		<b>Number of points (max)</b>		<b>Total</b>
	Current control	Practical works (1–10)	25	40	
		Independent work	7		
		Oral presentation	8		
	Mid-term control	Written work	10		
	Final control	Exam (Testing)	50		
<i>Topics of lectures:</i>	<ul style="list-style-type: none"><li>• Introduction. The concept of information processing. The main directions of development of modern information processing technologies.</li><li>• Fundamentals of sound processing. Sound theory. Digitalization. Discretization. The concept of noise. Jitter. Loudness. The concept of digital sound processing.</li><li>• Systems, selection and quantization. Principles of digital sound. Continuous-time systems. Theorem of choice. Spectral representations of discrete time. Discrete-time systems. Transition from a continuous-time system to a discrete-time system. Quantization.</li><li>• Delays and consequences. Audio and video delays and their causes. Linear and nonlinear delays of sound effects.</li><li>• Digital filters. Audio and image filters. MP3 audio filters, JPEG image filters and additional filter packages .</li><li>• Sound analysis. Sound modeling. Short-time Fourier transform. Linear coding. Spectral modeling. Time models. Nonlinear models. Physical models.</li><li>• Audio players in Windows operating system.</li><li>• Rearrange sound in Mac OS. MacPlayer software.</li><li>• Sound compression methods.</li><li>• Compression and decompression.</li><li>• File types for storing audio signals. AU, VOC, FIFF and FIFF-C file formats. Music file formats. Working with WAVE files.</li><li>• Determining static properties of images.</li><li>• Organizing image pixels based on pixel transformation.</li><li>• Spatial filtering of images.</li><li>• Boolean transform – logical operations as morphological operations.</li><li>• Fourier transform. Frequency representation of one- and two-dimensional digital signals.</li><li>• Filtering images in the frequency domain.</li></ul>				
<i>Literature:</i>	<p>1. Burger V., Burge M.J. Digital Image Processing: An Algorithmic Introduction Using Java. - New York: Springer, 2007. -564 p. 2. Digital Image Processing. Signal Processing and an Algorithmic Approach [Text]: monograph / D. Sundararajan. - New York: Springer, 2017. - 468 p. 3. R. Gonzalez., R. Woods., S. Eddins. Digital processing is carried out graphically in the MATLAB environment. 4. Sh. T. Kasimova, Sh. Chulliev, B. Boymurodov. Methodical methodology of laboratory work on the subject "Sound and Image Processing" Tashkent 2021. 5. Sh. T. Kasimova, B. Boymurodov, Sh. Chulliev. Methodical manual for performing laboratory work in the specialty "Sound and Image Processing" Tashkent 2021. 6. Beknazarova S.S. Video processing// Study guide.-T.: "IMPRESS MEDIA". 2023. - 288 p. Mukhamadiev A.Sh. Video processing. Methodological manual. "IMPRESS MEDIA". 2023. - 204 p.</p>				

6.7. Embedded management systems		
Semestr:	6	
Date of last modification:	31.08.2023	
Teachers:	Abaskhanova Halima Yunusovna	
Component:	Compulsory	
Cycle:	Core	
ECTS:	6	
Pre-requisities	Electronics and circuits I, Electronics and circuits II	
Workload:	Types of classes	Hours
	Total	180
	Lecture	42
	Practical works	30
	SAW (Student autonomous work)	108
	Form of final control	Exam
	Final assessment method	Testing
Control forms:	Current control, Mid-term control, Final control	
Assessment requirements	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
Final control	The final exam is taken in the form of a test, which contains 25 questions, worth 2 points each, tests are divided into 3 levels of difficulty. Total exam time 60 minutes	
Short content:	This course provides the necessary foundation for learning about embedded management systems, creating embedded management systems using high-level programming languages, and testing them based on hardware.	
Goal:	The purpose of mastering the discipline is to give students systematized theoretical knowledge and practical skills in embedded management systems.	
Objective:	-embedded management systems and their structure; -operating systems of modern embedded systems; -organization of microcontrollers; -parallel information processing tools; -hardware means of direct access to memory; -the principle of designing and operating software tools of the embedded system; -methods of information exchange; -creating programs in a high-performance programming language and configuring them in hardware support, -implementation and organization of the principles of information exchange in them, organization of means of connecting system devices with the control object.	
Learning outcome:	After studying the discipline, students should be able to: LO 1. Gains an understanding of control systems and embedded control systems. LO 2. Gain knowledge of hardware and software of real-time embedded systems. LO 3. Acquire practical skills in solving problems in the design of embedded systems and hardware design. LO 4. Digital devices can choose ways to create and configure software for workflows. LO 5. Knows the tools for creating software for automatic control of technological processes and their configuration and organization.	
Teaching methods:	In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized: - technology of problem- and project-based learning; - technologies of educational and research activities; - communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods); - case-study method (analysis of situations); - game technologies, in which students participate in business, role-playing, simulation games; - information and communication (including distance learning) technologies. In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned",	

	"INSERT", hands-on activities, gamification and others are actively used during practical classes.				
Assessment of the student's knowledge:	Type of task		Number of points (max)		Total
			30	40	
	Independent work	10			
	Mid-term control	Written work	10		100
	Final control	Exam (Testing)	50		
Topics of lectures:	<ul style="list-style-type: none"><li>• Introduction to the science of embedded control systems and their software.</li><li>• Embedded management systems, their classification and main features.</li><li>• Main features of embedded control systems: real-time mechanisms in embedded systems.</li><li>• Structural principles of modern embedded systems. The main components are hardware and software.</li><li>• Structural principles of hardware support of embedded management systems.</li><li>• Structural principles of hardware support of embedded management systems.</li><li>• Structural principles of hardware support of embedded management systems.</li><li>• Hardware design tools for embedded management systems and their capabilities.</li><li>• Analysis of modeling issues of control systems to be embedded.</li><li>• Software design of embedded control systems: organization of system and application software.</li><li>• Software of embedded management systems. Embedded operating systems.</li><li>• Instrumental tools for designing embedded management systems software.</li><li>• Principles of hardware and software testing of embedded control systems.</li><li>• Fields of application of embedded management systems. IoT principles and and IT/OT convergence. Principles of standardization of IoT.</li><li>• Principles of IoT organization: WSN, SCADA, RFID, M2M.</li></ul>				
Literature:	1. Abaskhanova H.Y., Amirsaidov U.B. Microprocessors. Study guide for higher educational institutions. "Science and technologies". Tashkent - 2017. - 272 p. 2. Abaskhanova H.Y., Mirzaeva M.B., Parsiev S.S Microprocessor. Study guide for higher educational institutions. "Hihol Print". Tashkent - 2021. -200 p. 3. Abaskhanova H.Y., Baltayev J.,B., Yaronova N.V. Microprocessor devices of radio communication, a textbook for higher educational institutions. "IMPRESS MEDIA". Tashkent - 2023. - 347 p.				

<b>6.8. Photography</b>		
<i>Semestr:</i>	4	
<i>Date of last modification:</i>	31.08.2023	
<i>Teachers:</i>	Ismailov Kamolitdin	
<i>Component:</i>	Elective	
<i>Cycle:</i>	Core	
<i>ECTS:</i>	6	
<i>Pre-requisities</i>	Image processing	
<i>Workload:</i>	<b>Types of classes</b>	<b>Hours</b>
	Total	180
	Lecture	42
	Practical works	30
	Self study	78
	Form of final control	Exam
	Final assessment method	Writing
<i>Control forms:</i>	Current control, Mid-term control, Final control	
<i>Assessment requirements</i>	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
<i>Final control</i>	The final exam is written in the form of 5 questions of 10 marks each, the questions consist of 2 parts: 3 theoretical questions and 2 practical questions. Total exam time is 80 minutes	
<i>Short content:</i>	Photography is the art and science of capturing light to create images, whether on film or digitally. It involves understanding composition, lighting, and technical aspects like exposure, shutter speed, and aperture. Photography serves various purposes, from documenting moments and telling stories to creating artistic expressions and commercial content. It also plays a critical role in fields like journalism, advertising, and social media. Studying photography helps one develop both creative and technical skills, enabling the creation of compelling visual narratives.	
<i>Goal:</i>	The theoretical provisions of the “Photography” course consist of two thematic sections that examine the basic concepts of using technology techniques and the rules for choosing composition and lighting that are necessary to create impressive photographs.	
<i>Objective:</i>	The two thematic sections of the course include: 1. Basic elements of digital photography 2. Creativity in Digital Photography.	
<i>Learning outcome:</i>	After studying the discipline, students should be able to: LO 1. Independently transform theoretical knowledge into a method of professional creativity LO 2. Competently use techniques and rules for choosing composition and lighting LO 3. Learn how to take impressive photos; LO 4. Learn to find and see areas and objects to photograph in the surrounding world; LO 5. Based on the knowledge gained, do and analyze your own photographs; LO 6. Competently construct plot compositions.	
<i>Teaching methods:</i>	In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized: - communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods); - game technologies, in which students participate in business, role-playing, simulation games; - information and communication (including distance learning) technologies.	

	In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.				
Assessment of the student's knowledge:	Type of task		Number of points (max)		Total
	Current control	Practical works (1-10)	24	40	100
		Independent work	6		
		Oral presentation	10		
	Mid-term control	Written work	10		
	Final control	Exam (Written)	50		
Topics of lectures:	<ul style="list-style-type: none"><li>- History and development of photography</li><li>- Introduction to basic concepts in photography</li><li>- Working with digital technologies</li><li>- Lenses used in digital photography</li><li>- Test lenses</li><li>- Digital exposure control</li><li>- Light in photography</li><li>- Filters used in photography</li><li>- Photo histogram</li><li>- Contents of graphic capabilities and technical means of materials</li><li>- Photographic explication</li><li>- Angle. Shooting point</li><li>- Composition in photography</li><li>- Portrait compositions</li><li>- Still life genre</li><li>- Landscape genre in photography</li><li>- Architecture - concept of interior and exterior</li><li>- The uniqueness of sports photography</li><li>- Thematic photography and photo report shooting</li><li>- Capture moving objects</li><li>- creative photography</li><li>- The genre of mobilography in photography</li></ul>				
Literature:	Mironov D.A. Great encyclopedia of digital photography / Dmitry Mironov. – M.: Eksmo , 2012. – 328 p.: ill. ISBN 978-5-699-54901-6 Michael Freeman. The Tao of Digital Photography. Ed. Good book, 2013, p.192 Claire Rosen. Imaginarium, or What's Behind the Scenes / Claire Rosen. - M.: Mann, Ivanov and Ferber, 2018. - 264 p. Bruce Werbaum . The essence of photography. The ability to see and create. Peter, 2016, p.176				

<b>6.9. Audio recording and editing</b>		
<i>Semestr:</i>	4	
<i>Teachers:</i>	Boymurodov Bobir Elmurodovich	
<i>Component:</i>	Elective	
<i>Cycle:</i>	Core	
<i>Credit point:</i>	6	
<i>Pre-requisities</i>	Theoretical fundamentals of acoustics	
<i>Workload:</i>	<b>Types of classes</b>	<b>Hours</b>
	Total	180
	Lecture	42
	Practical works	30
	SAW (Student autonomous work)	108
	Form of final control	Exam
	Final assessment method	Writing
<i>Control forms:</i>	Current control, Mid-term control, Final control	
<i>Assessment requirements</i>	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
<i>Final control</i>	The final exam is written in the form of 5 questions of 10 marks each, the questions consist of 2 parts: 3 theoretical questions and 2 practical questions. Total exam time is 80 minutes	
<i>Short content:</i>	"Processing of sound and images" provides students with general concepts of digital processing of sound signals and images, digital models of signals, distortion, processing of sound signals in the time and frequency domains, filtering, coding, digitization methods, compression, segmentation, characteristic count the marks.	
<i>Goal:</i>	The purpose of teaching the subject is to teach the students of "Sound and Image Processing" the general things about giving sounds to signals and images, energy models of signals, collection, restoration, filtering, coding, digitization of sound signals in the time and frequency domains, compression, production generation, segmentation of characteristic images, recognition, practical application of methods and algorithms to sound signals and their physical loading. is to teach and monitor the skills and competencies of acquired knowledge.	
<i>Objective:</i>	- Knowledge of the basics of computer graphics, physics.	
<i>Learning outcome:</i>	<p>After studying the discipline, students should be able to:</p> <p>LO 1. Basic programming knowledge and skills;</p> <p>LO 2. learn the most important requirements for creating audio design;</p> <p>LO 3. know and be able to use audio and video recording and processing technology when working with audio and video production.</p> <p>LO 4. Knowing the distribution of light and the placement of lighting devices in the shooting areas;</p> <p>LO 5. The ability to choose a location for filming various types of television and video productions;</p> <p>LO 6. able to perform practical work with professional sound recording and reproduction equipment;</p> <p>LO 7. being able to use microphones to create soundtracks in film and television;</p> <p>LO 8. distinguish between the necessary cameras and formats for recording and processing video data.</p>	

