KARSHI STATE UNIVERSITY

MINISTRY OF HIGHER EDUCATION, SCIENCE AND INNOVATIONS OF THE REPUBLIC OF UZBEKISTAN

KARSHI STATE UNIVERSITY

THE LATEST HISTORY OF UZBEKISTAN
MODULE HANDBOOK

Field of knowledge	500 000	Science, mathematics, physical
Field of education	530 000	Physical and statistics
Field of study	60530500	Physical

MODULE REFERENCES

Module name:	THE LATEST HISTORY OF UZBEKISTAN
Code, if applicable:	UYT1104
Semesters in which the module is taught:	1
Lecturer:	Sulaymanova Soxiba, senior teacher Quvvatova Nodira, senior teacher Tuxtayeva Ra'no, senior teacher
Language	Uzbek
Relation to curriculum:	Compulsory
Type of teaching, contact hours:	Lecture, practical
Workload:	120 hours Contact hours: 60 hours; lecture – 30 hours; practical – 30 hours Self-study: 60 hours
Credit points:	4
Recommended prerequisites:	History of Uzbekistan Archaeology Historical geography Medieval Uzbekistan Source studies

Module objectives Intended learning outcome	The essence of the historical path that our country has taken during the years of independence, the significance of the changes that have taken place in the recent history of Uzbekistan; Knows how to comprehensively analyze the aspects of the relationship between the development of statehood and international relations; Knows from the perspective of historicity and objectivity the processes of integration of Uzbekistan with the world community, ensuring security, interethnic harmony and religious tolerance, increasing the role and influence of the Republic of Uzbekistan in international ratings and indices in modern processes; Learns to analyze the uniqueness of historical processes in different periods of the recent history of Uzbekistan; Knows how to use the idea of national independence in studying the problems of the recent history of Uzbekistan, strengthening the worldview, Acquires the skills to express their attitude to the processes taking place around them, and to understand the role of history in the development of society and human worldview;

	will acquire the skills to understand the connection between current events and important events in history. will acquire the skills to apply the knowledge acquired in the subject in scientific research and scientific and pedagogical activities, and to conduct research on current issues of the history of statehood.
Content	Lecture 1. Introduction. The subject, goals and objectives of the academic discipline “The Latest History of Uzbekistan”, theoretical and methodological principles. Lecture 2. Historical foundations of the ideas of independence in Uzbekistan Lecture 3. Historical foundations of the ideas of independence in Uzbekistan Lecture 4. Historical foundations of the ideas of independence in Uzbekistan Lecture 5. Socio-political processes in Uzbekistan on the eve of independence Lecture 6. The historical significance of the formation of the independent Republic of Uzbekistan. The unique path of independence and development of Uzbekistan. Lecture 7. The formation of the foundations of democratic, civil society in Uzbekistan, the implemented political reforms. Lecture 8. Economic reforms, the formation of private ownership. The development of market relations in Uzbekistan. Lecture 9. Reforms in the social sphere in the Republic of Uzbekistan. Lecture 10. Spiritual and cultural development in Uzbekistan during the years of independence. Lecture 11. Reforms implemented in the field of education in the Republic of Uzbekistan. Lecture 12. Uzbekistan and the world community. Lecture 13. Reflection of changes taking place in the socio-political, economic and cultural life of New Uzbekistan in international ratings and indices Lecture 14. Reforms implemented in New Uzbekistan under the leadership and initiative of President Sh.M. Mirziyoyev Lecture 15. The socio-political significance of building a people's and humane state in New Uzbekistan. Seminars Seminar 1. Introduction. The subject, goals and objectives of the academic discipline "The Latest History of Uzbekistan", theoretical and methodological principles. Seminar 2. Historical foundations of the ideas of independence in Uzbekistan Seminar 3. Historical foundations of the ideas of independence in Uzbekistan Seminar 4. Historical foundations of the ideas of independence in Uzbekistan Seminar 5. Socio-political processes in Uzbekistan on the eve of independence

	Seminar 6. The historical significance of the formation of the independent Republic of Uzbekistan. The unique path of independence and development of Uzbekistan. Seminar 7. Formation of the foundations of democratic, civil society in Uzbekistan, implemented political reforms. Seminar 8. Economic reforms, the formation of private ownership. Development of market relations in Uzbekistan. Seminar 9. Reforms in the social sphere in the Republic of Uzbekistan. Seminar 10. Spiritual and cultural development in Uzbekistan during the years of independence. Seminar 11. Reforms implemented in the field of education in the Republic of Uzbekistan. Seminar 12. Uzbekistan and the world community. Seminar 13. Reflection of changes taking place in the socio-political, economic and cultural life of New Uzbekistan in international ratings and indices Seminar 14. Reforms being implemented in New Uzbekistan under the leadership and initiative of President Sh.M. Mirziyoyev Seminar 15. The socio-political significance of building a people-oriented and humane state in New Uzbekistan
Study and examination requirements and forms of examination	Types of control and assessment criteria The student must fully master the theoretical and methodological concepts of the subject, be able to correctly reflect the results of the analysis, independently observe the processes being studied, and complete the tasks and assignments given in the current, intermediate and final types of control. 1. The maximum sum of the current and intermediate control points is 50 points, and the qualifying score is 30 points. Tasks (tests, oral or written questions, case studies, etc.) for the current and intermediate types of control are compiled in a ratio of 40/60 or 50/50, based on the ratio of the audience (lecture, practical, laboratory and seminar) and independent study hours allocated to this subject. 2. The maximum score of the final control is 50 points. Assignments for the final type of control (tests, oral or written questions, case studies, etc.) are compiled in a ratio of 40/60 or 50/50, based on the ratio of classroom hours (lectures, practical, laboratory and seminar) and independent study hours allocated to this subject. 3. If the sum of the current and intermediate control points is less than 30 points or a student who misses 25 percent or more of the classroom hours allocated to the subject without a reason is excluded from this subject and is not included in the final control and is considered not to have mastered the relevant credits in this subject. A student who is not included or has not entered the final control type, as well as who has received an unsatisfactory grade in this type of control, that is, has not been able to collect a

	qualifying score (30 points), is considered to be an academic debtor. In such cases, the student re-masters the subject within the specified time limits.
Media employed	- lectures; - interactive case studies; - seminars (logical reasoning, quick questions and answers); - group work; - presentations; - individual projects.
Reading list	1. R.H. Murtazayeva O‘zbekistonda millatlararo munosabatlar va tolerantlik. Darslik. - Toshkent: Mumtoz so‘z, 2019. 2. R.H.Murtazayeva, A.A.Yermetov, A.A.Odilov va boshq. O‘zbekistonning eng yangi tarixi. - Toshkent, 2024. 3. A.S.Sagdullayev umumiy tahriri ositida. O‘zbekiston tarixi. 1-jild. Darslik. – Toshkent: NIF MSH. 2024. 3. B.J.Eshov, A.A.Odilov. O‘zbekiston tarixi. 2-jild. Darslik. – Toshkent: NIF MSH. 2024. 4. K.D.Saipova. Noveyshaya istoriya Uzbekistana (uchebnoe posobie). –Tashkent: NIF MSH, 2024.
Reviewers	B.J. Eshov – Professor of the Department of History of Uzbekistan, Doctor of Philosophy O.A. Rahmonkulova - Associate Professor of the Department of History of Uzbekistan, Doctor of Philosophy.
Confirmed place and time	Developed and approved by Karshi State University (Report № 1 30.08.2024)

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MINISTRY OF HIGHER EDUCATION, SCIENCE AND INNOVATIONS OF THE REPUBLIC OF UZBEKISTAN

KARSHI STATE UNIVERSITY

PHILOSOPHY

Field of knowledge: 500,000-Natural sciences, mathematics and statistics
Field of education: 530,000 - Physics and natural sciences
Field of education: 60530500-physics

MODULE REFERENCES

Module name:	PHILOSOPHY
Code, if applicable:	FAL 1204
Semesters in which the module is taught:	2
Lecturer:	Tohir Qurbonov
Language	Uzbek
Relation to curriculum:	Compulsory
Type of teaching, contact hours:	Lecture, practical
Workload:	Total -120 Contact hours: 60 hours; lecture – 30 hours; practical – 30 hours Self-study: 60 hours
Credit points:	4
Recommended prerequisites:	Psychology History Religion

Module objectives Intended learning outcome	It is aimed at creating a generalized system of students' worldview and showing the human mind in it, forming a person's knowledge of the world, socio-political, moral, aesthetic and other relations, and teaching the skills of correct thinking. To properly organize professional activities based on the study of the most ancient and modern philosophical knowledge about the world, to increase social responsibility, to form a sense of involvement in state policy; to independently analyze social processes; To have an idea of the main ideas of ancient, medieval and modern philosophy, the role of Eastern philosophy in the development of society, the philosophical content of Western philosophical movements, the essence of the Western Renaissance, the influence of medieval Eastern science and philosophy on its formation, and the important features of Western philosophy of the New and most modern eras; The directions of new ontology, the social significance of gene ontology, bioontology, medical ontology, the relationship and differences between physical and philosophical ontology, the protection of human and social interests in the use of technologies in an information society, the role of the biosphere and noosphere in the ontology of nature, social ecology, and environmental education and upbringing are all known and can be used.