Teaching methods:	<p>In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized:</p> <ul style="list-style-type: none"><li>- technology of problem- and project-based learning;</li><li>- technologies of educational and research activities;</li><li>- communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods);</li><li>- case-study method (analysis of situations);</li><li>- game technologies, in which students participate in business, role-playing, simulation games;</li><li>- information and communication (including distance learning) technologies.</li></ul> <p>In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.</p>																										
Assessment of the student's knowledge:	<table><tr><th colspan="2">Type of task</th><th colspan="2">Number of points (max)</th><th>Total</th></tr><tr><td rowspan="3">Current control</td><td>Practical works (1–10)</td><td>25</td><td rowspan="3">40</td><td rowspan="5">100</td></tr><tr><td>Independent work</td><td>7</td></tr><tr><td>Oral presentation</td><td>8</td></tr><tr><td>Mid-term control</td><td>Written work</td><td colspan="2">10</td></tr><tr><td>Final control</td><td>Exam (Written)</td><td colspan="2">50</td></tr></table>					Type of task		Number of points (max)		Total	Current control	Practical works (1–10)	25	40	100	Independent work	7	Oral presentation	8	Mid-term control	Written work	10		Final control	Exam (Written)	50	
Type of task		Number of points (max)		Total																							
Current control	Practical works (1–10)	25	40	100																							
	Independent work	7																									
	Oral presentation	8																									
Mid-term control	Written work	10																									
Final control	Exam (Written)	50																									
Topics of lectures:	<ul style="list-style-type: none"><li>- Enter. The concept of information processing. The main directions of development of modern information processing technologies. Orientation of information processing technology to text, sound and image. Basic functions of digital processing of sound and images..</li><li>- Basics of sound processing. Sound theory. Digitization. Discretization. The concept of noise. Jitter. Loudness. Concept of digital sound processing. Modern television studios. Modern television studios equipped on the basis of foreign experience.</li><li>- Systems, selection and quantization. Principles of digital audio rendering. Continuous time systems. Choice theorem. Discrete-time spectral representations. Discrete-time systems. Transfer from a continuous-time system to a discrete-time system. Quantization.</li><li>- Delays and effects. Delays in audio and video and their causes. Linear and non-linear sound effect delays.</li><li>- Digital filters. Sound and image filters. MP3-audio, JPEG-image filters and additional filter packs.</li><li>- Sound analysis. Sound modeling. Short-time Fourier transform. Linear coding. Spectral modeling. Time models. Non-linear models. physical models.</li><li>- Sound analysis. Sound modeling. Short-time Fourier transform. Linear coding. Spectral modeling. Time models. Non-linear models. physical models.</li><li>- Sound recording and processing devices. Microphones (Line, Shure, Behringer), mixers and amplifiers (Yamaha, Samsung, Sony).</li><li>- Sound recording and processing devices. Microphones (Line, Shure, Behringer), mixers and amplifiers (Yamaha, Samsung, Sony).</li><li>- Digital images. Types of digital images. Transition to digital technologies. Graphics file sizes. Raster and vector graphics and their formats. TIFF, GIF, PNG, JPEG, BMP, PBM.</li></ul>																										
Literature:	<p>Literature 1 Burger W., Burge M. J. Digital Image Processing: An Algorithmic Introduction using Java. –New York: Springer, 2007. –564 p. Ш.Т.Касимова, Ш.Чуллйев, Б.Боймуродов. Методическое пособие по выполнению лабораторных работ по предмету «Обработка звука и изображений» Ташкент 2021. Sh.T.Kasimova, B.Boymurodov, Sh.Chulliev. “Ovoz va tasvirni qayta ishlash” fanidan laboratoriya ishlarini bajarish bo'yicha uslubiy qo'llanma Toshkent 2021. Бекназарова С.С. Обработка видео// Учебное пособие.-Т.: “IMPRESS MEDIA”. 2023. - 288 с.</p>																										



<b>6.10 Computer graphics packages</b>		
<i>Semestr:</i>	5	
<i>Date of last modification:</i>	31.08.2023	
<i>Teachers:</i>	Modullayev Jahongir	
<i>Component:</i>	Elective	
<i>Cycle:</i>	Core	
<i>ECTS:</i>	6	
<i>Pre-requisites</i>	Computer graphics	
<i>Workload:</i>	<b>Types of classes</b>	<b>Hours</b>
	Total	180
	Lecture	42
	Practical works	30
	Self study	78
	Form of final control	Exam
	Final assessment method	Writing
<i>Control forms:</i>	Current control, Mid-term control, Final control	
<i>Assessment requirements</i>	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
<i>Final control</i>	The final exam is taken in the form of a test, which contains 25 questions, worth 2 points each, tests are divided into 3 levels of difficulty. Total exam time 60 minutes	
<i>Short content:</i>	At present, one of the most important areas of the information technology field is the study of web technologies and its software tools, and the attention to their active use in practice is increasing more and more. Moreover, this direction is reaching its level of perfection over time. In recent years, in the process of creating information systems based on web technologies, special attention has been paid to their design.	
<i>Goal:</i>	Issues such as creating information systems that are being created in every way convenient for users, enriching them with a design adapted to the field are considered urgent.	
<i>Objective:</i>	The purpose of teaching the science of computer graphics packages is to teach the manipulation of visual and geometric data. It is not purely aesthetic issues, but corrections to the mathematical and fundamentals of image processing.	
<i>Learning outcome:</i>	<p>After studying the discipline, students should be able to:</p> <p>LO 1. Knowledge of the concept of computer graphics packages and its essence.</p> <p>LO 2. To acquire skills about modern software tools of computer graphics packages.</p> <p>LO 3. Knowledge of computer graphics and the history of its origin.</p> <p>LO 4. To acquire skills about the current importance and specific aspects of computer graphics packages.</p> <p>LO 5. Know how to design 2D images based on graphic packages, how to model graphic data.</p> <p>LO 6. Use of 2D graphic programs, design of graphic data, processing of graphic products using vector graphics programs and ability to apply to future activities.</p>	
<i>Teaching methods:</i>	<p>In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized:</p> <ul style="list-style-type: none"> <li>- technology of problem- and project-based learning;</li> <li>- technologies of educational and research activities;</li> <li>- communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods);</li> <li>- case-study method (analysis of situations);</li> </ul>	

	<div>- game technologies, in which students participate in business, role-playing, simulation games;</div> <div>- information and communication (including distance learning) technologies.</div> <div>In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.</div>				
<i>Assessment of the student's knowledge:</i>	<b>Type of task</b>		<b>Number of points (max)</b>		<b>Total</b>
	Current control	Practical works (1-15)	10	30	
		Laboratory work(1-15)	10		
		Independent work	5		
		Oral presentation	5		
	Mid-term control	Written work	20		
	Final control	Exam (Written)	50		
<i>Topics of lectures:</i>	<div>- An introduction to computer graphics packages.</div> <div>- Computer graphics packages. Basic terms and concepts.</div> <div>- Fields of application of computer graphics packages.</div> <div>- Tools used in the work process and their types.</div> <div>- Coordinate system and transformation types of graphic data.</div> <div>- Color models.</div> <div>- Raster graphics.</div> <div>- Vector graphics.</div> <div>- Fractal graphics.</div> <div>- Three-dimensional graphics.</div> <div>- Popular computer graphics packages.</div> <div>- Working with texts, pagination.</div> <div>- Creating and using effects.</div> <div>- Giving volume to a given geometric shape.</div> <div>- Presentation of the project.</div>				
<i>Literature:</i>	<div>Literature 1.Т.И. Немцова, Т.В. Казанкова, А.В.Шнякин, Компьютерная графика и web дизайн, Москва, ИД “ФОРУМ” – ИНФРА-М 2018</div> <div>Literature 2.А.Nazirov, F.M.Nuraliyev,. B.Z.To'rayev. Kompyuter grafikasi.. Toshkent, 2015. Literature 3.Евсеев Д.А., Трофимов В.В. Web-дизайн в примерах и задачах. Москва, 2009.</div> <div>Literature 4.Фролов И.К., Перелыгин В.А., Самойлов Е.Э. Разработка, дизайн, программирование и раскрутка web-сайта. Москва, 2009. Literature 5. Акша Р. Создание эффективной рекламы, Практическое руководство по креативной деятельности.- М.: Вершина, 2003.-272с.</div>				

<b>6.11. Film visualization</b>		
<i>Semestr:</i>	5	
<i>Date of last modification:</i>	31.08.2023	
<i>Teachers:</i>	Yusupova Natalya Yuryevna	
<i>Component:</i>	Elective	
<i>Cycle:</i>	Core	
<i>ECTS:</i>	6	
<i>Pre-requisites</i>	Visual special effects in media products, 3d modeling and visualization	
<i>Workload:</i>	<b>Types of classes</b>	<b>Hours</b>
	Total	180
	Lecture	42
	Practical works	30
	SAW (Student autonomous work)	108
	Form of final control	Exam
	Final assessment method	Writing
<i>Control forms:</i>	Current control, Mid-term control, Final control	
<i>Assessment requirements</i>	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
<i>Final control</i>	The final exam is written in the form of 5 questions of 10 marks each, the questions consist of 2 parts: 3 theoretical questions and 2 practical questions. Total exam time is 80 minutes	
<i>Short content:</i>	The course is designed for a complete and comprehensive understanding of the history of the emergence of the concept of "visualization". The student will master the concept of film visualization from its origins to the latest methods and systems. Independent understanding and influence on the visual picture of the world of cinema.	
<i>Goal:</i>	The goal of mastering the discipline is to give students systematized theoretical knowledge and practical skills in working with text, camera, social resource, information media space.	
<i>Objective:</i>	<ul style="list-style-type: none"> <li>-Understanding the term and practical significance of visualization</li> <li>-Assimilation of historical knowledge about the consequences of media, television, radio, and the Internet;</li> <li>-Ability to work in the media space;</li> <li>- Optimization in the information field.</li> </ul>	
<i>Learning outcome:</i>	<p>After studying the discipline, students should be able to:</p> <p>LO 1. Understand how the media world works</p> <p>LO 2. Understand the process of creating material on Television, radio, and printed materials.</p> <p>LO 3. Have the skills to independently create media content.</p> <p>LO 4. Be able to defend your rights and obligations in the legal media space.</p> <p>LO 5. Be media literate.</p> <p>LO 6. Configure equipment independently for the filming process.</p>	
<i>Teaching methods:</i>	<p>In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized:</p> <ul style="list-style-type: none"> <li>- technology of problem- and project-based learning;</li> <li>- technologies of educational and research activities;</li> <li>- communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods);</li> <li>- case-study method (analysis of situations);</li> </ul>	

	<ul style="list-style-type: none"><li>- game technologies, in which students participate in business, role-playing, simulation games;</li><li>- information and communication (including distance learning) technologies.</li></ul> <p>In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.</p>				
<i>Assessment of the student's knowledge:</i>	<b>Type of task</b>		<b>Number of points (max)</b>		<b>Total</b>
	Current control	Practical works (1-10)	10	40	
		Independent work	10		
		Oral presentation	20		
	Mid-term control	Written work	10		100
	Final control	Exam (Written work)	50		
<i>Topics of lectures:</i>	<ul style="list-style-type: none"><li>- their study of the theory and practice of film production</li><li>- visualization and historical aspects</li><li>- the emergence of the moving image</li><li>- audio visualization as a science</li><li>- classical and audiovisual arts</li><li>- visualization technology</li><li>- international experience and globalization of film production</li><li>- the latest and innovative methods of visualization in cinema</li><li>- new history of film production</li><li>- new names and methods. Traditions and innovations of film production</li></ul>				
<i>Literature:</i>	Literature 1. Glaser M. Collaborative Conundrum: Do Wilds Have a Place in the Newsroom/Online Journalism Review.2024:2. Understanding media: human extensions. Marshall McLuhan. 2022; 3.Collaborative Citizen Journalism. SearchSOA.com. <a href="http://searchsoa.tech-target.com/definition/collaborative-citizen-journalism2024">http://searchsoa.tech-target.com/definition/collaborative-citizen-journalism2024</a> . 4..Owsinski, Bobby. The Mixing engineer's Handbook 5th edition. 2022.-398p ISBN:13:978-1-943837-12-7				

<b>6.12. Digital video cameras</b>		
<i>Semestr:</i>	6	
<i>Date of last modification:</i>	31.08.2023	
<i>Teachers:</i>	Saidov Farrukh	
<i>Component:</i>	Elective	
<i>Cycle:</i>	Core	
<i>ECTS:</i>	6	
<i>Pre-requisites</i>	Image processing	
<i>Workload:</i>	<b>Types of classes</b>	<b>Hours</b>
	Total	180
	Lecture	42
	Practical works	30
	Self study	78
	Form of final control	Exam
	Final assessment method	Writing
<i>Control forms:</i>	Current control, Mid-term control, Final control	
<i>Assessment requirements</i>	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
<i>Final control</i>	The final exam is written in the form of 5 questions of 10 marks each, the questions consist of 2 parts: 3 theoretical questions and 2 practical questions. Total exam time is 80 minutes	
<i>Short content:</i>	Digital Camera Seminar will help students form an understanding of the profession of a cinematographer, the techniques and methods of creating an aesthetic, expressive image on the screen, and the interaction between the director and cameraman when creating the audio of a visual work.	
<i>Goal:</i>	The primary goal of studying digital video cameras is to understand their technological components, functionalities, and applications in various fields. This includes learning about the mechanics, electronics, optics, software, and user-interface design that enable video capture, processing, and distribution. The study also aims to explore the impact of digital video technology on media, communication, and content creation.	
<i>Objective:</i>	- Editing and Post-Production: Gain proficiency in video editing software (e.g., Adobe Premiere Pro, Final Cut Pro) to manipulate video footage for various purposes. -Color Grading: Study techniques for color correction and grading to enhance visual aesthetics. -Special Effects: Understand the integration of visual effects (VFX) in digital video production.	
<i>Learning outcome:</i>	After studying the discipline, students should be able to: LO1.Independent application of digital video recording methods; LO2.Familiarization with the features of a special visualization process; LO3.Study of light and color dramaturgy of the image. LO4.Learning to shoot with a moving camera; LO5.Can work with long and short focal length lenses using a moving camera; LO6.Knows and knows how to apply lighting techniques and their capabilities in artistic, documentary and scientific photography.	

Teaching methods:	In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized: - technology of problem- and project-based learning; - technologies of educational and research activities; - communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods); - case-study method (analysis of situations); - game technologies, in which students participate in business, role-playing, simulation games; - information and communication (including distance learning) technologies. In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.																										
Assessment of the student's knowledge:	<table><tr><th colspan="2">Type of task</th><th colspan="2">Number of points (max)</th><th>Total</th></tr><tr><td rowspan="3">Current control</td><td>Practical works (1-10)</td><td>24</td><td rowspan="3">40</td><td rowspan="5">100</td></tr><tr><td>Independent work</td><td>6</td></tr><tr><td>Oral presentation</td><td>10</td></tr><tr><td>Mid-term control</td><td>Written work</td><td colspan="2">10</td></tr><tr><td>Final control</td><td>Exam (Written)</td><td colspan="2">50</td></tr></table>					Type of task		Number of points (max)		Total	Current control	Practical works (1-10)	24	40	100	Independent work	6	Oral presentation	10	Mid-term control	Written work	10		Final control	Exam (Written)	50	
Type of task		Number of points (max)		Total																							
Current control	Practical works (1-10)	24	40	100																							
	Independent work	6																									
	Oral presentation	10																									
Mid-term control	Written work	10																									
Final control	Exam (Written)	50																									
Topics of lectures:	<ul style="list-style-type: none"><li>- Video camera technology</li><li>- Pre-shoot checklist. Video technique for beginners. Video editing</li><li>- Video camera technology</li><li>- Basic operating techniques. Video Filming Basics: The Most Common Mistakes. How remove cinema: the best operators</li><li>- Visual language. From words to images.</li><li>- Interrelation and dominance of the main visual components</li><li>- . Visual language. What is the language of cinema?</li><li>- . Kinematic expansion</li><li>- DCP format is a modern necessity. SCOPE and FLAT formats. 2K and 4K in DCP</li><li>- Kinematic expansion</li><li>- How to choose an aspect ratio. What is the aspect ratio? Aspect ratio and mood. The aspect ratio determines the composition. Hidden objects. Format selection</li><li>- Light and light sources in cinema.</li><li>- Light as a component of video shooting. Lighting. Sources Sveta</li><li>- Light and light sources in cinema.</li><li>- Film lighting basics.</li><li>- TV formats SD, HD, Full HD, UHD TV</li><li>- Video resolution SD, HD, Full HD, UHD, 4k, 8k preview. Image quality SD SD format. HD format, HD image quality. Full HD format, HD quality.</li><li>- Digital film formats</li><li>- Video recording formats. Analog video formats. Digital video formats</li><li>- Virtual cameras</li><li>- How virtual cameras work. According to the laws of cinema. How modern engines have simplified working with cameras. Virtual production</li><li>- A virtual reality</li><li>- Virtual reality in cinema</li></ul>																										
Literature:	<ol style="list-style-type: none"><li>1. Mironov D.A. Great encyclopedia of digital photography / Dmitry Mironov. - M.: Eksmo, 2012. - 328s: ill. ISBN 978-5-699-54901-6</li><li>2. Kelby Scott. Digital Photography Book, Peachpit Press , SBN 13: 978-0-321-47404-9, ©2007, 2009.</li></ol>																										

<b>6.13. UX/UI design</b>		
<i>Semestr:</i>	6	
<i>Date of last modification:</i>	31.08.2023	
<i>Teachers:</i>	Modullayev Jahongir	
<i>Component:</i>	Elective	
<i>Cycle:</i>	Core	
<i>ECTS:</i>	6	
<i>Pre-requisities</i>	Computer graphics	
<i>Workload:</i>	<b>Types of classes</b>	<b>Hours</b>
	Total	180
	Lecture	42
	Practical works	30
	Self study	78
	Form of final control	Exam
	Final assessment method	Writing
<i>Control forms:</i>	Current control, Mid-term control, Final control	
<i>Assessment requirements</i>	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
<i>Final control</i>	The final exam is written in the form of 5 questions of 10 marks each, the questions consist of 2 parts: 3 theoretical questions and 2 practical questions. Total exam time is 80 minutes	
<i>Short content:</i>	The science of UI/UX design consists of introducing students to practical software tools designed for designing mobile and web designs and interfaces that appear in human thinking, their visual reflection, and development of ui/ux design.	
<i>Goal:</i>	The study of this course is based on the knowledge obtained in the study of "Computer Graphics", "Computer Graphics Packages", "Digital Media and TV Technologies".	
<i>Objective:</i>	The mission of the subject is to provide students with sufficient experience and application of UI/UX design to solve theoretical and practical issues of mobile and web design development, as well as to create, edit and analyze sketches and designs using additional plugins.	
<i>Learning outcome:</i>	<p>After studying the discipline, students should be able to:</p> <p>LO 1. Having theoretical and practical skills about UI/UX design.</p> <p>LO 2. Acquire practical skills in clarifying user research.</p> <p>LO 3. Ability to create a functional, interactive prototype.</p> <p>LO 4. Know the quality criteria of the user interface and be able to develop a prototype and use it.</p> <p>LO 5. Possess effective usability and user experience Written skills.</p> <p>LO 6. Proficiency in creating usability and user experience evaluation reports.</p>	
<i>Teaching methods:</i>	<p>In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized:</p> <ul style="list-style-type: none"> <li>- technology of problem- and project-based learning;</li> <li>- technologies of educational and research activities;</li> <li>- communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods);</li> <li>- case-study method (analysis of situations);</li> <li>- game technologies, in which students participate in business, role-playing, simulation games;</li> <li>- information and communication (including distance learning) technologies.</li> </ul>	

	In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.				
<i>Assessment of the student's knowledge:</i>	<b>Type of task</b>		<b>Number of points (max)</b>		<b>Total</b>
	Current control	Practical works (1-15)	10	30	
		Laboratory work(1-15)	10		
		Independent work	5		
		Oral presentation	5		
	Mid-term control	Written work	20		
	Final control	Exam (Written)	50		
<i>Topics of lectures:</i>	<ul style="list-style-type: none"><li>- The core concepts and subject areas of UI/UX design.</li><li>- A brief historical overview of interface design, interface conventions, approaches to screen-based UI</li><li>- The intersection of design, technology and business.</li><li>- Know the user. User research through interviews.</li><li>- Web ergonomics and use.</li><li>- User interface quality criteria.</li><li>- User interface quality criteria.</li><li>- Characteristics of human information perception.</li><li>- User Interface Design Process.</li><li>- User Interface Design Process.</li><li>- Prototype development.</li><li>- Visual culture of interface design.</li><li>- Usability and Written.</li><li>- Characteristics of developing interfaces for mobile devices.</li><li>- Characteristics of developing interfaces for mobile devices.</li></ul>				
<i>Literature:</i>	Literature 1. Lund, A. M. Measuring usability with the USE questionnaire / A. M. Lund // Usability Interface. – 2001. – № 8(2). – P. 3–6. 2. UX-дизайн. Идея – эскиз – воплощение / С. Гринберг [и др.]. – СПб.: Питер, 2014. – 272 с.: ил. 3. Леви, Жейми. UX-стратегия. Чего хотят пользователи и как им это дать/ Монография/Дж.Леви, 2017. – 304с. 4. Marcus, Aaron. HCI and User-Experience Design: Fast-Forward to the Past, Present, and Future [Text] : Монография/ A. Marcus, 2015. - 282 p.				



<b>6.14. Technologies for creating audio-video media products</b>		
<i>Semestr:</i>	7	
<i>Date of last modification:</i>	31.08.2023	
<i>Teachers:</i>	Tashmuxamedova Gulnora Xudayberdiyevna	
<i>Component:</i>	Elective	
<i>Cycle:</i>	Core	
<i>Credit point:</i>	6	
<i>Pre-requisites</i>	Audio data processing, Image processing	
<i>Workload:</i>	<b>Types of classes</b>	<b>Hours</b>
	Total	180
	Lecture	42
	Practical works	30
	SAW (Student autonomous work)	108
	Form of final control	Exam
	Final assessment method	Writing
<i>Control forms:</i>	Current control, Mid-term control, Final control	
<i>Assessment requirements</i>	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
<i>Final control</i>	The final exam is written in the form of 5 questions of 10 marks each, the questions consist of 2 parts: 3 theoretical questions and 2 practical questions. Total exam time is 80 minutes	
<i>Short content:</i>	The study of this course is based on the knowledge and skills acquired in the study of “Computer Graphics”, “Audio and Video Editing”, “Digital Media and TV Technologies”, “Sound and Image Processing”.	
<i>Goal:</i>	The purpose of mastering the discipline is to give students systematized theoretical knowledge and practical skills for independent production of audiovisual information using appropriate technical means	
<i>Objective:</i>	<p>- work with information: find, evaluate and use information from various sources necessary to solve professional problems recognize and take into account sociocultural differences between different audience groups in the process of preparing entertainment and information media products; navigate genres, formats, technological platforms for transmitting media products and the ability to select them in accordance with the needs of the audience; correctly operate instruments and devices used to measure photometric and colorimetric quantities when creating high-quality films, television shows and other media products ability to identify multimedia and interactive tools to achieve communication goals.</p>	
<i>Learning outcome:</i>	<p>After studying the discipline, students should be able to:</p> <p>LO 1. Understand the principles of the impact of audiovisual technologies on the human subconscious</p> <p>LO 2. Design the simplest forms of audiovisual solutions;</p> <p>LO 3. Independently produce audiovisual information using appropriate technical means;</p> <p>LO 4. Have basic understanding of information visualization, form and content visualization technology</p> <p>LO 5. work with information: find, evaluate and use information from various sources necessary to solve professional problems</p> <p>LO 6. recognize and take into account sociocultural differences between different audience groups in the process of preparing entertainment and information media products</p>	

Teaching methods:	In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized: - technology of problem- and project-based learning; - technologies of educational and research activities; - communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods); - case-study method (analysis of situations); - game technologies, in which students participate in business, role-playing, simulation games; - information and communication (including distance learning) technologies. In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.																										
Assessment of the student's knowledge:	<table><tr><th colspan="2">Type of task</th><th colspan="2">Number of points (max)</th><th>Total</th></tr><tr><td rowspan="3">Current control</td><td>Practical works (1–10)</td><td>25</td><td rowspan="3">40</td><td rowspan="5">100</td></tr><tr><td>Independent work</td><td>7</td></tr><tr><td>Oral presentation</td><td>8</td></tr><tr><td>Mid-term control</td><td>Written work</td><td colspan="2">10</td></tr><tr><td>Final control</td><td>Exam (Written)</td><td colspan="2">50</td></tr></table>					Type of task		Number of points (max)		Total	Current control	Practical works (1–10)	25	40	100	Independent work	7	Oral presentation	8	Mid-term control	Written work	10		Final control	Exam (Written)	50	
Type of task		Number of points (max)		Total																							
Current control	Practical works (1–10)	25	40	100																							
	Independent work	7																									
	Oral presentation	8																									
Mid-term control	Written work	10																									
Final control	Exam (Written)	50																									
Topics of lectures:	<ul style="list-style-type: none"><li>- Introduction. The essence of the concept of audiovisual technologies</li><li>- Audiovisual culture and ways of its formation</li><li>- Experience using audiovisual technologies</li><li>- Means of influence of audiovisual technologies on the human subconscious</li><li>- Modern multimedia technologies in advertising</li><li>- Augmented Reality</li><li>- Audiovisual Technology Market Trends</li><li>- Audiovisual information design</li><li>- The essence of the concept of visualization</li><li>- Experience in using visualization in media communication</li><li>- Media literacy and media culture</li><li>- Content visualization</li><li>- The role of infographics in solving creative problems.</li><li>- The needs of the mass audience</li><li>- Media design in various types of media.</li></ul>																										
Literature:	А. Г. Соколов. Монтаж: телевидение, кино, видео — Эдитинг: телевизион, синема, видео. — М.: Издательство «625», 2001.—207с. ; А. Г. Соколов. Монтаж: телевидение, кино, видео -- Эдитинг: телевизион, синема, видео.— М.: Издатель А. Г. Дворников, 2003.—206 с.: ил. Учебник. Часть третья; Ключкова Э.Ю.Влияние личности звукорежиссера на процесс формирования аудио-визуального образа второй половины XX века. Театр. Живопись. Кино. Музыка. 2016. ; Mark Christiansen. Adobe After Effects CS5 Visual effects and Compositing Studio Techniques. – Adobe, 2017. – 568 с. ; Adobe After Effects 7.0. Спецеффеки и создание видеокмпозитсий / Энтони Боланте. – М.: Триумф, 2017. - 832 с. ; Медведев Г.С., Птачинский В.С. Adobe After Effects SS3 с нуля. Видеомонтаж, Анимация, спецеффеки.–М.: Триумф, 2018. -272 с.																										

6.15. Infographics		
Semestr:	7	
Date of last modification:	31.08.2023	
Teachers:	Modullayev Jahongir Sobir ugli	
Component:	Elective	
Cycle:	Core	
Credit point:	6	
Pre-requisities	Computer graphics	
Workload:	Types of classes	Hours
	Total	180
	Lecture	24
	Practical works	24
	Laboratory work	24
	SAW (Student autonomous work)	108
	Form of final control	Exam
	Final assessment method	Writing
Control forms:	Current control, Mid-term control, Final control	
Assessment requirements	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
Final control	The final exam is written in the form of 5 questions of 10 marks each, the questions consist of 2 parts: 3 theoretical questions and 2 practical questions. Total exam time is 80 minutes	
Short content:	The goal of this course is to teach students the art of Data Storytelling and graphical representation of statistical data. Data visualization is a graphical representation of data. In the world of big data, data visualization tools and technologies are essential for analyzing large volumes of data and making data-driven decisions.	
Goal:	The science of infographics teaches you how to develop effective ways to visualize statistical data that is meaningful and interesting to the public.	
Objective:	- Knowledge of computer graphics basics, Digital Media and TV basics.	
Learning outcome:	After studying the discipline, students should be able to: LO 1. Has an understanding of infographics; LO 2. Analysis of unique methods of creating infographics; LO 3. Can distinguish types of infographics; LO 4. Learn about infographics software tools; LO 5. Learns methods of presenting information; LO 6. Learns guidelines for creating infographics; LO 7. Can graphically represent large amounts of data; LO 8. Can use infographics to visually present large amounts of information.	
Teaching methods:	In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized: - technology of problem- and project-based learning; - technologies of educational and research activities; - communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods); - case-study method (analysis of situations); - game technologies, in which students participate in business, role-playing, simulation games; - information and communication (including distance learning) technologies.	