Content	Training format: lecture 1. Philosophy and its role in the life of society. 2. Stages of development of philosophical thought: Eastern philosophy. 3. Stages of development of philosophical thought: Western philosophy. 4. Philosophy of being (ontology) and development. 5. Philosophy of knowledge (epistemology). 6. Logic. 7. Forms of thought: concept, judgment and conclusion. 8. Philosophy of society. 9. Philosophy of man (Philosophical anthropology). 10. Philosophy of values (axiology). 11. Philosophy of morality (Ethics) 12. Philosophy of aesthetics (Aesthetics). 13. Philosophy of globalization and sustainable development. 14. World experience in combating corruption. 14. Anti-corruption policy of Uzbekistan. Form of classes: practical 1. Philosophy and its role in the life of society. 2. Stages of development of philosophical thought: Eastern philosophy. 3. Stages of development of philosophical thought: Western philosophy. 4. Philosophy of being (ontology) and development. 5. Philosophy of knowledge (epistemology). 6. Logic. 7. Forms of thought: concept, judgment and conclusion. 8. Philosophy of society. 9. Philosophy of man (Philosophical anthropology). 10. Philosophy of values (axiology). 11. Philosophy of morality (Ethics). 12. Philosophy of sophistication (Aesthetics). 13. Philosophy of globalization and sustainable development. 14. World experience in combating corruption. 15. Anti-corruption policy of Uzbekistan.

Study and examination requirements and forms of examination	a) To receive a grade of 5, the student's level of knowledge must meet the following requirements: can fully explain the essence and content of the subject; maintains scientificity and logic in presenting the topics in the subject, avoiding scientific errors and confusion; has a clear idea of the theoretical or practical significance of the subject materials in the subject; can demonstrate the ability to think independently within the scope of the subject; can answer the questions asked clearly and concisely; has carefully prepared the outline; has completed independent assignments completely and clearly; has fully mastered the laws and other regulatory and legal documents related to the discipline; has published a scientific article on one of the topics related to the discipline; can interpret historical processes; b) To receive a grade of 4, the student's level of knowledge must meet the following requirements: understands the essence and content of the subject, does not allow scientific and logical confusion in explaining the topics in the subject; understands the practical significance of the content of the subject; performs the assigned tasks and assignments within the framework of the curriculum; can correctly answer the questions asked in the subject; has carefully formulated a subject outline; has fully completed independent assignments in the subject; has mastered laws and other regulatory documents related to the subject. c) To receive a grade of 3, the student's level of knowledge must meet the following criteria: has a general understanding of the subject; covers the topics of the subject in a narrow range, with some inconsistencies in the presentation; is not fluent in the presentation; if complex and confusing answers are given to questions on the subject; if the text on the subject is not well-structured. g) In the following cases, the student's level of knowledge may be assessed as unsatisfactory with a grade of 2: if preparation for the subject exercises is not carried out; if the student has no idea about the subject exercises; if it is noticeable that the texts on the subject have been copied from others; if serious errors and confusions are made in the text on the subject; if the questions asked about the subject are not answered; if the subject is not known.
Media employed	Some of the most effective methods of pedagogical technologies are the use of "Problem Situation", "FSMU", "Fish Skeleton", "Cluster" and "Why", "How" organizers in the educational process, presentation, brainstorming Blitz, discussion, question and answer technologies.

Reading list	1.Davronov Z., Shermuhamedova N, Qahharova M, Nurmatova M, Husanov B, Sultonova A. Falsafa. - Toshkent: TMU, 2019 Madaeva Sh. Shermuhamedova N. va boshqalar. Falsafa - o'quv qo‘llanmasi. - Toshkent: 2019 2.Muhammadjonova L.A., Abdulla Sher, Shodimetova G. Axloq falsafasi. - Toshkent: Vneshinvestprom, 2023 3.Saifnazarov I. Muxtorov A., Sultanov T., Usmonov F. Falsafa. Darslik. - T.: Innovatsion rivojlanish nashriyot - matbaa uyi, 2021.- 424 b. 4.Saifnazarov I.C, Abdullaxonova., Ernazarov D.Z. Filosofiya (Logika,Etika, Estetika) Uchebnoe posobie dlya vыsshix uchebnыx zavedeniy. LAMBERT Academik Publishing RU. 2019. -134 str 5.Shermuhamedova N. Falsafa. - Toshkent: Idris Abdurauf Nashr, 2021. 667-b.
Reviewers	Professor of the Department of Philosophy and Sociology Choriyev S.A. Associate Professor of the Department of Social Sciences Ph.D. (DSc) Omonov B.N.
Confirmed place and time	Developed and approved by Karshi State University (Report № 1 30.08.2024)

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MINISTRY OF HIGHER EDUCATION, SCIENCE AND INNOVATIONS OF THE REPUBLIC OF UZBEKISTAN

KARSHI STATE UNIVERSITY

RUSSIAN LANGUAGE
MODULE HANDBOOK

Field of knowledge	500 000	Natural sciences, mathematics and statistics
Field of education	540 000	Mathematics and statistics
Field of study	60530500	Physical

MODULE REFERENCES

Module name:	Russian language
Code, if applicable:	O'RT1204
Semesters in which the module is taught:	2
Lecturer:	**Saidova N.Z.** – Lecturer, Department of Russian Language and Literature **Supervisor:** Sadinova D.U.
Language	Russian
Relation to curriculum:	Compulsory
Type of teaching, contact hours:	practical
Workload:	120 hours Contact hours: 60 hours; Practical – 60 hours Independent study: 60 hours
Credit points:	4
Recommended prerequisites:	-

Module objectives Intended learning outcome	The acquisition of language knowledge, as well as the development and refinement of speech skills and abilities in areas relevant to learners, including academic, professional, and socio-cultural domains, taking into account the specificity of their field of study and the formation of certain aspects of the cultural component of communicative competence. The formation of a scientific and gumanitarnыy (humanistic) worldview, high moral and spiritual values, democratic culture, creative thinking, strong convictions, and socio-political engagement based on the ideas of national independence and democracy, as well as national and universal values, through the medium of the Russian language. **As a result of mastering the course, a bachelor's degree student should:** **know (have an understanding of how to):** construct a monologic statement in Russian on general language topics as well as on academic and professional subjects; express their thoughts fluently in both oral and written forms on professionally relevant topics; demonstrate command of the linguistic and speech norms of the modern Russian language within the professional field of their chosen specialty; conduct a dialogue and participate in a polylogue on a given topic; produce secondary academic texts (annotation, abstract, résumé). During the course, the students will: · independently search for and utilize scientific information as a foundation for professional activity;

	· work independently when preparing presentations, reports, and academic papers on professional topics; · compose annotations and abstracts, selecting appropriate linguistic means in accordance with communicative intention and the context of communication.
Content	The subject of the sentence and its types of expression. Simple sentence. Types of sentences: declarative, interrogative, imperative. **Lexical topic:** Independence Day of the Republic of Uzbekistan. Gender of nouns. Noun as a part of speech. Singular and plural forms. Animate and inanimate nouns. Determining gender through agreement with other words. **Lexical topic:** Russian as a language of interethnic communication. Phonetic and orthoepic norms of the Russian language. Language norm. Rules for the use of linguistic means at a particular stage of language development. Consistency in pronunciation. Phonetics. **Lexical topic:** Our University. 4–5. Cases. Declension of nouns, pronouns, and ordinal numerals and their agreement. Nominative case. **Lexical topic:** The Moscow Kremlin. Genitive case. Forms of the genitive case in singular and plural nouns. Genitive case of personal, demonstrative, and possessive pronouns, adjectives, and numerals. **Lexical topic:** Moscow. Dative case. Forms of the dative case in singular and plural nouns. Dative case of pronouns, adjectives, and numerals. **Lexical topic:** Independent Uzbekistan – a state with a great past. Accusative case. Forms of the accusative case in singular and plural nouns. Accusative case of pronouns, adjectives, and numerals. **Lexical topic:** State Emblem. Instrumental case. Forms of the instrumental case in singular and plural nouns. Instrumental case of pronouns, adjectives, and numerals. **Lexical topic:** State Flag of the Republic of Uzbekistan. . Prepositional case. Forms of nouns, pronouns, adjectives, and ordinal numerals and their agreement. Prepositions expressing place and direction. **Lexical topic:** Interesting Facts. . Verbs: forms and government (past, present, future). Verbs of motion; aspect (perfective/imperfective). Agreement of verbs with nouns, adjectives, numerals, and pronouns. **Lexical topic:** I Study the Russian Language. . Numerals: categories and spelling. Cardinal and ordinal numerals. Declension of numerals. **Lexical topic:** World Day of the Sick (February 11). . Expression of spatial relations in simple and complex sentences. Adverbials of place. Prepositional constructions. **Lexical topic:** Mikhail Vasilyevich Lomonosov. . Expression of temporal relations in simple and complex sentences. Adverbials of time. Complex sentences with subordinate clauses of time. Use of prepositions (v, pri, vo vremya, v techenie, na protyajenii, v xode, v protsesse, do, pered, cherez, posle). **Lexical topic:** Avicenna – the first famous physician.