	In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.				
Assessment of the student's knowledge:	Type of task		Number of points (max)		Total
	Current control	Practical works	15	40	100
		Laboratory works	15		
		Independent work	5		
		Oral presentation	5		
	Mid-term control	Written work	10		
Final control	Exam (Written)	50			
Topics of lectures:	<ul style="list-style-type: none"><li>- The history of the development of infographics.</li><li>- Concepts commonly used in infographics.</li><li>- An overview of infographics.</li><li>- Approach to infographics as the art of presenting information.</li><li>- Software tools in infographics.</li><li>- Methods of providing information.</li><li>- Guidelines for creating infographics.</li><li>- Principles of visual perception</li><li>- Types of infographics.</li><li>- Principles of infographics.</li><li>- Steps to create an infographic.</li><li>- Choosing the right chart type.</li><li>- Data visualization: methods and tools for creating graphs, charts and other types of visual representations of data.</li><li>- Animation. Preparation of content for animation. Working with formats.</li><li>- Create dashboards and dashboards.</li></ul>				
Literature:	<p>Literature 1. Северова, Т. С. Инфографика : учебное пособие / Т. С. Северова. — Москва : МПГУ. — 96 с. — ISBN 978-5-4263-1215-9. — Текст : электронный // Лань : электронно-библиотечная система. — URL: <a href="https://e.lanbook.com/book/338990">https://e.lanbook.com/book/338990</a> — Режим доступа: для авториз. Пользователей 2. Пушкарева, Т. П. Компьютерный дизайн : учебное пособие / Т. П. Пушкарева, С. А. Титова. — Красноярск : СФУ, 2020. — 192 с. — ISBN 978-5-7638-4194-7. — Текст : электронный // Лань : электронно-библиотечная система. — URL: <a href="https://e.lanbook.com/book/181561">https://e.lanbook.com/book/181561</a> — Режим доступа: для авториз. пользователей. 3. Heidelberg, S. B. (2005). Introduction to Machine Learning Using Neural Nets. Retrieved on 9/02/2015 from <a href="http://link.springer.com/chapter/10.1007/3-540-27335-2_7">http://link.springer.com/chapter/10.1007/3-540-27335-2_7</a>. 4. Tufte, Edward. The Visual Display of Quantitative Information. Graphics Press, 2001.</p>				

<b>6.16. Modern television studios</b>		
<i>Semestr:</i>	7	
<i>Date of last modification:</i>	31.08.2023	
<i>Teachers:</i>	Boymurodov Bobir Elmurodovich	
<i>Component:</i>	Elective	
<i>Cycle:</i>	Core	
<i>Credit point:</i>	6	
<i>Pre-requisites</i>	Computer graphics, Visual special effects in media products	
<i>Workload:</i>	<b>Types of classes</b>	<b>Hours</b>
	Total	180
	Lecture	24
	Practical works	24
	Laboratory work	24
	SAW (Student autonomous work)	108
	Form of final control	Exam
	Final assessment method	Writing
<i>Control forms:</i>	Current control, Mid-term control, Final control	
<i>Assessment requirements</i>	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
<i>Final control</i>	The final exam is written in the form of 5 questions of 10 marks each, the questions consist of 2 parts: 3 theoretical questions and 2 practical questions. Total exam time is 80 minutes	
<i>Short content:</i>	The purpose of this course is to broadcast television formation of students' knowledge in the direction of studios , recording and processing of digital audio and video data and modern television focused on knowledge in the field of studio equipment and performance technology, and the creation and application of audiovisual products in production areas . This course aims to provide students with an understanding of modern television equipment standards and operating technologies.	
<i>Goal:</i>	The history of the development of television studios, the standards of modern audio and video equipment, the disadvantages and advantages of analog and digital television equipment, the study of the acoustics of various rooms and sound and television studios, familiarization with the complex of sound and video equipment, engineers, operators, various types of audio and video products developers, organizing work in television, radio and other types of studios involves instilling knowledge and skills about radio into the minds of students.	
<i>Objective:</i>	- Knowledge of the basics of computer graphics, physics.	
<i>Learning outcome:</i>	<p>After studying the discipline, students should be able to:</p> <p>LO 1. Mastering the skills of working in studios (recording, dubbing, editing) in various conditions;</p> <p>LO 2. Know the basics of sound recording and recording;</p> <p>LO 3. Having skills to work with auxiliary television devices (audio, video mixer, etc.).</p> <p>LO 4. Knowing the distribution of light and the placement of lighting devices in the shooting areas;</p> <p>LO 5. The ability to choose a location for filming various types of television and video productions;</p> <p>LO 6. Learns the basic principles of coupled wave theory;</p> <p>LO 7. Can describe digital holography;</p> <p>LO 8. Can use holographic interferometry.</p>	

Teaching methods:	<p>In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized:</p> <ul style="list-style-type: none"><li>- technology of problem- and project-based learning;</li><li>- technologies of educational and research activities;</li><li>- communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods);</li><li>- case-study method (analysis of situations);</li><li>- game technologies, in which students participate in business, role-playing, simulation games;</li><li>- information and communication (including distance learning) technologies.</li></ul> <p>In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.</p>																														
Assessment of the student's knowledge:	<table><tr><th colspan="2">Type of task</th><th colspan="2">Number of points (max)</th><th>Total</th></tr><tr><td rowspan="4">Current control</td><td>Practical works</td><td>15</td><td rowspan="4">40</td><td rowspan="8">100</td></tr><tr><td>Laboratory works</td><td>15</td></tr><tr><td>Independent work</td><td>5</td></tr><tr><td>Oral presentation</td><td>5</td></tr><tr><td>Mid-term control</td><td>Written work</td><td colspan="2">10</td><td></td></tr><tr><td>Final control</td><td>Exam (Written)</td><td colspan="2">50</td><td></td></tr></table>					Type of task		Number of points (max)		Total	Current control	Practical works	15	40	100	Laboratory works	15	Independent work	5	Oral presentation	5	Mid-term control	Written work	10			Final control	Exam (Written)	50		
Type of task		Number of points (max)		Total																											
Current control	Practical works	15	40	100																											
	Laboratory works	15																													
	Independent work	5																													
	Oral presentation	5																													
Mid-term control	Written work	10																													
Final control	Exam (Written)	50																													
Topics of lectures:	<ul style="list-style-type: none"><li>- Enter. The purpose and tasks of the lesson. Development history of television and television studios.</li><li>- the National Television and Radio Company of Uzbekistan ( UzM TRK ) . Devices of television studios on the example of the National Television and Radio Company of Uzbekistan</li><li>- Modern television studios. Modern television studios equipped on the basis of foreign experience.</li><li>- Modern television studios. Study media centers.</li><li>- Television recording studio equipment. Layout and equipment of recording studios.</li><li>- recording studios for audio effects . Layout and equipment of noise and additional sound recording studios.</li><li>- Editing studios. Layout and equipment of editors' studios.</li><li>- Television pavilions . A complex of equipment used in television pavilions.</li><li>- Complex of lighting equipment. Complex of lighting equipment in pavilions.</li><li>- Modern television studios with LED projectors. Work processes in studios with modern LED projectors.</li><li>- Photography equipment workshop. Acquaintance with photography equipment workshop equipment and devices.</li><li>- Virtual television studio devices. Virtual television studio devices..</li><li>- Virtual television studio devices. Virtual television studio equipment and software . Unreal engine 5, 3dMax software capabilities.</li><li>- Live broadcasting in television studios. Technologies for live broadcasting in television studios.</li><li>- Television production technology. Television production processes and technologies.</li></ul>																														
Literature:	Literature 1 C. C. Beknazarova. Digital media and television technology, part 1. Uchebnoe posobie. 2021 g. C. C. Beknazarova. Digital media and television technology, part 2. Uchebnoe posobie. 2021 g. Dittmar Nim. Audio engineering. Focal Press 2018 - 254p. Zakharchenko N. A.. Contemporary television program, 2019																														

<b>6.17. Audio post production</b>		
<i>Semestr:</i>	7	
<i>Date of last modification:</i>	31.08.2023	
<i>Teachers:</i>	Yusupova Natalya Yuryevna	
<i>Component:</i>	Elective	
<i>Cycle:</i>	Core	
<i>Credit point:</i>	6	
<i>Pre-requisities</i>	Theoretical fundamentals of acoustics	
<i>Workload:</i>	<b>Types of classes</b>	<b>Hours</b>
	Total	180
	Lecture	30
	Practical works	42
	SAW (Student autonomous work)	108
	Form of final control	Exam
	Final assessment method	Writing
<i>Control forms:</i>	Current control, Mid-term control, Final control	
<i>Assessment requirements</i>	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
<i>Final control</i>	The final exam is written in the form of 5 questions of 10 marks each, the questions consist of 2 parts: 3 theoretical questions and 2 practical questions. Total exam time is 80 minutes	
<i>Short content:</i>	Growing innovations in digital technology and media have changed the landscape of audio post-production for film and television. The post-production industry is now driven by the advent of digital audio, video and effects in digital audio workstations. Despite this explosive digital revolution, the one thing that remains constant is the need for people who are thoroughly trained in the process and application of this technology and develop into technical professionals with creative problem-solving skills.	
<i>Goal:</i>	Creation of a competitive specialist with a clear understanding of audio post-production. Able to create high-quality audio content.	
<i>Objective:</i>	<ul style="list-style-type: none"> <li>- Ability to use correct technical equipment for sound recording</li> <li>- Ability to record sound, noise, edit audio tracks</li> <li>-Mastering music editing programs</li> <li>-Study of musical styles and trends</li> <li>-Formation of a competent musical view</li> </ul>	
<i>Learning outcome:</i>	<p>After studying the discipline, students should be able to:</p> <p>LO1. Ability to use technical devices for sound recording.</p> <p>LO2. Ability to competently compose musical scores for television broadcasting and cinematography.</p> <p>LO3. Ability to competently work with music programs</p> <p>LO4. Ability to work with microphones.</p> <p>LO5. Ability to work with dubbing actors</p> <p>LO6. Ability to take responsibility for dramatic sound in film and television.</p>	
<i>Teaching methods:</i>	<p>In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized:</p> <ul style="list-style-type: none"> <li>- sound recording technology in practice;</li> <li>- technologies of educational and research activities;</li> <li>- communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods);</li> <li>- case-study method (analysis of situations);</li> </ul>	

	- game technologies, in which students participate in business, role-playing, simulation games; - information and communication (including distance learning) technologies. In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.			
<i>Assessment of the student's knowledge:</i>	<b>Type of task</b>		<b>Number of points (max)</b>	<b>Total</b>
	Current control	Practical works (1–10)	25	40
		Independent work	7	
		Oral presentation	8	
	Mid-term control	Written work	10	
	Final control	Exam (Written)	50	100
<i>Topics of lectures:</i>	- Sound properties -Decibels, hertz, octaves -History of sound recording -Introduction to post-production -Post-production in detail -Location Sound Recording -Working with SFX and SFX libraries -Production dialogue and ADR/dialogue replacement - Defining and creating Foley sound effects -Editing temporary and source music for film and television -Mixing music for film and television -Pre-dub/temp mix -Final dubbing. Working with dubbing actors -M&E Mix (Musical and spectacular mix for foreign distribution) -Sound delivery and archiving			
<i>Literature:</i>	Literature 1. Audio Post production for film and television. Mark Cross.2013.-228p; Understanding audio. Daniel.M.Tompson.2018. ISBN: 9781495028755; <a href="#">"The VES Handbook of Visual Effects, 3rd Edition"</a> . Dj.Okun. 2024.ISBN: 978-5-97060-927-9; Final cut PRO-X. Dj.Cocs. 2016, ISBN: 978-5-97060-395-6. .			



<b>6.18. Design of audio studios</b>		
<i>Semestr:</i>	7	
<i>Date of last modification:</i>	31.08.2023	
<i>Teachers:</i>	Boymurodov Bobir Elmurodovich	
<i>Component:</i>	Elective	
<i>Cycle:</i>	Core	
<i>Credit point:</i>	6	
<i>Pre-requisities</i>	Theoretical fundamentals of acoustics	
<i>Workload:</i>	<b>Types of classes</b>	<b>Hours</b>
	Total	180
	Lecture	24
	Practical works	24
	Laboratory work	24
	SAW (Student autonomous work)	108
	Form of final control	Exam
	Final assessment method	Writing
<i>Control forms:</i>	Current control, Mid-term control, Final control	
<i>Assessment requirements</i>	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
<i>Final control</i>	The final exam is written in the form of 5 questions of 10 marks each, the questions consist of 2 parts: 3 theoretical questions and 2 practical questions. Total exam time is 80 minutes	
<i>Short content:</i>	In the modern conditions of working with digital technologies, it is important for professionals of television, radio, cinema, recording studios, concert organizations, and theaters to know the basics of recording and processing audio and video data.	
<i>Goal:</i>	The purpose of this subject is to master the sound recording process, to process it in computer programs, to record video on various devices and media in digital technologies. This subject helps to prepare a creative, technically competent, technologically trained specialist who can work effectively in the industries involved in the production of television, radio, film and audio and video products.	
<i>Objective:</i>	- Knowledge of the basics of computer graphics, physics.	
<i>Learning outcome:</i>	<p>After studying the discipline, students should be able to:</p> <p>LO 1. full mastery of information about digital audio and video and television technologies</p> <p>LO 2. get an idea of the most important tools for creating audio studios;</p> <p>LO 3. learn the most important requirements for creating audio design</p> <p>LO 4. studying radio studios and the technology of creating their interior design, their types;</p> <p>LO 5. know and be able to use audio and video recording and processing technology when working with audio and video production;</p> <p>LO 6. able to perform practical work with professional sound recording and reproduction equipment;</p> <p>LO 7. being able to use microphones to create soundtracks in film and television;</p> <p>LO 8. distinguish between the necessary cameras and formats for recording and processing video data.</p>	
<i>Teaching methods:</i>	<p>In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized:</p> <ul style="list-style-type: none"> <li>- technology of problem- and project-based learning;</li> <li>- technologies of educational and research activities;</li> </ul>	

	<ul style="list-style-type: none"><li>- communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods);</li><li>- case-study method (analysis of situations);</li><li>- game technologies, in which students participate in business, role-playing, simulation games;</li><li>- information and communication (including distance learning) technologies.</li></ul> <p>In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.</p>				
<i>Assessment of the student's knowledge:</i>	<b>Type of task</b>		<b>Number of points (max)</b>		<b>Total</b>
	Current control	Practical works	15	40	
		Laboratory works	15		
		Independent work	5		
		Oral presentation	5		
	Mid-term control	Written work	10		
Final control	Exam (Written)	50			
<i>Topics of lectures:</i>	<ul style="list-style-type: none"><li>- Introduction to science. The most basic terms and terms.</li><li>- M2 Radio studios are directly related to the field of audiovisual technologies.</li><li>- The most important tools for creating audio studios.</li><li>- The importance of audio studio design in the production of audio products.</li><li>- Radio studios are directly related to the field of audiovisual technologies.</li><li>- The main properties of holograms.</li><li>- The most important requirements for creating audio design.</li><li>- Ergonomic rules in radio studios.</li><li>- Radio studios and their interior design.</li><li>- Modern methods of sound recording in an audio studio.</li><li>- Technical means of sound recording in the process of sound recording.</li><li>- Stages of development of audio-video data recording devices and carriers.</li><li>- Microphones and their types.</li><li>- Software tools for voice recording during voice recording.</li><li>- Adobe Audition software and its capabilities.</li></ul>				
<i>Literature:</i>	Literature 1 Efimova N.N. Zvuk v efire. 2 izd. M.: Institut povyshenia qualificasii rabotnikov television i radioveshchaniya, 2015. 145 p. Literature 2 Klyuchkova E.Yu. Theater. Answer. Cinema. Music. 2016. Literature 3 Philip Newell. Recording Studio Design. Third Edition. 2012.				

<b>6.19. VR/AR technologies</b>		
<i>Semestr:</i>	7	
<i>Date of last modification:</i>	31.08.2023	
<i>Teachers:</i>	Ortikova Feruza	
<i>Component:</i>	Elective	
<i>Cycle:</i>	Core	
<i>Credit point:</i>	6	
<i>Pre-requisites</i>	3d modeling and visualization	
<i>Workload:</i>	<b>Types of classes</b>	<b>Hours</b>
	Total	180
	Lecture	24
	Laboratory work	24
	Practical works	24
	SAW (Student autonomous work)	108
	Form of final control	Exam
	Final assessment method	writing
<i>Control forms:</i>	Current control, Mid-term control, Final control	
<i>Assessment requirements</i>	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
<i>Final control</i>	The final exam is written in the form of 5 questions of 10 marks each, the questions consist of 2 parts: 3 theoretical questions and 2 practical questions. Total exam time is 80 minutes	
<i>Short content:</i>	Currently, one of the most important trends in the field of information technology is paying increasing attention to the research of virtual reality technologies and its software. And also, their active use in practice. Moreover, this direction reaches its level of perfection over time. In recent years, in the process of developing virtual environments based on VR / AR technologies, special attention has been paid to their quality and model design. Issues such as creating comprehensive comfort for users of virtual environments being developed today and enriching them with 3D models adapted to this area are considered relevant	
<i>Goal:</i>	The purpose of mastering the discipline is to give students systematized theoretical knowledge and practical skills in building virtual reality environment using 3D models and learning skills that can be applied to a future career	
<i>Objective:</i>	- The study of this course is based on the knowledge gained from studying the disciplines “Computer Graphics” and “Computer Animation”.	
<i>Learning outcome:</i>	<p>After studying the discipline, students should be able to:</p> <p>LO 1. Knowledge of the concept of virtual reality visualization and its essence;</p> <p>LO 2. Gaining skills in working with modern VR / AR software;</p> <p>LO 3. Knowledge of VR / AR technologies and the history of their appearance;</p> <p>LO 4. Using 3D graphics software, designing a model, developing a virtual reality environment using 3D models and learning skills that can be applied to a future career</p> <p>LO 5. Learning skills of importance and specific aspects of virtual reality;</p>	
<i>Teaching methods:</i>	<p>In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized:</p> <ul style="list-style-type: none"> <li>- technology of problem- and project-based learning;</li> <li>- technologies of educational and research activities;</li> <li>- communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods);</li> <li>- case-study method (analysis of situations);</li> </ul>	

	<ul style="list-style-type: none"><li>- game technologies, in which students participate in business, role-playing, simulation games;</li><li>- information and communication (including distance learning) technologies.</li></ul> <p>In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.</p>				
<i>Assessment of the student's knowledge:</i>	<b>Type of task</b>		<b>Number of points (max)</b>		<b>Total</b>
	Current control	Practical works	15	40	
		Laboratory works	15		
		Independent work	5		
		Oral presentation	5		
	Mid-term control	Written work	10		
	Final control	Exam (Written)	50		
<i>Topics of lectures:</i>	<ul style="list-style-type: none"><li>- Introduction. A virtual reality. What is virtual reality? A modern virtual reality experience. E stages of history.</li><li>- A bird's eye view of virtual reality. Hardware, software, physiology and human perception.</li><li>- Geometry of virtual reality. Geometric models, position and orientation changes, angular representation of rotation, view transformation, chain transformation</li><li>- Light and optics in virtual reality. Basic behavior of light, lenses, optical aberrations, the human eye.</li><li>- Physiology of human vision. From cornea to photoreceptors, from photoreceptors to visual cortex, eye movements, meaning of virtual reality.</li><li>- Visual perception. Tension perception, motion perception, color perception, integration of information sources.</li><li>- Visual rendering. Ray tracing and shading models, rasterization, optical aberration correction, latency and frame rate improvements, immersive photography and video</li><li>- Movement in the real and virtual worlds. Velocities and accelerations, the vestibular system, physics in the virtual world, movement discrepancy and vexia.</li><li>- Tracking. 2D orientation tracking , 3D orientation tracking , position and orientation tracking , attached object tracking , 3D environment scanning</li><li>- Interaction. Programs of action and reassignment, movement , manipulation , social interaction, additional mechanisms of interaction.</li><li>- Interaction . Programs of action and reassignment, movement , manipulation , social interaction, additional mechanisms of interaction</li><li>- Check VR/ AR systems and experiences. Perception training, recommendations for developers, advantages and disadvantages of virtual reality, experiments on humans</li><li>- Boundaries. Touch and proprioception, sound and taste, robotic interfaces, brain-machine interfaces.</li><li>- Integration of models from 3D Max into Unreal Engine</li><li>- Creating a simple first-person shooter in Unreal Engine</li></ul>				
<i>Literature:</i>	Literature 1. Nentcova TI, Kazankova TV, Shnyakin AV Kompyuternaya grafika i web design, Moskva, ID “FORUM” – INFRA-M 2018; Nazirov A, Nuraliyev FM , T u rayev BZ . Kompyuter grafikasi. T a shkent, 2015. Steven M. LaValle, VIRTUAL REALITY. University of Oulu , 2019.				

6.20. Experimental television		
Semestr:	7	
Date of last modification:	31.08.2023	
Teachers:	Umarova Dildora Bakhtiyarovna	
Component:	Elective	
Cycle:	Core	
Credit point:	6	
Pre-requisites	Computer graphics, Visual special effects in media products	
Workload:	Types of classes	Hours
	Total	180
	Lecture	24
	Practical works	24
	Laboratory exercises	24
	SAW (Student autonomous work)	108
	Form of final control	Exam
	Final assessment method	Writing
Control forms:	Current control, Mid-term control, Final control	
Assessment requirements	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
Final control	The final exam is written in the form of 5 questions of 10 marks each, the questions consist of 2 parts: 3 theoretical questions and 2 practical questions. Total exam time is 80 minutes	
Short content:	The proposed Experimental Television course provides students with information about management work and its fundamentals in film and television production. Students study all stages of film production, the duties and responsibilities of employees, the basics of management, film evaluation and its main elements, the ABC of creating films on television and in cinema, solving management issues, creating films of different genres and types, post-script, estimates, production calendar, develops skills in using plan.	
Goal:	From a knowledge point of view: CO1 Can explain the basics and concepts of television. CO2 Our country's relations with the global media industry can demonstrate an understanding of their results. CO3 Can explain the modern television production industry and its development in our country and the world in a market economy. CO4 Can demonstrate understanding of television control techniques. In terms of skills: CO5 Learn and use the main members of the television team and their responsibilities, the concepts of modern and non-traditional, experimental television, the basics of managing a television team. CO6 They can discuss the visual show and do an analysis. CO7 Can explain the features of modern and experimental television	
Objective:	1. Based on the knowledge and skills acquired during the study of science such as: “Computer graphics”, “Digital media and TV technologies”, “Modern television studios”, “Sound studio design”	
Learning outcome:	After studying the discipline, students should be able to: LO 1. Understand how a computer network works. LO 2. Understand the process of data transfer in the computer network. LO 3. Possess skills in network design and organizing interconnection. LO 4. Use standards when building computer networks (ISO, IEEE). LO 5. Perform network infrastructure design work with scalability in mind LO 6. Perform configuration of network equipment in accordance with the tasks	

Teaching methods:	In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized: - technology of problem- and project-based learning; - technologies of educational and research activities; - communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods); - case-study method (analysis of situations); - game technologies, in which students participate in business, role-playing, simulation games; - information and communication (including distance learning) technologies. In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.																													
Assessment of the student's knowledge:	<table><tr><th colspan="2">Type of task</th><th colspan="2">Number of points (max)</th><th>Total</th></tr><tr><td rowspan="4">Current control</td><td>Practical works</td><td>15</td><td rowspan="4">40</td><td rowspan="8">100</td></tr><tr><td>Laboratory works</td><td>15</td></tr><tr><td>Independent work</td><td>5</td></tr><tr><td>Oral presentation</td><td>5</td></tr><tr><td>Mid-term control</td><td>Written work</td><td colspan="2">10</td><td></td></tr><tr><td>Final control</td><td>Exam (Written)</td><td colspan="2">50</td><td></td></tr></table>				Type of task		Number of points (max)		Total	Current control	Practical works	15	40	100	Laboratory works	15	Independent work	5	Oral presentation	5	Mid-term control	Written work	10			Final control	Exam (Written)	50		
Type of task		Number of points (max)		Total																										
Current control	Practical works	15	40	100																										
	Laboratory works	15																												
	Independent work	5																												
	Oral presentation	5																												
Mid-term control	Written work	10																												
Final control	Exam (Written)	50																												
Topics of lectures:	<ul style="list-style-type: none"><li>- L1 Introduction to science. Goals and objectives of experimental television.</li><li>- L2 The main products produced by experimental television.</li><li>- L3 The role and importance of media centers at industry enterprises in the development of domestic media.</li><li>- L4 The main composition of the creative team for creating modern and creative media content.</li><li>- L5 The composition of the main technical tools used by the creative team when creating modern and creative media content.</li><li>- L6 Modern multimedia technologies of audio and video editing in the preparation of television content.</li><li>- L7 Basic concepts of digital audio and video editing.</li><li>- L8 The role and importance of modern software in the preparation of experimental television production.</li><li>- L9 The role and importance of modern software in the preparation of experimental television production.</li><li>- L10 The role and importance of filming pavilions in the preparation of experimental television production.</li><li>- L11 Experimental television activities based on foreign experience.</li><li>- L12 Scheduling. Creating a creative team. Identification of pavilions and natural areas for photography.</li><li>- L13 Pre-production preparation. Planning work and drawing up special schedules.</li><li>- L14 Cooperation between universities and MTRK in the preparation of television products. Integration of education and production.</li></ul>																													
Literature:	<ol style="list-style-type: none"><li>1. Abdurakhimov A., Kuchkarbekov T., Saburova N., Ismailov K. Fundamentals of film production management. Tashkent, "Alokachi" publishing house, 2018, 160 p.</li><li>2. Bazarbaev B.J., Saliev M.M., Ismailov K.S. "Digital cinematography and editing" Tashkent. Communicator. 2017.</li><li>3. Sh. T. Kasimova, B. Boymurodov, Sh. Chulliev. Methodical guide for performing laboratory work in "Sound and image processing" Tashkent 2021.</li><li>4. Beknazarova S.S. Processing video// Uchebnoe posobie.-T.: "IMPRESS MEDIA". 2023. - 288 p.</li><li>5. Mukhamadiyev A.Sh. Video processing. Study guide. "IMPRESS MEDIA". 2023. - 204 p.</li></ol>																													

<b>6.21. Introduction to Computer Vision</b>		
<i>Semestr:</i>	7	
<i>Date of last modification:</i>	31.08.2023	
<i>Teachers:</i>	Tastanova Saida Aldiyarovna	
<i>Component:</i>	Elective	
<i>Cycle:</i>	Core	
<i>Credit point:</i>	6	
<i>Pre-requisities</i>	Computer graphics	
<i>Workload:</i>	<b>Types of classes</b>	<b>Hours</b>
	Total	180
	Lecture	42
	Practical works	30
	SAW (Student autonomous work)	108
	Form of final control	Exam
	Final assessment method	Writing
<i>Control forms:</i>	Current control, Mid-term control, Final control	
<i>Assessment requirements</i>	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
<i>Final control</i>	The final exam is written in the form of 5 questions of 10 marks each, the questions consist of 2 parts: 3 theoretical questions and 2 practical questions. Total exam time is 80 minutes	
<i>Short content:</i>	Computer vision is the construction of a computer model of the vision system, i.e. creating a program that can answer any question about an image that a human can answer.	
<i>Goal:</i>	The purpose of the course is to provide students with fundamental knowledge and practical skills in the field of processing and analysis of visual information using computer technology.	
<i>Objective:</i>	- pattern recognition; - video and image processing; - 3D reconstruction and digital photography; - geometric image transformations; - fundamentals of image filtering and processing	
<i>Learning outcome:</i>	<p>After studying the discipline, students should be able to:</p> <p>LO 1. Understand fundamental concepts</p> <p>LO 2. Algorithm development.</p> <p>LO 3. Machine learning integration.</p> <p>LO 4. Practical application skills.</p> <p>LO 5. Critical thinking and problem solving</p> <p>LO 6. Software proficiency</p>	
<i>Teaching methods:</i>	<p>In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized:</p> <ul style="list-style-type: none"> <li>- technology of problem- and project-based learning;</li> <li>- technologies of educational and research activities;</li> <li>- communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods);</li> <li>- case-study method (analysis of situations);</li> <li>- game technologies, in which students participate in business, role-playing, simulation games;</li> <li>- information and communication (including distance learning) technologies.</li> </ul> <p>In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned",</p>	