	. Expression of purpose relations in simple and complex sentences. Adverbials of purpose. Infinitive constructions. Subordinate clauses of purpose. **Lexical topic:** Education in Uzbekistan. . Expression of subject–predicate and object (complement) relations in simple and complex sentences. Direct and indirect objects. Transitive and intransitive verbs. **Lexical topic:** Stories about Alisher Navoi. . Expression of attributive relations in simple and complex sentences. Attributes: soglasovannыe i nesoglasovannыe (agreeing and non-agreeing modifiers). Declension of adjectives. **Lexical topic:** Maslenitsa Traditions. . Expression of cause-and-effect relations in simple and complex sentences. Participial constructions. Subordinate clauses of cause. **Lexical topic:** Abu Rayhan Beruni. . Expression of connection, comparison, contrast, and opposition. Coordinated sentence structures. Comparative degree of adjectives and adverbs. **Lexical topic:** Olympic Games. Achievements of Uzbek Athletes. . Expression of conditional and concessive relations in simple and complex sentences. Real condition. Subordinate concessive clauses. **Lexical topic:** Language as the most important means of communication. . Pronouns. Declension of pronouns: personal, possessive, negative, indefinite, determinative, demonstrative. **Lexical topic:** Culture of Communication. . Adverbs. Spelling of adverbs. Types of adverbs (qualitative and pronominal). **Lexical topic:** Native Language – My Pride and Glory. . Description of a person, object, and space. Portrait and characterization in literary and conversational styles. **Lexical topic:** What is Oil? . Lexical relations: polysemy, synonyms, antonyms, homonyms, paronyms. Phraseological units. **Lexical topic:** Navruz – a National Holiday. 25–26. Verbs of motion with prefixes. One-directional and multi-directional movement. Usage with prepositions. **Lexical topic:** Women's Day. . Official-business style. Legislative, administrative, and diplomatic substyles. Formal documents: autobiography, reference, power of attorney, receipt, application. **Lexical topic:** Ruler of Happy Constellations. . Literary (fictional) style. Functions of literary language. Stylistic devices (e.g., simile). **Lexical topic:** A.S. Pushkin – the Greatest Russian Poet. . Scientific style: lexical, morphological, and syntactic features. **Lexical topic:** Monument to Amir Temur. . Language means and conventions for writing annotation, abstract, and review. Structure of academic texts. **Lexical topic:** Bukhara – the Pearl of the East.

Study and examination requirements and forms of examination	Oral Examination: For this exam, the student is given 20 minutes for preparation to answer the questions. The answers to the questions are graded as follows: 1. If detailed and complete answers are provided for all questions – 5 (Excellent) 2. If answers are provided for all questions (some of them partially) or complete answers are given for 2/3 of the questions – 4 (Good) 3. If answers are given to some of the questions or partial answers are provided for 2/3 of the questions – 3 (Satisfactory) 4. If no answers are provided or the answers do not correspond to the questions – 2 (Unsatisfactory)
Media employed	• Presentations, videos, simulations, electronic resources and others
Reading list	1. Rozental, D. E., Golub, I. B., & Telenkova, M. A. *Modern Russian Language*. Moscow: Rol'f, 2003. 448 p.
Reviewers	**Pardaeva D.R.** – Associate Professor, Department of Russian Language and Literature, PhD **Buranova Zh.A.** – Associate Professor, Department of Russian Language and Literature
Confirmed place and time	Developed and approved by Karshi State University (Report № 1 30.08.2024)

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MINISTRY OF HIGHER EDUCATION,

SCIENCE AND INNOVATIONS OF THE REPUBLIC OF UZBEKISTAN

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RELIGIOUS STUDIES
MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODULE REFERENCES

Module name:	Religious studies
Code, if applicable:	DIN 1304
Semesters in which the module is taught:	3
Lecturer:	Dilshod Sunatov
Language	Uzbek
Relation to curriculum:	Compulsory
Type of teaching, contact hours:	Lecture, seminar
Workload:	Total -120 Contact hours: 60 hours; lecture – 30 hours; seminar – 30 hours Self-study: 60 hours
Credit points:	4
Recommended prerequisites:	Psychology History

Module objectives Intended learning outcome	Students will gain an idea of the essence of religion, its role in society and individual life, how people with religious beliefs understand the world, the balance of secular and religious knowledge, the relationship between religion and science, and the goals of religious and secular education; By studying theology, students will be able to understand and use the essence of different religions, the differences and similarities between their traditions and beliefs, the role of religious and secular knowledge in educating people's tolerance and mutual respect, the analysis of national and world religions, beliefs and traditions, religious and moral ideas, the basic concepts of religious studies: God, prophets, man, fate, the afterlife, the essence of faith, the history of Buddhism and its ideas about human education, the role of Christian religious ideas in educating the spiritual and moral perfection of a person, the essence of the Sunni, Shiite and Khawarij directions of Islam, the formation of theology and the essence of the teachings of Sufism; understand the processes of secularization, the culture of mutual understanding with believers and non-believers of different religions, and communicate with them; will have the skills to combat spiritual threats and information attacks artificially associated with the name of religion. will be able to understand the essence of religious belief, local customs and traditions, to make common cause with believers and

	non-believers of different religions, and to communicate with them; will have the skills to combat spiritual threats and information attacks artificially associated with the name of religion will have information about religious pluralism, religious tolerance, and the role of tolerance in the life of society.
Content	Lecture 1 Subject, purpose and tasks of religious studies. Lecture 2 National religions. Lecture 3 History and main ideas of Buddhism. Lecture 4 History and main ideas of Christianity. Lecture 5 History and essence of Islam. Lecture 6 Sources of Islam, doctrinal schools and their significance in the present. Lecture 7 Islamic jurisprudential schools. Lecture 8 The influence of Sufism on Eastern culture. Lecture 9 The significance of Islamic values and enlightenment in the present. Lecture 10 New religious teachings and sects. Lecture 11 Religion in cyberspace. The socio-political dangers of missionary work and proselytism. Lecture 12 The history of religious fanaticism, extremism, fundamentalism, terrorism and their threat to security in the modern era. Lecture 13 Religious organizations operating in Uzbekistan. Lecture 14 The history of the activities of international religious organizations and their importance in achieving sustainable development goals. Lecture 15 The importance of ensuring the balance of secular and religious knowledge. Form of classes: Seminar class Seminar 1 The subject, goals and objectives of religious studies. Seminar 2 National religions. Seminar 3 History and ideas of Buddhism. Seminar 4 History and ideas of Christianity. Seminar 5 History and essence of Islam. Seminar 6 Sources of Islam, doctrinal schools and their importance in the modern era. Seminar 7 Islamic jurisprudential schools. Seminar 8 The influence of Sufi teachings on Eastern culture. Seminar 9 The importance of Islamic values and enlightenment in the modern era. Seminar 10 New religious teachings and sects. Seminar 11 Religion in cyberspace. The socio-political dangers of missionary work and proselytism.

	Seminar 12 The history of religious fanaticism, extremism, fundamentalism and terrorism and their threat to security in the modern era. Seminar 13 Religious organizations operating in Uzbekistan. Seminar 14 The history of the activities of international religious organizations and their importance in achieving sustainable development goals. Seminar 15 The importance of ensuring the balance of secular and religious knowledge.
Study and examination requirements and forms of examination	a) To receive a grade of 5, the student's level of knowledge must meet the following requirements: can fully explain the essence and content of the subject; maintains scientificity and logic in presenting the topics in the subject, avoiding scientific errors and confusion; has a clear idea of the theoretical or practical significance of the subject materials in the subject; can demonstrate the ability to think independently within the scope of the subject; can answer the questions asked clearly and concisely; has carefully prepared the outline; has completed independent assignments completely and clearly; has fully mastered the laws and other regulatory and legal documents related to the discipline; has published a scientific article on one of the topics related to the discipline; can interpret historical processes; b) To receive a grade of 4, the student's level of knowledge must meet the following requirements: understands the essence and content of the subject, does not allow scientific and logical confusion in explaining the topics in the subject; understands the practical significance of the content of the subject; performs the assigned tasks and assignments within the framework of the curriculum; can correctly answer the questions asked in the subject; has carefully formulated a subject outline; has fully completed independent assignments in the subject; has mastered laws and other regulatory documents related to the subject. c) To receive a grade of 3, the student's level of knowledge must meet the following criteria: has a general understanding of the subject; covers the topics of the subject in a narrow range, with some inconsistencies in the presentation; is not fluent in the presentation; if complex and confusing answers are given to questions on the subject; if the text on the subject is not well-structured. g) In the following cases, the student's level of knowledge may be assessed as unsatisfactory with a grade of 2: if preparation for the subject exercises is not carried out; if the student has no idea about the subject exercises;

	if it is noticeable that the texts on the subject have been copied from others; if serious errors and confusions are made in the text on the subject; if the questions asked about the subject are not answered; if the subject is not known.
Media employed	Some of the most effective methods of pedagogical technologies are the use of "Problem Situation", "FSMU", "Fish Skeleton", "Cluster" and "Why", "How" organizers in the educational process, presentation, brainstorming Blitz, discussion, question and answer technologies.
Reading list	1. Jalilov B. Philosophy of religions. Textbook. – Tashkent: Publisher, 2019. – 148 p. 2. Kamilov D. Religious studies. Textbook. – Tashkent: Lesson Press, 2021.–128 p. 3. Muratov D., Alimova M., Karimov J. Religious studies, textbook. – Tashkent: “Navro’z” publishing house, 2019. – 264 p. 4. Rakhimdjanov D., Ernazarov O. Introduction to religious studies. Textbook. –Tashkent: “O’FMJ” publishing house, 2018. – 304 p. 5. Shermukhamedova N.A. Phenomenon of religious fanaticism/Human philosophy. – Textbook. –Tashkent: Innovation-Ziyo, 2021. – P. 314-499.
Reviewers	A.Yakubov – Associate Professor of the Department of the National Idea, Fundamentals of Spirituality. A.Ro'ziyev – Associate Professor of the Department of the National Idea, Fundamentals of Spirituality.
Confirmed place and time	Developed and approved by Karshi State University (Report № 6 30.08.2024)

KARSHI STATE UNIVERSITY

MINISTRY OF HIGHER EDUCATION, SCIENCE AND INNOVATIONS OF THE REPUBLIC OF UZBEKISTAN

KARSHI STATE UNIVERSITY

GENERAL PSYCHOLOGY
MODULE HANDBOOK

Field of knowledge	500 000	Science, mathematics, physical
Field of education	530 000	Physical and statistics
Field of study	605 30500	Physical

MODULE REFERENCES

Module name:	General psychology
Code, if applicable:	UPS1106
Semesters in which the module is taught:	1
Lecturer:	Sattarova Gulnora
Language	Uzbek
Relation to curriculum:	Compulsory
Type of teaching, contact hours:	Lecture seminar
Workload:	180 hours Contact hours: 90 hours; lecture – 30 hours; practical – 60 hours Self-study: 90 hours
Credit points:	6
Recommended prerequisites:	General pedagogy

Module objectives Intended learning outcome	The objectives of the course based on this curriculum are as follows: The aim of teaching this course is to develop students' knowledge, skills, and competencies in general psychology, including the psyche, personality, activity, communication, cognitive processes, volitional qualities, emotional states, and individual characteristics.Furthermore, the course is designed to ensure that future pedagogical specialists acquire and systematically internalize modern scientific knowledge regarding the laws, stages, mechanisms, factors, and conditions of psychological development, and are able to apply this knowledge effectively in their professional practice. ● Students will acquire knowledge and understanding of the subject, objectives, tasks, and principles of general psychology, as well as the essence of the psyche. ● They will develop an understanding of the relationship between psychology and scientific and technological progress, the nature of the psyche as a form of reflection of objective reality by living beings, the forms of psychic reflection, the relationship between psyche and consciousness, and the psychophysiological foundations of behavior, including knowledge of the nervous system and neurons. ● Students' understanding of the concepts of the individual, personality, and individuality will be expanded, along with knowledge of personal activity, experimental methods of personality research, factors influencing personality development, and the psychological structure of personality.

	● They will study the role of communication in the phylogenetic and ontogenetic development of humans, as well as verbal and nonverbal means of communication. ● Their knowledge will be broadened regarding the characteristics of attention and its development, the laws governing sensation and perception, memory processes and methods of studying memory, imagination and its types, thinking and emotional cognition, intelligence, and psychological differentiation in the field of intelligence. ● Students will form a clear understanding of the development of higher mental functions, motivational processes, mental states, and the emotional-volitional sphere of personality, including volitional actions and their regulation. ● They will develop competencies in applying theoretical knowledge about the influence of environment and education on psychological development, as well as theories of temperament, character, and abilities, and the development of abilities in practical professional activities.
Content	General Psychology – Lesson Plan Lesson 1. 4 hours (Lecture / Practical) • Subject, aim, and objectives of General Psychology • Understanding the scope and purpose of the course Lesson 2. 4 hours (Lecture / Practical) • Methods of General Psychology • Research methods in psychology; specifics of conducting scientific investigations in psychology Lesson 3. 4 hours (Lecture / Practical) • Phylogenetic development of the psyche and consciousness • Understanding the evolution of mental processes and consciousness Lesson 4. 4 hours (Lecture / Practical) • Personality • Concepts of personality, individual, and individuality Lesson 5. 4 hours (Lecture / Practical) • Concept of activity • Types of activity and their characteristics Lesson 6. 4 hours (Lecture / Practical) • Psychology of communication • The role of communication in human phylogenetic and ontogenetic development Lesson 7. 4 hours (Lecture / Practical) • Mental processes: Attention • Attention, its types and characteristics Lesson 8. 4 hours (Lecture / Practical) • Sensation • Types of sensations and the laws governing sensory processes Lesson 9. 4 hours (Lecture / Practical) • Perception • Characteristics and laws of perception Lesson 10. 4 hours (Lecture / Practical) • Memory and imagination • Processes of memory and imagination, and their types Lesson 11. 4 hours (Lecture / Practical)

	• Thinking • Forms and types of thinking Lesson 12. 4 hours (Lecture / Practical) • Emotion and volition • Emotional-volitional sphere of personality Lesson 13. 4 hours (Lecture / Practical) • Temperament • Characteristics and types of temperament Lesson 14. 4 hours (Lecture / Practical) • Character • Structure and traits of character Lesson 15. 4 hours (Lecture / Practical) • Abilities • Structure and types of abilities
Study and examination requirements and forms of examination	Oral Examination: For this exam, the student is given 20 minutes for preparation to answer the questions. The answers to the questions are graded as follows: 1. If detailed and complete answers are provided for all questions – 5 (Excellent) 2. If answers are provided for all questions (some of them partially) or complete answers are given for 2/3 of the questions – 4 (Good) 3. If answers are given to some of the questions or partial answers are provided for 2/3 of the questions – 3 (Satisfactory) 4. If no answers are provided or the answers do not correspond to the questions – 2 (Unsatisfactory)
Media employed	Multimedia Equipment for Teaching Psychology 1. Basic Technical Equipment • Computer (desktop or laptop) • Multimedia projector • Interactive whiteboard (smart board) • Large-screen TV 2. Audio Equipment • Speakers • Microphone (wired or wireless) • Headphones (for individual use) 3. Video and Recording Equipment • Video camera • Webcam • Digital camera 4. Data Storage and Transfer Devices • USB flash drive • External hard drive (HDD/SSD) • CD/DVD discs (if needed) 5. Internet and Communication Tools • Wi-Fi router • Modem • Devices for accessing online platforms 6. Specialized Psychology Software and Platforms • Testing and survey software • Presentation software (e.g., PowerPoint) • Online learning platforms (e.g., Zoom, Google Meet) 7. Additional Equipment