	"INSERT", hands-on activities, gamification and others are actively used during practical classes.				
Assessment of the student's knowledge:	Type of task		Number of points (max)		Total
	Current control	Practical works (1–10)	25	40	
		Independent work	7		
		Oral presentation	8		
	Mid-term control	Written work	10		
	Final control	Exam (Written)	50		
Topics of lectures:	<ul style="list-style-type: none"><li>-Introduction to the topic "Introduction to Computer Vision".</li><li>-Perception of light by the human eye. Cameras and optics</li><li>-Digitization of images. Pixels, histograms and color spaces.</li><li>-Tools used in the work process and their types.</li><li>-Linear filtering. Convolution matrix</li><li>-Frequency representation of images</li><li>-Morphology, edge extraction and segmentation</li><li>-Image reconstruction and transformation</li><li>-Identification of characteristic points, Harris method for identifying angles</li><li>-Comparison of characteristic points. SIFT, SURF and HoG</li><li>-Basic concepts of machine learning. Clustering. Classification</li><li>-Introduction to pattern recognition. Face recognition algorithms. Eigenfaces, Viola Jones</li><li>-Optical character recognition</li><li>-Epipolar geometry and 3D reconstruction</li><li>-Modern advances in computer vision. Limitations and prospects.</li></ul>				
Literature:	Literature 1. Computer Networking: This Book Includes: Computer Networking for Beginners and Beginners Guide (All in One). Rassel Scott, 2019. 2. A Top-Down Approach: Computer Networking, James F. Kurose, Keith W. Ross 2017. Pearson Education Limited. 3. Computer Networks, Fourth Edition. Andrew S. Tanenbaum. Publisher; Prentice Hall, 2011. 4. “Computer networks. Principles, technologies, protocols: A textbook for university students, Fifth Edition” N.A. Olifer, V.G. Olifer, St. Petersburg, Peter, 2016.				



**6.22. Virtual reality visualization**

<i>Semestr:</i>	8	
<i>Date of last modification:</i>	31.08.2023	
<i>Teachers:</i>	Ortikova Feruza	
<i>Component:</i>	Elective	
<i>Cycle:</i>	Core	
<i>Credit point:</i>	6	
<i>Pre-requisites</i>	3d modeling and visualization	
<i>Workload:</i>	<b>Types of classes</b>	<b>Hours</b>
	Total	180
	Lecture	24
	Practical works	24
	Laboratory work	24
	SAW (Student autonomous work)	108
	Form of final control	Exam
	Final assessment method	Writing
<i>Control forms:</i>	Current control, Mid-term control, Final control	
<i>Assessment requirements</i>	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
<i>Final control</i>	The final exam is written in the form of 5 questions of 10 marks each, the questions consist of 2 parts: 3 theoretical questions and 2 practical questions. Total exam time is 80 minutes	
<i>Short content:</i>	At present, one of the most important areas of the information technology field is the study of VR technologies and its software tools, and the attention to their active use in practice is increasing more and more. Moreover, this direction is reaching its level of perfection over time.	
<i>Goal:</i>	In recent years, in the process of developing virtual environments based on VR technologies, special attention has been paid to their quality and the design of models. Issues such as creating all-round comfort for users of virtual environments being developed now, enriching them with 3D models adapted to the field are considered urgent.	
<i>Objective:</i>	- The study of this course is based on the knowledge obtained in the study of "Computer Graphics" and "Computer Animation".	
<i>Learning outcome:</i>	After studying the discipline, students should be able to: LO 1. Knowledge of the concept of visualization of virtual reality and its essence; LO 2. Gaining VR skills; LO 3. To acquire skills about modern VR software tools; LO 4. Knowledge of VR and the history of its origin; LO 5. To acquire skills about the importance and specific aspects of VR today; LO 6. Know how to design 3D images based on 3D programs, modeling methods; LO 7. Gain skills in using 3D graphics programs, designing models, developing VR environments using 3D models, and applying them to future activities.	
<i>Teaching methods:</i>	In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized: - technology of problem- and project-based learning; - technologies of educational and research activities; - communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods); - case-study method (analysis of situations);	

	<div>- game technologies, in which students participate in business, role-playing, simulation games;</div> <div>- information and communication (including distance learning) technologies.</div> <div>In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.</div>				
<i>Assessment of the student's knowledge:</i>	<b>Type of task</b>		<b>Number of points (max)</b>		<b>Total</b>
	Current control	Practical works	15	40	
		Laboratory works	15		
		Independent work	5		
		Oral presentation	5		
	Mid-term control	Written work	10		100
	Final control	Exam (Written)	50		
<i>Topics of lectures:</i>	<div>- Virtual reality and access to it. What is virtual reality? Modern VR experiences, History repeats itself.</div> <div>- An overview of virtual reality. Hardware, Software, Human physiology and cognition.</div> <div>- Geometry of virtual reality. Geometric Models, Position and Orientation, Axial-Angle Representations of Rotation, Viewing Transformations, Chaining Transformations.</div> <div>- Light and optics in virtual reality. Basic movement of light, Lenses, Optical distortions, Human eye.</div> <div>- Physiology of human vision. From cornea to photoreceptors, From photoreceptors to visual cortex, Eye movements, Implications for VR</div> <div>- Visual perception. Depth perception, Motion perception, Color perception, Integration of information sources.</div> <div>- Visual rendering. Ray tracing and shading models, Rasterization, Optical distortion correction, Latency and frame rate enhancement, Immersive photos and videos.</div> <div>- Movement in the real and virtual world. Velocities and accelerations, Vestibular system, Physics in the virtual world, Incoherent motion and vection.</div> <div>- Tracking. 2D orientation tracking, 3D orientation tracking, Location and orientation tracking, Attached object tracking, 3D environmental scanning.</div> <div>- Interaction. Action programs and remapping, Mobility, Manipulation, Social interaction, Additional interaction mechanisms.</div> <div>- Audio. Physics of sound, Physiology of human hearing, Sense of hearing, Rendering of hearing.</div> <div>- Evaluation of VR systems and experiences. Perceptual training, Recommendations for programmers, Comfort and VR disease, Experiments with human subjects.</div> <div>- Boundaries. Touch and proprioception, Smell and taste, Robotic interfaces, Brain-machine interfaces.</div>				
<i>Literature:</i>	<div>Literature 1 Т.И. Немцова, Т.В. Казанкова, А.В.Шнякин, Компьютерная графика и web дизайн, Москва, ИД “ФОРУМ” – ИНФРА-М 2018. 2 A.Nazirov, F.M.Nuraliyev,. B.Z.To'rayev. Kompyuter grafikasi.. Toshkent, 2015. 3. Steven M. LaValle, VIRTUAL REALITY. University of Oulu 2019. 4. Фролов И.К., Перельгин В.А., Самойлов Е.Э. Разработка, дизайн,</div>				

6.23. Video post-production		
Semestr:	8	
Date of last modification:	31.08.2023	
Teachers:	Saidov Farrukh Fakhriddinovich	
Component:	Elective	
Cycle:	Core	
Credit point:	6	
Pre-requisities	Image processing, Computer graphics	
Workload:	Types of classes	Hours
	Total	180
	Lecture	24
	Practical works	24
	Labaratory works	24
	SAW (Student autonomous work)	108
	Form of final control	Exam
	Final assessment method	Writing
Control forms:	Current control, Mid-term control, Final control	
Assessment requirements	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
Final control	The final exam is written in the form of 5 questions of 10 marks each, the questions consist of 2 parts: 3 theoretical questions and 2 practical questions. Total exam time is 80 minutes	
Short content:	Video Post-Production is designed to teach students the basic principles, techniques and tools of video editing and post-production. Through this subject, students learn how to apply processes such as video editing, trimming, sound design, color correction, special effects and motion graphics.	
Goal:	The purpose of this subject: Mastering the process of video recording, its processing in computer programs, video recording in digital technologies on various devices and media. This subject helps to prepare a creative, technically competent, technologically trained specialist who can work effectively in the industries involved in the production of television, radio, film and audio and video products.	
Objective:	The task of science: to provide students with knowledge about video studios, their types and possibilities. Explaining the main terms and concepts of the course to students, learning to apply the learned theoretical knowledge in practice.	
Learning outcome:	After studying the discipline, students should be able to: 1. <b>Understand the Basic Stages of Post-Production:</b> Students will comprehend the main stages, processes, and terminology of video post-production. 2. <b>Develop Video Editing Skills:</b> Students will acquire skills in cutting, trimming, and combining video footage through basic editing techniques. 3. <b>Create and Edit Sound Design and Effects:</b> Students will be able to edit sound, create sound effects, and use foley techniques to add and balance audio in videos. 4. <b>Apply Color Correction and Grading Techniques:</b> Students will use color correction and grading techniques to enhance the color palette and change the mood of the video. 5. <b>Create Visual Effects (VFX) and Motion Graphics:</b> Students will gain skills in creating basic visual effects and motion graphics, including keying and compositing. 6. <b>Effectively Use Post-Production Software:</b> Students will efficiently use popular post-production software such as Adobe Premiere Pro, Final Cut Pro, or DaVinci Resolve.	

Teaching methods:	<p>In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized:</p> <ul style="list-style-type: none"><li>- technology of problem- and project-based learning;</li><li>- technologies of educational and research activities;</li><li>- communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods);</li><li>- case-study method (analysis of situations);</li><li>- game technologies, in which students participate in business, role-playing, simulation games;</li><li>- information and communication (including distance learning) technologies.</li></ul> <p>In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.</p>																												
Assessment of the student's knowledge:	<table><tr><th colspan="2">Type of task</th><th colspan="2">Number of points (max)</th><th>Total</th></tr><tr><td rowspan="4">Current control</td><td>Practical works</td><td>15</td><td rowspan="4">40</td><td rowspan="6">100</td></tr><tr><td>Laboratory works</td><td>15</td></tr><tr><td>Independent work</td><td>5</td></tr><tr><td>Oral presentation</td><td>5</td></tr><tr><td>Mid-term control</td><td>Written work</td><td>10</td><td></td></tr><tr><td>Final control</td><td>Exam (Written)</td><td>50</td><td></td></tr></table>					Type of task		Number of points (max)		Total	Current control	Practical works	15	40	100	Laboratory works	15	Independent work	5	Oral presentation	5	Mid-term control	Written work	10		Final control	Exam (Written)	50	
Type of task		Number of points (max)		Total																									
Current control	Practical works	15	40	100																									
	Laboratory works	15																											
	Independent work	5																											
	Oral presentation	5																											
Mid-term control	Written work	10																											
Final control	Exam (Written)	50																											
Topics of lectures:	<ul style="list-style-type: none"><li>- Introduction to Video Post-Production. Overview of post-production. Workflow and pipeline</li><li>- Video Editing Basics. Timeline editing. Cutting and trimming</li><li>- Advanced Editing Techniques. Multi-cam editing. Nested sequences</li><li>- Introduction to Post-Production Software. Overview of popular software (Adobe Premiere, Final Cut Pro, DaVinci Resolve). Basic interface and tools</li><li>- Sound Design. Basics of sound editing. Adding and editing audio tracks</li><li>- Sound Effects and Foley. Creating and integrating sound effects. Foley techniques</li><li>- Color Theory and Correction. Basics of color theory. Color correction tools and techniques</li><li>- Color Grading. Advanced color grading. Creating mood and style</li><li>- Visual Effects Basics. Introduction to VFX. Keying and compositing</li><li>- Motion Graphics. Basics of motion graphics. Creating simple animations</li><li>- Title Design and Animation. Designing and animating titles. Using templates and presets</li><li>- Rendering and Exporting. Export settings and formats. Delivering the final product</li><li>- Post-Production Workflow Management. File organization and management. Backup and archiving</li><li>- Project Collaboration. Working in a team. Sharing projects and assets</li><li>- Trends and Future of Video Post-Production. Emerging technologies. Future trends in post-production</li></ul>																												
Literature:	<p>Literature 1. "Adobe Premiere Pro Classroom in a Book" by Maxim Jago. Year: 2020. Pages: 480</p> <p>Literature 2. "The Filmmaker's Guide to Visual Effects: The Art and Techniques of VFX for Directors, Producers, Editors and Cinematographers" by Eran Dinur. Year: 2017. Pages: 192</p> <p>Literature 3. "Color Correction Handbook: Professional Techniques for Video and Cinema" by Alexis Van Hurkman. Year: 2013. Pages: 672</p> <p>Literature 4. "Sound Design: The Expressive Power of Music, Voice, and Sound Effects in Cinema" by David Sonnenschein. Year: 2001. Pages: 245</p> <p>Literature 5. "After Effects Apprentice: Real-World Skills for the Aspiring Motion Graphics Artist" by Chris and Trish Meyer. Year: 2012. Pages: 432</p>																												