	• Graphics tablet (for diagrams and experiments) • Printer and scanner • VR (Virtual Reality) devices (for advanced teaching methods)
Reading list	Main References 1. Mirziyoyev, Sh.M. Decree No. PF-4947 of 07.02.2017, "On the Strategy of Action for the Further Development of the Republic of Uzbekistan." 2. Constitution of the Republic of Uzbekistan. Adopted by national referendum on April 30, 2023. 3. Davletshin, M.G., Toychiyeva, S.M. General Psychology. Tashkent: TDPU, 2002. – 202 p. 4. Karimova, V.M. Psychology. Tashkent: Sharq, 2000. – 256 p. 5. Ivanov, P.I., Zufarova, M.Ye. General Psychology. Tashkent: National Society of Philosophers of Uzbekistan, 2008. – 480 p. 6. Boymurodov, N. Leadership Psychology. Tashkent: Yangi Asr Avlodi, 2007. – 327 p. 7. Jalilova, S.X., Haydarov, F.I., Khalilova, N.I. Occupational Psychology. Tashkent: TDPU, 2010. – 127 p. 8. G'oziyev, E. General Psychology. Tashkent: Philosophers, 2010. – 541 p. 9. Jo'rayev, B. General Psychology. Qarshi: Ilm, Fan va Ma'naviyat, 2024. – 295 p.
Reviewers	B. Jo'rayev – Doctor of Psychology, Professor, Qarshi State University L. Beknazarova – Doctor of Psychology, Professor
Confirmed place and time	Developed and approved by Karshi State University (Report № 1 30.08.2024)

KARSHI STATE UNIVERSITY

MINISTRY OF HIGHER EDUCATION, SCIENCE AND INNOVATIONS OF THE REPUBLIC OF UZBEKISTAN

KARSHI STATE UNIVERSITY

GENERAL PEDAGOGY

MODULE HANDBOOK

Field of knowledge	500 000	Natural sciences, mathematics and statistics
Field of education	540 000	Mathematics and statistics
Field of study	60530500	Physical

MODULE REFERENCES

Module name:	General pedagogy
Code, if applicable:	UPE13408
Semesters in which the module is taught:	3-4
Lecturer:	Oysara Karakhanova, senior teacher
Language	Uzbek
Relation to curriculum:	Compulsory
Type of teaching, contact hours:	Lecture, practical
Workload:	240 hours Contact hours: 120 hours; lecture – 60 hours; practical – 60 hours Self-study: 120 hours
Credit points:	4
Recommended prerequisites:	General psychology

Module objectives Intended learning outcome	The purpose of teaching the subject is to equip future teachers with the theoretical and historical foundations of modern pedagogical science and knowledge of teaching skills, to teach them to rationally organize the educational process based on the requirements established by the Law of the Republic of Uzbekistan "On Education", to effectively use pedagogical heritage, and to demonstrate high pedagogical culture and techniques in real educational practice. As a result of mastering the subject, the student will acquire the following competencies: • motivational-cognitive - orientation to cognitive activity, awareness of educational and cognitive activity, creativity, behavior in non-standard situations, independence in solving educational tasks, interest and aspirations to master the profession of a teacher; • informational - working with information, protection from information attacks, mastering the culture of information consumption; • communicative - linguistic literacy, mastering the rules of literary and scientific style, mastering verbal and non-verbal speech skills, exchanging ideas, engaging in free dialogue in analyzing reality, expressing one's objective attitude to pedagogical reality; • awareness of the content and essence of the ideological-ideological-national idea, understanding the ideological landscape of the world, possession of ideological immunity, protection from ideological threats, understanding the personal and social essence of

	the national idea, clarifying the place of the national idea in pedagogical activity; • understanding the essence of reforms being carried out in the fields of citizenship - political, socio-economic, spiritual-educational, cultural, harmonious analysis of the national-cultural heritage, the past, present and future of the people, active participation in socio-political life. Show activity in projects carried out by local community life and self-government institutions, social movements; • spiritual and moral - mastering and applying the norms of behavior accepted in society, mastering high spiritual and moral qualities and turning them into the main criterion of pedagogical activity, combating spiritual threats, preparing for the organization of spiritual propaganda and agitation; • acmeological confidence in oneself and the environment surrounding one, full understanding of one's desires and needs, identifying the current opportunities and prospects for future creative development, the ability to reflect, identify, interiorize, change one's views, beliefs and attitudes; • • axiological - axiological assessment of pedagogical reality, understanding pedagogical phenomena as values, enjoying the pedagogical process, experiencing a sense of responsibility, understanding one's pedagogical position and readiness for pedagogical activity based on educational values.
Content	Topic 1: history of pedagogy as a science. Education in primitive community. Education and pedagogical ideas from the most ancient periods to the 7th century. Education, school and pedagogical ideas in central asia from the 7th century to the first half of the 14th century. Topic 2: development of pedagogical ideas during the eastern awakening. Development of educational and moral ideas during the eastern awakening Topic 3: development of education, school and pedagogical ideas in movaraunnah in the second half of the 14th century and in the 16th century. Topic 4: development of education, school and pedagogical ideas from the 17th century to the middle of the 19th century. Education, school and pedagogical ideas in turkestan in the 2nd half of the 19th century - the 1st quarter of the 20th century. Topic 5. Education system and development of pedagogical ideas in uzbekistan in 1924-1991. Education system of independent uzbekistan. Development of pedagogical ideas in the years of independence. Topic 6: history of the development of world pedagogical science from the most ancient periods to the first half of the 19th century. Pedagogical theory of y.a. Comenius. Topic 7: education system of the countries of the world in the present period. Topic 8: history of pedagogical thought and issues of teacher skills in school practice. Main components of pedagogical skills. Topic 9. Pedagogical competence in teacher activity. Topic 10: communicative skills and influence. Culture and psychology of behavior in teacher activity. Topic 11: pedagogical tact and pedagogical ethics

	Topic 12: concept of pedagogical technique. Methodology of forming pedagogical technique. Topic 13: speech technique and culture. Topic 14: scientific organization of teacher's work. 15th report. Self-education and work on oneself. System of acquiring pedagogical experience. Seminar topics Topic 1: educational issues in the oldest written monuments. The science of hadith and its heritage significance. Topic 2: pedagogical ideas of abu nasr forabi and abu ali ibn sino on education. Topic 3: educational and moral views of yusuf khos hajib, mahmud kashgari and ahmad yugnaki and kaykovus's "qabusnoma" and youth education. Topic 4: mirzo ulugh'bek's pedagogical ideas and contributions to the development of education. Topic 5: educational and moral views of abdurahmon jomii and pedagogical views of alisher navai. Topic 6: pedagogical views of new enlighteners and pedagogical views of abdulla avloni Topic 7: expression of conceptual ideas on the spiritual and moral foundations of society development and the formation of a highly spiritual person in the works of the first president of the republic of uzbekistan i.a. karimov. Topic 8: pedagogical system of jan amos comenius. Pedagogical system of konstantin dmitriyevich ushinsky. Topic 9 global trends in the world education system of the 20th century. Topic 10: Ways to form pedagogical skills. The concept of communication. Topic 11: Communicative skills and pedagogical influence. Culture and psychology of communication in the work of a teacher Topic 12: The concept of tact and pedagogical tact. Conditions for using pedagogical tact. Topic 13. Pedagogical etiquette. Etiquette of behavior of a teacher. Topic 14. Pedagogical technique. Speech technique and culture. Topic 15. Self-education and work on oneself as the main condition for pedagogical skill.
Study and examination requirements and forms of examination	The following criteria are recommended for monitoring a student's mastery of the subject: a) To receive a grade of 5, the student's level of knowledge must meet the following requirements: fully covers the essence and content of the subject; maintains scientific and logical approach to the presentation of the subject's topics, avoiding scientific errors and confusion; has a clear idea of the theoretical or practical significance of the subject materials in the subject; can demonstrate the ability to think independently within the scope of the subject;

	can answer the questions posed clearly and concisely; has carefully prepared the outline; has completed independent assignments completely and clearly; has fully mastered the laws and other regulatory and legal documents related to the subject; has published a scientific article on one of the topics related to the subject; can interpret historical processes; b) to receive a grade of 4, the student's level of knowledge must meet the following requirements: understands the essence and content of the subject, does not allow scientific and logical confusion in presenting the topics in the subject; understands the practical significance of the content of the subject; performs the tasks and assignments assigned to the subject within the framework of the curriculum; can answer the questions asked in the subject correctly; has carefully formulated the subject outline; has completed independent assignments in the subject; has mastered the laws and other regulatory documents related to the subject. c) To receive a grade of 3, the student's level of knowledge must meet the following requirements: has a general understanding of the subject; if the subject topics are covered in a narrow range and some confusion is allowed in the presentation; if the presentation is not smooth; if complex and confusing answers are given to questions on the subject; if the text on the subject is not well-formed. d) In the following cases, the student's level of knowledge may be assessed with an unsatisfactory grade of 2: if preparation for the subject exercises is not carried out; has no idea about the subject; is clearly copying the subject texts from others; has serious errors and inaccuracies in the subject text; does not answer the questions asked about the subject; does not know the subject.
Media employed	• technology for organizing interactive lectures, seminars and practical classes; • modular learning technology; • problem-based learning technology; • cooperative learning technology; • reflexive learning technology;

	• art technologies; • web quest; • graphic and pictorial models (logical graph, frame model, basic outline, semantic network, mind map).
Reading list	1. Ayupova M. Logopediya. Darslik.- T.: “O’zbekiston faylasuflari milliy jamiyati nashriyoti”, 2007. - 560 b. 2. Abdullayeva, B.S., Xoliqov A.A., D.R. Farsaxonova va bosh. Umumiy pedagogika. Pedagogika nazariyasi, pedagogika tarixi. Darslik.- T.: 2021. -342 b. 3. Abdullayeva B.S., Xoliqov A.A., Sodiqov N.M. va bosh. Umumiy pedagogika. Pedagogik mahorat. Darslik.- T.: 2021. -204 b. 4. Akramova H. Defektologiya. Logopediya: O’quv –uslubiy qo’llanma, T.: 2021. -160 b. 5. Djamilova N, Xasanboyeva O. Pedagogika fanlarini o’qitish metodikasi; O’quv qo’llanma.-T.; 2021-180 b. 6. Berdiyeva G. Oila pedagogikasi. O’quv qo’llanma.- T.: “Voris nashriyoti”, 2021. – 208 b. 7. Hasanboyev J. va bosh. Pedagogika. Pedagogika nazariyasi va tarixi. Darslik.- T:”Noshir” 2011. - 448 b. 8. Ismoilova Yu. Umumiy pedagogika O’quv qo’llanma.- Qarshi fan va ta’lim nashriyoti 2022.- 424 b. 9. Jalolova R.M. Pedagogik mahorat. O’quv qo’llanma.- T.: Chinor fayzi, 2022. - 312b. 10. Karimjonov A. Pedagogik tizimni boshqarish asoslari. . O’quv qo’llanma-T.: 2008. -176 b. 11. Karaxanova O.Yu. Qiyosiy pedagogika. O’quv qo’llanma.- Qarshi: 2022. - 272 b. 12. Karaxanova O.Yu. Pedagogik texnologiya. O’quv qo’llanma.- Qarshi davlat universiteti: 2023. - 254 b. 13. Karaxanova O.Yu. Umumiy pedagogika. O’quv qo’llanma.- Qarshi davlat universiteti: 2024. - 250 b. 14. Mamedov K.Q. va bosh. Oligofrenopedagogika asoslari. O’quv qo’llanma.- T.: “O’qituvchi”, 1994 .- 168 b. 15. Musurmonova O., N.J. Isaqulova M.T.Jumaniyozova va bosh. Umumiy pedagogika. O’quv qo’llanma II-qism. T.; 2020.-194 b. 16. Muhammadiyeva M.M. Sharq uyg’onish davri pedagogik fikr taraqqiyoti: O’quv qo’llanma.- Qarshi fan va ta’lim nashriyoti 2021. - 132 b. 17. Murodova Z. Umumiy pedagogika (pedagogika nazariyasi). O’quv qo’llanma.- Qarshi fan va ta’lim nashriyoti 2022. - 328 b. 18. Muhammadiyeva M.M. Xalq pedagogikasi. Darslik. Qarshi fan va ta’lim nashriyoti 2023. -276 b. 19. Oripova N.X., Aliqulova M.Sh. Oila pedagogikasi O’quv qo’llanma.- Qarshi fan va ta’lim nashriyoti 2023. - 240 b. 20. Safarova R., Pedagogika. Ensiklopediya. 11-jild, O’zbekiston milliy ensiklopediyasi Davlat milliy nashriyoti.-T.: 2015. -376 b. 21. Sultonov A. Ijtimoiy pedagogika. O’quv qo’llanma.- Qarshi: 2021. - 284 b. 22. Po’latova P.M. Maxsus Pedagogika. Darslik.- T.: “G’afur G’ulom nomidagi nashriyot matbaa ijodiy uyi”, 2005. -224 b. 23. Rahmonova V.S. Defektologiya va logopediya asoslari. O’quv – uslubiy qo’llanma, T.: “O’qituvchi”, 1991. – 110 b.

	24. Rajabova L. Kasbiy pedagogika. O'quv qo'llanma.- Qarshi fan va ta'lim nashriyoti 2021. - 184 b. 25. Tolipov O'., Ro'ziyeva D. Pedagogik texnologiyalar va pedagogik mahorat. O'quv qo'llanma.- T.: 2021. -276 b. 26. Xudoyqulov X., Xolov O.. Tarbiyaviy ishlar metodikasi. O'quv qo'llanma.- T.: "Innovatsiya-Ziyo", 2020. – 164 b. 27. Xamidova. M.U. Maxsus pedagogika. O'quv qo'llanma.- T.: 2021. – 164 b. 28. Xodjayev B., Bozorova M., Murodova Z. va bosh. Pedagogik tadqiqotlarni modellashtirish. O'quv qo'llanma.- Qarshi fan va ta'lim nashriyoti 2021. - 216 b. 29. Xodjayev B.X., Begmatova S.N., Xo'jamqulov A. Umumiy pedagogika. O'quv qo'llanma.- Qarshi fan va ta'lim nashriyoti 2023. - 316 b. 30. Xujayarova N.S. Umumiy pedagogika (pedagogik mahorat) O'quv qo'llanma.- Qarshi fan va ta'lim nashriyoti 2023. - 124 b. 31. Yarmanova Yu. Maktabgacha pedagogika. O'quv qo'llanma.- Qarshi fan va ta'lim nashriyoti 2021. - 128 b. 32. Choriyeva F. Maktabgacha ta'limda pedagogik diagnostika. O'quv qo'llanma.- Qarshi fan va ta'lim nashriyoti 2021. - 140 b. 33. Shodiyev R. D..,Pedagogik konfelektologiya: Darslik.- Qarshi: "Nasaf", 2019. - 100 b. 34. Shodiyev R. D., M. Kazakova. Nasafiylarning pedagogik qarashlari: O'quv qo'llanma.- Qarshi: 2021. - 100 b. 35. Sharifzoda S.O', Yuldashev S.N., Jo'rayev A.R.va bosh. Pedagogika tarixi. O'quv qo'llanma.-T.; 2022. – 172 b.
Reviewers	Yuldoshev Ismoil Abruyevich - Dean of the Faculty of Pedagogy, Associate Professor Oripova Nodima Khalilovna - Head of the Department of Karshi State University, Doctor of Pedagogical Sciences, Professor
Confirmed place and time	Developed and approved by Karshi State University (Report № 1 30.08.2024)

MINISTRY OF HIGHER EDUCATION, SCIENCE AND INNOVATIONS OF THE REPUBLIC OF UZBEKISTAN

KARSHI STATE UNIVERSITY

MEDIA LITERACY AND INFORMATION CULTURE
MODULE HANDBOOK

Field of knowledge: 500,000-Natural sciences, mathematics and statistics
Field of education: 530,000 - Physics and natural sciences
Field of education: 60530500-Physics

MODULE REFERENCES

Module name:	Media Literacy And Information Culture
Code, if applicable:	MAM1304
Semesters in which the module is taught:	3
Lecturer:	Eldor Baratov
Language	Uzbek
Relation to curriculum:	Elective
Type of teaching, contact hours:	Lecture, practical
Workload:	Total - 120 Contact hours: 60 hours; lecture – 30 hours; practical – 30 hours Self-study: 60 hours
Credit points:	4
Recommended prerequisites:	Psychology History Religion

Module objectives Intended learning outcome	The aim is to substantiate the need for students to teach the subject "Media Literacy and Information Culture", analyze the concepts of media and information, understand that media and information cover all spheres of society, evaluate the media, and form knowledge and skills on the development of "Media Literacy and Information Culture" in Uzbekistan.
Content	Training format: lecture 1. The evolution of media literacy and information culture and its importance in society. The role and importance of information in society. The importance of media and information in the activation of citizens in the new Uzbekistan. 2. Competitive environment in the world media and information space. The role of foreign media in the media space. 3. Structure and influence of the media space. Information attacks and threats in social networks. 4. Identification and systematic study and analysis of the principle of information exchange in social networks. Culture of information dissemination in the media space. Person-oriented information: psychological, religious and cultural threats. 5. Ideological and theoretical foundations of ensuring information security. Spiritual and legal foundations of information security in Uzbekistan.