<b>6.24. Artificial intelligence in audio and video processing</b>		
<i>Semestr:</i>	8	
<i>Date of last modification:</i>	31.08.2023	
<i>Teachers:</i>	Tastanova Saida Aldiyarovna	
<i>Component:</i>	Elective	
<i>Cycle:</i>	Core	
<i>Credit point:</i>	4	
<i>Pre-requisites</i>	Computer graphics, Image processing	
<i>Workload:</i>	<b>Types of classes</b>	<b>Hours</b>
	Total	120
	Lecture	30
	Practical works	18
	SAW (Student autonomous work)	72
	Form of final control	Exam
	Final assessment method	Writing
<i>Control forms:</i>	Current control, Mid-term control, Final control	
<i>Assessment requirements</i>	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
<i>Final control</i>	The final exam is written in the form of 5 questions of 10 marks each, the questions consist of 2 parts: 3 theoretical questions and 2 practical questions. Total exam time is 80 minutes	
<i>Short content:</i>	The purpose of this course is to acquire general concepts and knowledge about artificial intelligence in the field of audio and video processing, create information systems based on the latest technologies of artificial intelligence and audio and image processing, form students' thinking and thinking, clearly state opinions and conclusions in a reasonable form training and formation of skills and qualifications based on the acquired knowledge. Artificial intelligence in audio and video processing teaches students modern methods of audio and video processing.	
<i>Goal:</i>	The primary goal of this course is to equip students with the knowledge and skills to use artificial intelligence tools and methodologies effectively in processing, analyzing, and synthesizing audio and video content.	
<i>Objective:</i>	<ul style="list-style-type: none"> <li>- AI tools and methods for processing and analyzing audio and video data;</li> <li>- Teach students how AI can be applied to real-world scenarios in media, entertainment, security, healthcare, and other industries;</li> <li>- Encourage innovative and creative approaches to solving complex problems in audio and video processing using AI;</li> <li>- Instill an understanding of the ethical implications of AI in media processing, particularly regarding privacy, bias, and social impact</li> </ul>	
<i>Learning outcome:</i>	<p>After studying the discipline, students should be able to:</p> <p>LO 1. Mastery of core concepts</p> <p>LO 2. Technical skills development.</p> <p>LO 3. Design and implement systems.</p> <p>LO 4. Utilize modern AI tools.</p> <p>LO 5. Analyze and solve problems</p> <p>LO 6. Apply AI techniques</p>	
<i>Teaching methods:</i>	<p>In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized:</p> <ul style="list-style-type: none"> <li>- technology of problem- and project-based learning;</li> <li>- technologies of educational and research activities;</li> </ul>	

	<ul style="list-style-type: none"> <li>- communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods);</li> <li>- case-study method (analysis of situations);</li> <li>- game technologies, in which students participate in business, role-playing, simulation games;</li> <li>- information and communication (including distance learning) technologies.</li> </ul> <p>In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.</p>		
<i>Assessment of the student's knowledge:</i>	<b>Type of task</b>	<b>Number of points (max)</b>	<b>Total</b>
	Practical works (1-10)	24	100
	Independent work	12	
	Oral presentation	14	
	Frontier control	10	
	<b>Exam (Written)</b>	<b>0-50</b>	
<i>Topics of lectures:</i>	<ul style="list-style-type: none"> <li>- Introduction to the topic "Artificial intelligence in audio and video processing".</li> <li>- Basic terms and concepts of artificial intelligence in audio and video processing.</li> <li>- Areas of application of artificial intelligence in audio and video processing.</li> <li>- Tools used in the workflow and their types.</li> <li>- Artificial intelligence. History and fundamentals of artificial intelligence. The concept of machine learning. Basic concepts. Application of machine learning in artificial intelligence.</li> <li>- Fundamentals of linear algebra. Basic concepts of linear algebra. Using linear algebra operations in machine learning. Perform various operations on vectors and matrices (scalar addition, multiplication, matrix inversion, normalization, color calculation, transpanning, etc.).</li> <li>- Types of machine learning Learning with a teacher. Learning without supervision. Semi-supervised learning. Reinforcement learning algorithms. Algorithms with self-monitoring. Transfer training. Online training. Batch training.</li> <li>- Using tools in machine learning. Necessary tools. Basic operation statements in the Python programming environment. Basic operation statements in the Python programming environment. Declaring vectors and matrices and performing operations on them. Control and loop operators. Working with vectorization operations. Working with functions. The concept of a function. Working with functions. Working with functions for reading model data.</li> <li>- Graphical representation of data. Methods for graphical representation of data. The importance of graphical representation in machine learning. Understanding the description and functionality of available Python graphics libraries (Matplotlib, Pandas Plotting, Plotly).</li> <li>- Educational sample (data set). Methods for creating samples in machine learning. Methods for creating, collecting, and preprocessing an educational sample. Forming a training sample. Functions for generating a training sample (pandas package). Work with existing training samples (open data sets). OpenSource training options.</li> </ul>		
<i>Literature:</i>	<p>Literature 1. Artificial Intelligence in Audio and Video Processing: This Book Includes: "Artificial Intelligence in Audio and Video Processing: This Book Includes: Techniques, Tools, and Applications" by Elena Petrova and Michael Thompson, 2024, Oxford University Press. 2. Deep Learning for Computer Vision by Rajalingappaa Shanmugamani, 2018. Packt Publishing. 3. Machine Learning for Audio, Image, and Video Analysis: Theory and Applications, Second Edition by Francesco Camastra and Alessandro Vinciarelli, 2015. Springer. 4. Computer Vision: Algorithms and Applications by Richard Szeliski, 2010. Springer-Verlag.</p>		

<b>6.25. Hologram</b>		
<i>Semestr:</i>	8	
<i>Date of last modification:</i>	31.08.2023	
<i>Teachers:</i>	Modullayev Jahongir Sobir ugli	
<i>Component:</i>	Elective	
<i>Cycle:</i>	Core	
<i>Credit point:</i>	4	
<i>Pre-requisites</i>	Computer graphics	
<i>Workload:</i>	<b>Types of classes</b>	<b>Hours</b>
	Total	120
	Lecture	18
	Practical works	18
	Laboratory work	18
	SAW (Student autonomous work)	72
	Form of final control	Exam
	Final assessment method	Writing
<i>Control forms:</i>	Current control, Mid-term control, Final control	
<i>Assessment requirements</i>	Attendance at classes and 60% of academic progress in total for 2 types of control, to obtain admission to the final control	
<i>Final control</i>	The final exam is written in the form of 5 questions of 10 marks each, the questions consist of 2 parts: 3 theoretical questions and 2 practical questions. Total exam time is 80 minutes	
<i>Short content:</i>	The purpose of this course is to teach students Holograms and their physical properties. Students are already familiar with the basic physical phenomena underlying the holographic method of recording and reproducing information.	
<i>Goal:</i>	Holographic science teaches the development of methods for practical implementation of the schemes, processes and phenomena under consideration, primarily showing the capabilities of holographic methods compared to traditional methods.	
<i>Objective:</i>	- Knowledge of the basics of computer graphics, physics.	
<i>Learning outcome:</i>	<p>After studying the discipline, students should be able to:</p> <p>LO 1. Has an understanding of holography;</p> <p>LO 2. Analysis of the main stages of the development of holography;</p> <p>LO 3. Can distinguish types of holographic schemes;</p> <p>LO 4. Learns the main properties of holograms;</p> <p>LO 5. Explores three-dimensional hologram presentation techniques;</p> <p>LO 6. Learns the basic principles of coupled wave theory;</p> <p>LO 7. Can describe digital holography;</p> <p>LO 8. Can use holographic interferometry.</p>	
<i>Teaching methods:</i>	<p>In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized:</p> <ul style="list-style-type: none"> <li>- technology of problem- and project-based learning;</li> <li>- technologies of educational and research activities;</li> <li>- communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods);</li> <li>- case-study method (analysis of situations);</li> <li>- game technologies, in which students participate in business, role-playing, simulation games;</li> <li>- information and communication (including distance learning) technologies.</li> </ul>	

	In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "Know-Want to Know-Learned", "INSERT", hands-on activities, gamification and others are actively used during practical classes.				
Assessment of the student's knowledge:	Type of task		Number of points (max)		Total
	Current control	Practical works	15	40	
		Laboratory works	15		
		Independent work	5		
		Oral presentation	5		
	Mid-term control	Written work	10		
	Final control	Exam (Written)	50		
Topics of lectures:	<ul style="list-style-type: none"><li>- The main stages of the development of holography.</li><li>- Hologram as an information carrier: interference pattern and recording medium.</li><li>- Obtaining object images using reconstructed object wavelet. Basic characteristics of objects for holography and images of the object obtained using a hologram.</li><li>- Types of holographic schemes and their practical application.</li><li>- Types of holograms according to the photoresponse feature of the recorder.</li><li>- The main properties of holograms.</li><li>- Classification of holograms. Theoretical analysis of three-dimensional holograms.</li><li>- Basic principles of coupled wave theory.</li><li>- Threshold values of the main parameters of various types of holograms in linear and non-linear recording modes.</li><li>- Radiation sources for holography.</li><li>- Settings for registration of holograms.</li><li>- Writing tools for holography.</li><li>- Digital holography.</li><li>- Digital holography.</li><li>- Holographic interferometry.</li></ul>				
Literature:	Literature 1 M.Pell, Envisioning Holograms / America. 2017. – Edition 1. 2 О.В. Андреева, Прикладная голография. - Санкт-Петербург 2008. 3. Островский Ю.И., Бутусов М.М., Островская Г.В. Голографическая интерферометрия. - М.: Наука. 1977. - 339 с. 4. Клименко И.С. Голография сфокусированных изображений и спеклинтерферометрия. - М.: Наука. 1985. - 222 с.				



<b>6.26. Individual project</b>		
<i>Semestr:</i>	5	
<i>Date of last modification:</i>	31.08.2023	
<i>Teachers:</i>	Nuraliyev Fakhriddin Murodillayevich	
<i>Component:</i>	Compulsory	
<i>Cycle:</i>	Core	
<i>Credit point:</i>	4	
<i>Pre-requisites</i>	–	
<i>Workload:</i>	<b>Types of classes</b>	<b>Hours</b>
	Total	120
	Lecture	-
	Practical works	48
	SAW (Student autonomous work)	72
	Form of final control	Report
<i>Control forms:</i>	Report	
<i>Final control:</i>	The student defends the completed project by presenting it to the commission, and each member of the commission evaluates the work.	
<i>Short content:</i>	This course is an independent scientific research work of the student, which is carried out independently on the basis of in-depth mastering of the scientific and theoretical foundations of specialized subjects, study, analysis and generalization of international and national economic problems.	
<i>Goal:</i>	The goal of the individual project course is to deeply master the scientific and theoretical foundations of specialized subjects by students.	
<i>Objective:</i>	Concept of individual project, project activity, project culture; Goals, design tasks, problems in the modern world.	
<i>Learning outcome:</i>	<p>After studying the discipline, students should be able to:</p> <p>LO 1. Understand the problematic topic in the field of computer engineering.</p> <p>LO 2. To develop students' ability to set a specific problem and solve it.</p> <p>LO 3. Development of proposals and recommendations aimed at the implementation of a problematic topic.</p> <p>LO 4. Increase the potential of students to effectively use scientific literature, practical analytical-statistical data and other materials in scientific-practical activities.</p>	
<i>Teaching methods:</i>	<p>In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized:</p> <ul style="list-style-type: none"> <li>- technology of problem- and project-based learning;</li> <li>- technologies of educational and research activities;</li> <li>- communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods);</li> <li>- case-study method (analysis of situations);</li> <li>- game technologies, in which students participate in business, role-playing, simulation games;</li> <li>- information and communication (including distance learning) technologies.</li> </ul> <p>In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "INSERT", "Fishbone" method, "I know, I found out, I want to know" hands-on activities, gamification and others are actively used during practical classes.</p>	

<i>Assessment of the student's knowledge:</i>	<b>Type of task</b>	<b>Number of points (max)</b>	<b>Total</b>
	Completeness of theoretical material	<b>0-20</b>	<b>0-100</b>
	Implementation of the practical part of the project	<b>0-30</b>	
	To answer the given questions clearly and succinctly	<b>0-50</b>	
<i>Topics of lectures:</i>	<ul style="list-style-type: none"><li>- Introduction to Computer Engineering</li><li>- Concept of "Individual project, project activity, project culture". Goals, design tasks, problems in the modern world. 2</li><li>- Methodology and technology of project activity. Design thinking methods.</li><li>- Designing the topic and problems of the project. Design concept. Relevance - evidence, validity.</li><li>- Methods of determining the goal and dividing it into tasks, originality, compliance with the topic. Review of key materials on the topic.</li><li>- Logic of actions and sequence of steps in personal project planning. Calculate the calendar schedule of your activity.</li><li>- Information search and systematization. Information culture. Types of information sources. Information processing tools - methods, techniques, technologies.</li><li>- Use of information technologies in research and project activities. Working on the Internet. Organization of work with scientific literature. Introduction to catalogs.</li><li>- Communication barriers in public defense of project results. Use of information technology in research and project. Methods and forms of data submission.</li><li>- Presentation of the results of the educational project. Analysis of information, implementation of the project, formation of conclusions. Prepare possible forms for presenting results. A basis for the design process. Explanation of the obtained results.</li><li>- Recommendations and analysis of reported errors. Correction of defects. Search, compare, identify strengths and weaknesses of similar projects.</li><li>- Initial public presentation: topic, working hypothesis, relevance, research plan, expected results, project plan.</li></ul>		
<i>Literature:</i>	1. Andrew S. Tanenbaum. Computer Networks, Fourth Edition. Publisher; Prentice Hall, 2011. 2. James F. Kurose, Keith W. Ross "A Top-Down Approach: Computer Networking", 2017. Pearson Education Limited 3. Musaev M.M. "Computer systems and networks". Tashkent.: "Alokachi" publishing house, 2013. Chapter 8. 394 pages. - Guide for higher educational institutions. 4. Miryusupov Z. Z., Djumanov J. Kh. Computer networks: study guide, Muhammad Al-Khorazmi name. TATTOO. - T.: Alokachi, 2020. - 144 p.		