	6. The emergence of the Internet and computer games. The impact of virtual games on the minds of young people. Media space and Internet capabilities. Training format: practical training 1. The evolution of media literacy and information culture and its importance in society. The role and importance of information in society. 2. The importance of media and information in the activation of citizens in the new Uzbekistan. 3. Competitive environment in the world media and information space. The role of foreign media in the media space. 4. Structure and influence of the media space. 5. Information attacks and threats in social networks. 6. Identification of the principle of information exchange in social networks and systematic research and analysis. 7. Culture of information dissemination in the media space. 8. Person-oriented information: psychological, religious and cultural threats. 9. Ideological and theoretical foundations of ensuring information security. 10. Moral and legal foundations of information security in Uzbekistan. 11. The emergence of the Internet and computer games. The impact of virtual games on the minds of young people. 12. Media space and Internet capabilities.
Study and examination requirements and forms of examination	a) To receive a grade of 5, the student's level of knowledge must meet the following requirements: can fully explain the essence and content of the subject; maintains scientificity and logic in presenting the topics in the subject, avoiding scientific errors and confusion; has a clear idea of the theoretical or practical significance of the subject materials in the subject; can demonstrate the ability to think independently within the scope of the subject; can answer the questions asked clearly and concisely; has carefully prepared the outline; has completed independent assignments completely and clearly; has fully mastered the laws and other regulatory and legal documents related to the discipline; has published a scientific article on one of the topics related to the discipline; can interpret historical processes; b) To receive a grade of 4, the student's level of knowledge must meet the following requirements: understands the essence and content of the subject, does not allow scientific and logical confusion in explaining the topics in the subject; understands the practical significance of the content of the subject;

	performs the assigned tasks and assignments within the framework of the curriculum; can correctly answer the questions asked in the subject; has carefully formulated a subject outline; has fully completed independent assignments in the subject; has mastered laws and other regulatory documents related to the subject. c) To receive a grade of 3, the student's level of knowledge must meet the following criteria: has a general understanding of the subject; covers the topics of the subject in a narrow range, with some inconsistencies in the presentation; is not fluent in the presentation; if complex and confusing answers are given to questions on the subject; if the text on the subject is not well-structured. g) In the following cases, the student's level of knowledge may be assessed as unsatisfactory with a grade of 2: if preparation for the subject exercises is not carried out; if the student has no idea about the subject exercises; if it is noticeable that the texts on the subject have been copied from others; if serious errors and confusions are made in the text on the subject; if the questions asked about the subject are not answered; if the subject is not known.
Media employed	Some of the most effective methods of pedagogical technologies are the use of "Problem Situation", "FSMU", "Fish Skeleton", "Cluster" and "Why", "How" organizers in the educational process, presentation, brainstorming Blitz, discussion, question and answer technologies.
Reading list	1.Kostyuk K.N. Kniga v novoy medynoy srede. Elektron-uchebnik. Moskva:"Direkt-media", 2015, 428 str. 2.Gudilina S.I. Mediaobrazovatelnaya sreda. Uchebnoe posobie.Moskva:»MPGU», 2022, 88 str. 3. Gudilina S.I. Mediyno-informatsionnaya gramotnost Uchebnoe posobie.Moskva:»Litres», 2024. 108 s. 4. Mamatova Yo. Sulaymonova S. O'zbekiston mediata'lim taraqqiyoti yo'lida. O'quv qo'llanma. Toshkent: "Extremum-press", 2015. 94 b. 5. Muratova N., Grizl E., Mirzaxmedova. Jurnalistikada media va axborot savodxonligi. Toshkent: Baktria press, 2019. -112 b. 6.Irnazarov K.T. va b. Hozirgi zamon jurnalistikasi. O'quv qo'llanma Toshkent.: «Aloqachi", 2008. 312 b.
Reviewers	Dolanov A.E. - Associate Professor of the Department of Philosophy and Sociology, Ph.D. Boymurodov S.B. - Associate Professor of the Department of Philosophy and Sociology, Ph.D.
Confirmed place and time	Developed and approved by Karshi State University (Report № 1 30.08.2024)

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MATHEMATICAL ANALYSIS
MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODULE REFERENCES

Module name:	Mathematical Analysis
Code, if applicable:	MA11210
Semesters in which the module is taught:	1, 2
Lecturer:	Sh.Abdimurodova - Karshi State University, teacher of the department of "Mathematical Analysis and Differential Equations".
Language	Uzbek
Relation to curriculum:	1. Compulsory
Type of teaching, contact hours:	Lecture, practical
Workload:	10 ECTS (300 hours): For the course load Classroom sessions lecture 60 hours practical training 90 hours Independent study: 150 hours
Credit points:	10
Recommended prerequisites:	Elementary mathematics
Module objectives Intended learning outcome	As a result of mastering the subject, the student will: • Have knowledge of the basic laws of mechanics and their formulas; • Have knowledge of the meaning, content, laws of motion and analysis of their graphs of basic physical processes • Have knowledge of the meaning, units and comparison of physical quantities;
Contents	Lectures Topic 1. Sets and operations on them (2 hours). Topic 2. Reflections and their types. (2 hours). Topic 3. Real numbers. Limits of the set of real numbers. Operations on real numbers Topic 4: Sequence of numbers and its limit Topic 5. Properties of converging sequences Topic 6. Monotone sequences and their limits Topic 7. Partial and fundamental sequences Topic 8. Lower and upper limits of a sequence. Topic 9. The concept of a function. The limit of a function Topic 10. Properties of functions with limits. Topic 11. Comparison of functions. Continuity of a function Topic 12. Local and global properties of continuous functions. Topic 13. Derivative of a function. Rules for calculating the derivative Topic 14. Differential of a function. Topic 15. Higher-order derivative and differential of a function.

	Topic 16. The concepts of elementary functions and indefinite integrals Topic 17. Integration methods. Integration of simple fractions Topic 18: Integrating Rational Functions Topic 19. Integrating some irrational functions. Integrating trigonometric functions Topic 20. The concept of the definite integral. The criterion for the integrability of a function Topic 21. The class of integrable functions. Properties of definite integrals Topic 22. Definite integrals with variable limits. Calculating definite integrals Topic 23. Surface of a plane figure and its calculation. Arc length and its calculation. Applications of the definite integral. Topic 24. Improper integrals with infinite limits. Improper integrals of a non-negative function. Absolute convergence of the integral Topic 25. Improper integrals of an unbounded function. The initial value of the improper integral Topic 26. R™ space. Open and closed sets in R™ space Topic 27. Sequence and its limit in the space R Topic 28. Multivariable function and its limit. Topic 29. Continuity of a multivariable function. Smooth continuity Topic 30. Particular derivatives of a multivariable function. Differentiability and differential of a function The following topics are recommended for practical exercises: Topic 1. Sets and operations on them Topic 2. Reflections and their types. Topic 3. Real numbers. Limits of the set of real numbers. Operations on real numbers Topic 4: Sequence of numbers and its limit Topic 5. Properties of converging sequences Topic 6. Monotone sequences and their limits Topic 7. Partial and fundamental sequences Topic 8. Lower and upper limits of a sequence. Topic 9. The concept of a function. The limit of a function Topic 10. Properties of functions with limits. Topic 11. Comparison of functions. Continuity of a function Topic 12. Local and global properties of continuous functions. Topic 13. Derivative of a function. Rules for calculating the derivative Topic 14. Differential of a function.