<b>6.27. Qualification Practice 1 (Practical Training)</b>		
<i>Semestr:</i>	6	
<i>Date of last modification:</i>	31.08.2023	
<i>Teachers:</i>	Nuraliyev Fakhriddin Murodillayevich	
<i>Component:</i>	Compulsory	
<i>Cycle:</i>	Core	
<i>Credit point:</i>	6	
<i>Pre-requisites</i>	Individual project	
<i>Workload:</i>	<b>Types of classes</b>	<b>Hours</b>
	Total	180
	Lecture	-
	Practical works	-
	SAW (Student autonomous work)	180
	Form of final control	Practice Report
<i>Control forms:</i>	Practice Report	
<i>Final control:</i>	The report is the practice work of the student in the form of a report on the subject of the graduation qualification work.	
<i>Short content:</i>	Development and formation of general professional competences, as well as acquisition by students of the necessary skills and experience of practical work in their specialty in modern conditions, and preparation for graduation qualification work.	
<i>Goal:</i>	The goal of production practice is comprehensive development of all types of professional activity of students in their fields.	
<i>Objective:</i>	The direct management of practice in enterprises is carried out by the engineering and technical staff of these enterprises. The head of the enterprise assigns the responsibility for the organization of the operation to the chief specialist or his deputy.	
<i>Learning outcome:</i>	<p>After studying the discipline, students should be able to:</p> <p>LO 1. Understand the problematic topic in the field of computer engineering.</p> <p>LO 2. Search for information, critically analyze and synthesize, apply a systematic approach to solving given problems.</p> <p>LO 3. Development of proposals and recommendations aimed at the implementation of a problematic topic.</p> <p>LO 4. To be able to carry out social communication and fulfill one's role in the team, control technological process parameters, product quality and production control in the field of computer engineering.</p>	
<i>Teaching methods:</i>	<p>In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized:</p> <ul style="list-style-type: none"> <li>- technology of problem- and project-based learning;</li> <li>- technologies of educational and research activities;</li> <li>- communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods);</li> <li>- case-study method (analysis of situations);</li> <li>- game technologies, in which students participate in business, role-playing, simulation games;</li> <li>- information and communication (including distance learning) technologies.</li> </ul> <p>In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "INSERT", "Fishbone" method, "I know, I found out, I want to know" hands-on activities, gamification and others are actively used during practical classes.</p>	

Assessment of the student's knowledge:	Type of task	Number of points (max)	Total
	Complete and accurate completion of the task	0-50	0-100
	Being able to demonstrate the ability to think independently within the framework of pre-graduate work practice	0-20	
	To answer the given questions clearly and succinctly	0-30	
Topics of lectures:	<ul style="list-style-type: none"> <li>- The direct management of practice in enterprises is carried out by the engineering and technical staff of these enterprises. The head of the enterprise assigns the responsibility for the organization of the operation to the chief specialist or his deputy.</li> <li>- Study of normative and technical literature on the topic of practice.</li> <li>- Get technical safety instructions.</li> <li>- Get the topics of the graduation thesis. Identifying problematic situations for graduate work. Forming a group.</li> <li>- Determining the main goals and tasks of the graduate work.</li> <li>- Standards for the development of a technical assignment for a graduate qualification work. Development of requirements for graduate work</li> <li>- Projecting. Search and systematization of information on the topic of graduate work.</li> <li>- Projecting. Creating a model on the subject of a graduate thesis.</li> <li>- Analysis of information, implementation of graduation qualification work, formation of conclusions. Prepare possible forms for presenting results. Explanation of the obtained results.</li> <li>- Recommendations and analysis of reported errors. Correction of defects. Search, compare, and identify strengths and weaknesses of similar graduate qualifications. Preparation of reports.</li> <li>- Initial public presentation: topic, working hypothesis, relevance, research plan, expected results, thesis plan.</li> <li>- Final presentation. Presentation of work carried out within the framework of pre-graduation qualification work</li> </ul>		
Literature:	1. Project Solving Basic Technique Third edition, Fujitsu Learning Media Ltd. – 2011, 2013. –62 p. 2. Andrew S. Tanenbaum. Computer Networks, Fourth Edition. Publisher; Prentice Hall, 2011. 3. James F. Kurose, Keith W. Ross "A Top-Down Approach: Computer Networking", 2017. Pearson Education Limited 4. Musaev M.M. "Computer systems and networks". Tashkent.: "Alokachi" publishing house, 2013. Chapter 8. 394 pages. - Guide for higher educational institutions. 5. Miryusupov Z. Z., Djumanov J. Kh. Computer networks: a study guide, named after Muhammad Al-Khorazmi. TATTOO. - T.: Alokachi, 2020. - 144 p.		

**6.28. Qualification Practice 2 (Pre-Graduation Work Practice)**

<i>Semestr:</i>	8												
<i>Date of last modification:</i>	31.08.2023												
<i>Teachers:</i>	Nuraliyev Fakhriddin Murodillayevich												
<i>Component:</i>	Compulsory												
<i>Cycle:</i>	Core												
<i>Credit point:</i>	6												
<i>Pre-requisites</i>	Qualification Practice 1 (Practical Training)												
<i>Workload:</i>	<table> <tr> <th>Types of classes</th><th>Hours</th></tr> <tr> <td>Total</td><td>180</td></tr> <tr> <td>Lecture</td><td>-</td></tr> <tr> <td>Practical works</td><td>-</td></tr> <tr> <td>SAW (Student autonomous work)</td><td>180</td></tr> <tr> <td>Final assessment method</td><td>Practice Report</td></tr> </table>	Types of classes	Hours	Total	180	Lecture	-	Practical works	-	SAW (Student autonomous work)	180	Final assessment method	Practice Report
Types of classes	Hours												
Total	180												
Lecture	-												
Practical works	-												
SAW (Student autonomous work)	180												
Final assessment method	Practice Report												
<i>Control forms:</i>	Practice Report												
<i>Final control</i>	The report is the individual work of the student in the form of a report on the subject of the graduation qualification work.												
<i>Short content:</i>	In modern conditions, mastering the necessary skills and experience of practical work in one's specialty and preparing for graduation work.												
<i>Goal:</i>	The goal of pre-graduation practice is comprehensive development of all types of professional activities of students in their fields.												
<i>Objective:</i>	The direct management of practice in enterprises is carried out by the engineering and technical staff of these enterprises. The head of the enterprise assigns the responsibility for the organization of the operation to the chief specialist or his deputy.												
<i>Learning outcome:</i>	<p>After studying the discipline, students should be able to:</p> <p>LO 1. Understand the problematic topic in the field of computer engineering.</p> <p>LO 2. Search for information, critically analyze and synthesize, apply a systematic approach to solving given problems.</p> <p>LO 3. Development of proposals and recommendations aimed at the implementation of a problematic topic.</p> <p>LO 4. To be able to carry out social communication and fulfill one's role in the team, control technological process parameters, product quality and production control in the field of computer engineering.</p>												
<i>Teaching methods:</i>	<p>In the conditions of the credit system of education, classes are conducted mainly in active and creative forms. Among the effective pedagogical methods and technologies that promote active involvement of students in the search and management of knowledge, the acquisition of experience in independent problem solving should be emphasized:</p> <ul style="list-style-type: none"> <li>- technology of problem- and project-based learning;</li> <li>- technologies of educational and research activities;</li> <li>- communication technologies (discussion, press-conference, brainstorming, educational debates and other active forms and methods);</li> <li>- case-study method (analysis of situations);</li> <li>- game technologies, in which students participate in business, role-playing, simulation games;</li> <li>- information and communication (including distance learning) technologies.</li> </ul> <p>In order to develop critical thinking among students, such methods as "Prediction with open questions", "Cluster", "Cross-discussion", "INSERT", "Fishbone" method, "I know, I found out, I want to know" hands-on activities, gamification and others are actively used during practical classes.</p>												

Assessment of the student's knowledge:	Type of task	Number of points (max)	Total
	Complete and accurate completion of the task	0-50	0-100
	Being able to demonstrate the ability to think independently within the framework of pre-graduate work practice	0-20	
	To answer the given questions clearly and succinctly	0-30	
Topics of lectures:	<ul style="list-style-type: none"> <li>- The direct management of practice in enterprises is carried out by the engineering and technical staff of these enterprises. The head of the enterprise assigns the responsibility for the organization of the operation to the chief specialist or his deputy.</li> <li>- Study of normative and technical literature on the topic of practice.</li> <li>- Get technical safety instructions.</li> <li>- Get the topics of the graduation thesis. Identifying problematic situations for graduate work. Forming a group.</li> <li>- Determining the main goals and tasks of the graduate work.</li> <li>- Standards for the development of a technical assignment for a graduate qualification work. Development of requirements for graduate work</li> <li>- Projecting. Search and systematization of information on the topic of graduate work.</li> <li>- Projecting. Creating a model on the subject of a graduate thesis.</li> <li>- Analysis of information, implementation of graduation qualification work, formation of conclusions. Prepare possible forms for presenting results. Explanation of the obtained results.</li> <li>- Recommendations and analysis of reported errors. Correction of defects. Search, compare, and identify strengths and weaknesses of similar graduate qualifications. Preparation of reports.</li> <li>- Initial public presentation: topic, working hypothesis, relevance, research plan, expected results, thesis plan.</li> <li>- Final presentation. Presentation of work carried out within the framework of pre-graduation qualification work</li> </ul>		
Literature:	1. Project Solving Basic Technique Third edition, Fujitsu Learning Media Ltd. – 2011, 2013. –62 p. 2. Andrew S. Tanenbaum. Computer Networks, Fourth Edition. Publisher; Prentice Hall, 2011. 3. James F. Kurose, Keith W. Ross "A Top-Down Approach: Computer Networking", 2017. Pearson Education Limited 4. Musaev M.M. "Computer systems and networks". Tashkent.: "Alokachi" publishing house, 2013. Chapter 8. 394 pages. - Guide for higher educational institutions. 5. Miryusupov Z. Z., Djumanov J. Kh. Computer networks: a study guide, named after Muhammad Al-Khorazmi. TATTOO. - T.: Alokachi, 2020. - 144 p.		

<b>6.29. Graduation qualification work</b>			
<i>Semestr:</i>	8		
<i>Date of last modification:</i>	31.08.2023		
<i>Teachers:</i>	Nuraliyev Fakhridin Murodillayevich		
<i>Component:</i>	Compulsory		
<i>Cycle:</i>	Core		
<i>Credit point:</i>	14		
<i>Pre-requisites</i>	–		
<i>Workload:</i>	<b>Types of classes</b>		<b>Hours</b>
	Total		420
	Lecture		-
	Practical works		-
	SAW (Student autonomous work)		420
	Form of final control		State Attestation
<i>Control forms:</i>	State Attestation		
<i>Final control:</i>	The defense is conducted through a presentation of the completed work. The presenter is given 10 minutes, followed by time for questions from the commission members.		
<i>Short content:</i>	This work aims to show the student's competence in analyzing, researching, and addressing complex issues within their field of study, reflecting their readiness for professional practice. Additionally, it serves to assess the student's proficiency in conducting independent research, critical thinking, and effective communication of their findings.		
<i>Goal:</i>	The goal of the graduation qualification work is to demonstrate the student's ability to independently apply the knowledge and skills acquired during their studies to solve specific professional tasks.		
<i>Objective:</i>	Applying Theoretical Knowledge: To apply the theoretical concepts and methodologies learned during the course of study to real-world problems within the student's field. Conducting Independent Research: To develop and implement a research plan, including data collection, analysis, and interpretation, demonstrating the student's ability to conduct independent research.		
<i>Learning outcome:</i>	LO 1. Applying Theoretical Knowledge: To apply the theoretical concepts and methodologies learned during the course of study to real-world problems within the student's field. LO 2. To develop and implement a research plan, including data collection, analysis, and interpretation, demonstrating the student's ability to conduct independent research. LO 3. To identify and analyze a specific problem or question relevant to the field, proposing viable solutions or approaches. LO 4. To enhance the student's ability to critically evaluate existing literature, theories, and practices related to the chosen topic. LO 5. To encourage the exploration of new ideas, techniques, or approaches within the field, contributing to the advancement of knowledge or practice. LO 6. To effectively communicate research findings and arguments in a clear, concise, and well-structured manner, both in written and oral forms.		
<i>Teaching methods:</i>	–		
<i>Assessment of the student's knowledge:</i>	<b>Type of task</b>	<b>Number of points (max)</b>	<b>Total</b>
	Completeness of theoretical material	<b>0-20</b>	<b>0-100</b>
	Implementation of the practical part of the project	<b>0-30</b>	
	To answer the given questions clearly and succinctly	<b>0-50</b>	

<i>Topics of lectures:</i>	<ul style="list-style-type: none"> <li>- Choosing a topic: Selecting and agreeing on a thesis topic that should be relevant, significant, and aligned with the field of study.</li> <li>- Creating a plan: Developing a detailed plan of the work, including the main sections and the order in which they will be completed. The plan is approved by the academic advisor.</li> <li>- Literature review and analysis: Searching for and studying scientific sources, literature, and data related to the research topic. This stage involves analyzing previous studies and forming the theoretical foundation of the work.</li> <li>- Conducting research: Developing and implementing the research methodology, collecting necessary data, conducting experiments, surveys, interviews, and other research procedures.</li> <li>- Data analysis and processing: Processing the collected data using appropriate methods, analyzing them, and interpreting the results.</li> <li>- Writing the thesis: Composing the theoretical and practical sections of the work, including the introduction, main sections, conclusion, and bibliography. The work must adhere to the formatting requirements set by the university.</li> <li>- Editing and revisions: Reviewing the text to ensure it meets the requirements, correcting errors, and refining details. Editing the work based on feedback from the academic advisor.</li> <li>- Preparation for defense: Preparing a presentation, thesis summary, and speech for the defense of the thesis before the committee.</li> <li>- Thesis defense: Presenting and defending the thesis before the examination committee and answering questions from the committee members.</li> <li>- Final submission: Making any necessary corrections based on the defense results, finalizing the thesis, and submitting it to the university archive.</li> </ul>
<i>Literature:</i>	<p>1. Karimov, I. (2020). Methods of scientific research. Tashkent: National Encyclopedia of Uzbekistan. 2. Rahimov, B. (2019). Methodology of conducting scientific research works. Tashkent: Science and Technology. 3. Mirzaev, M. (2018). A guide to writing and defending graduate theses. Tashkent: Ministry of Higher and Secondary Special Education. 4. Bell, J., &amp; Waters, S. (2018). Doing Your Research Project: A Guide for First-time Researchers. McGraw-Hill Education. 5. Robson, C., &amp; McCartan, K. (2016). Real World Research. Wiley. 6. Resnik, D. B. (2020). The Ethics of Research with Human Subjects. Springer. 7. Jones, L. (2011). Academic Integrity: A Guide for Students. University of Queensland Press.</p>