	Topic 15. Higher-order derivative and differential of a function. Topic 16. The concepts of elementary functions and indefinite integrals Topic 17. Integration methods. Integration of simple fractions Topic 18. Integrating rational functions Topic 19. Integrating some irrational functions. Integrating trigonometric functions Topic 20. The concept of the definite integral. The criterion for the integrability of a function Topic 21. The class of integrable functions. Properties of definite integrals Topic 22. Definite integrals with variable limits. Calculating definite integrals Topic 23. Surface of a plane figure and its calculation. Arc length and its calculation. Applications of the definite integral. Topic 24. Improper integrals with infinite limits. Improper integrals of a non-negative function. Absolute convergence of the integral Topic 25. Improper integrals of an unbounded function. The initial value of the improper integral Topic 26. R" space. Open and closed sets in R™ space. Topic 27. Sequence and its limit in R™ space Topic 28. Multivariable function and its limit. Topic 29. Continuity of a multivariable function. Smooth continuity Topic 30. Particular derivatives of a multivariable function. Differentiability and differential of a function.
Media employed	**Presentations, videos, simulations, electronic resources and others**
Study and examination requirements and forms of examination	Written Exam: In this exam, the student is given 90 minutes to answer the questions. The answers to the questions are evaluated as follows: 1. If all questions are answered in detail and completely – 5 (Excellent) 2. If all questions are answered (some of them partially) or 2/3 of the questions are answered completely – 4 (Good) 3. If some questions are answered or 2/3 of the questions are answered partially – 3 (Satisfactory) 4. If no answers are given or the answers do not correspond to the questions – 2 (Unsatisfactory)
Reading list	Referens

	1. Wolter A.Stranss. Partial Differential Equations; An introduction. Birkhhauzer. Germany, 2005. 2. Davia D.Bleecker, George Csordes. Basic of Partial Differential Equations. Birkhhauzer. Germany, 2009. 3. Бабенко К.И. К теории уравнений смешенного типа: Вис. доктора физ-мат.наука. -М. Матем.инст. РАН. 1952. 4. Бицадзе А.В. Уравнения смешенного типа. -М. 1959. 1646. 5. Салохиддинов М.С., Уринов А.К. Краевые задачи для сбалансированного смешанного типа со спектральными параметрами. Ташкент. Наука. 1997. 168 и. 6. Смирнов М.М. Уравнения смешенного типа. М. Наука. 1966. 292 6 7. Салохиддинов М.С., Уринов А.К. Aralash turdagi differensial tenglamalar.Ташкент. 2007. 284 с.
Reviewers	J. Istamov - teacher of the department "Mathematical Analysis and Differential Equations".
Confirmed place and time	Developed and approved by Karshi State University (Report №1 30.08.2024)

KARSHI STATE UNIVERSITY

MINISTRY OF HIGHER EDUCATION, SCIENCE AND INNOVATIONS OF THE REPUBLIC OF UZBEKISTAN

KARSHI STATE UNIVERSITY

LINEAR ALGEBRA AND ANALYTIC GEOMETRY

MODULE HANDBOOK

Field of knowledge	500 000	Natural sciences, mathematics and statistics
Field of education	540 000	Mathematics and statistics
Field of study	60530500	Physical

Module designation	1. CG11210
Semester(s) in which the module is taught	1,2
Person is responsible for the module	Shodiev.S.Yu-KarshiSU, Senior Lecturer of the Department of Algebra and Geometry. Sh.U.Temirov-KarshiSU, Lecturer of the Department of Algebra and Geometry
Language	Uzbek language
Relation to curriculum	Main course
Teaching methods	Lecture, discussion, problem solving, quizzes, peer-feedback, practice, dialog.
Workload (incl. contact hours, self-study hours)	Workload for 10 ECTS (300 hours): Lectures: 60 hours Practical training 90 hours Self-Study and Independent Learning: 150 hours
Credit points	10
Required and recommended prerequisites for joining the module	The course **"Linear Algebra and Analytic Geometry"** is logically closely connected with subjects such as **Mathematical Analysis, Complex Analysis, and Differential Equations**.
Module objectives/intended learning outcomes	**The purpose of teaching the course** is to introduce students to the essential knowledge of **Linear Algebra and Analytic Geometry** (concepts, theorems and their proofs, methods for solving practical problems, etc.). At the same time, it aims to develop students' **logical thinking, ability to draw correct conclusions, and mathematical culture**.
Content	The Gaussian method for solving systems of linear equations. Matrices and operations on them. Determinants of small order. Permutations and arrangements. Determinants of order nnn and their properties. Cofactors and minors. Laplace theorem. Additional properties of determinants and matrices. Inverse matrix. Cramer's rule and the inverse matrix method for solving systems of linear equations. nnn-dimensional vector space. Linear dependence. Basis of a vector space. Rank of a matrix. Kronecker–Capelli theorem. Homogeneous systems of equations. Fundamental solution. Complex numbers and operations on them. De Moivre's formula. Extracting roots of complex numbers. Polynomials in one variable. Horner's scheme. Bézout's theorem. Linear spaces. Euclidean space. Orthogonal complement. Vectors and linear operations on them Scalar, vector, and mixed (triple) products of vectors Coordinate transformations Polar, cylindrical, and spherical coordinate systems Equations of a straight line in the plane

	Plane and straight line in space Relative positions of lines in the plane. Relative positions of planes in space Second-order curves in the plane Equations of ellipse, parabola, and hyperbola in polar coordinates General equations of second-order curves in the plane Relative position of a second-order curve and a straight line Simplification of equations of second-order curves Second-order surfaces Cylindrical, conical, and ruled surfaces Straight-line generators of second-order surfaces
Examination forms	Paper examination
Study and examination requirements	It is necessary to fully master the theoretical and methodological concepts of the subject, be able to accurately reflect the results of the analysis, conduct independent observations of the processes being studied, and complete the tasks and assignments given in the forms of current and intermediate control, and submit a test or written work for final control.
Reading list	1. Narmanov A.Ya. Analitik geometriya. O'zbekiston Respublikasi faylasuflar milliy jamiyati nashriyoti, 2008 y. 2. Modenov P.S. Analiticheskaya geometriya. M. Izd-vo MGU, 1969. 3. Baxvalov S.V., Modenov P.S., Parxomenko A.S. Analitik geometriyadan masalalar to'plami. T. Universitet, 2006. 4. Ayupov Sh.A., Omirov B.A. Xudoyberdiyev A.X., Xaydarov F.H. Algebra va sonlar nazariyasi. Tafakkur gulshani. T. 2019. 5. Xojiev J.X. Faynleyb A.S. Algebra va sonlar nazariyasi kursi. Toshkent. «Uzbekiston» , 2001 y. 6. Kenneth Kuttler Elementary linear algebra 2012. Ventus Publishing Aps. ISBN 978-87-403-0018-5. 7. Proskuryakov I.L. Sbornik zadach po lineynoy algebre. «Nauka», 2005 g
Reviewers	E. Tokhtayev - Karshi State University, teacher of the department of "Algebra and Geometry"
Confirmed place and time	Developed and approved by Karshi State University (Report № 1 30.08.2024)

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KARSHI STATE UNIVERSITY

PRACTICAL PHYSICS
MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODULE REFERENCES

Module name:	Practical Physics
Code, if applicable:	FP 112345626
Semesters in which the module is taught:	1,2,3,4,5,6
Lecturer:	Teachers of the Department of General Physics B. Koyliyev - Professor of the Department of General Physics, Karshi State University, S. Umarova, Senior Lecturer of the Department of General Physics, Karshi State University, H. Botirov - Teacher of the Department of General Physics, Karshi State University, A. Nekboyev - Teacher of the Department of General Physics, Karshi State University J. Khojamberdiyeva - Senior Lecturer of the Department of General Physics, Karshi State University.
Language	Uzbek
Relation to curriculum:	1. Compulsory
Type of teaching, contact hours:	Laboratory
Workload:	ECTS 26 (780 hours): For the course load Classroom classes Laboratory: 390 hours Independent study: 390 hours
Credit points:	26
Recommended prerequisites:	Mechanics Molecular Physics Electricity and Magnetism Optics Atomic Physics
Module objectives Intended learning outcome	As a result of mastering the subject, the student: What will he/she be able to do/produce - The student will practically test the theoretical knowledge acquired in general physics in laboratory exercises using appropriate tools and equipment; - Knows how to apply appropriate theoretical and experimental methods; - Has the ability to process and analyze experimental results; - Has knowledge of how to apply basic physical laws and processes to physical phenomena; - Verify physical laws and formulas in practice by performing laboratory work.

Contents	Laboratory exercises from the Department of Mechanics Topic 1. Technical safety. Error theory. Procedures for conducting experiments. Determination of the gravitational constant with Cavendish Torsion Balances. Recording with an IR motion detector and analyzing the results of measurements on a computer. Topic 2. Measurement of energy and momentum in an inelastic collision - with a two-horned light sensor. Topic 3. Recording and analyzing free fall results with VIDEOCOM. Topic 4. Motion of a body at an angle to the horizon. Topic 5. Conservation of angular momentum in a rotational inelastic collision. Topic 6. Conservation of angular momentum in a rotational inelastic collision. Topic 7. Gyroscope oscillation. Topic 8. Determination of the acceleration of free fall using a mathematical pendulum. Topic 9. Determining the dependence of the frequency of vibration of a string on the length and tension of the string. Topic 10. Laboratory device "Maxwell's pendulum". Topic 11. Studying the dependence of the speed of sound in air on temperature. Topic 12. Learning to work on an analytical balance Topic 13. Determining the moment of inertia of a wheel. Topic 14. Determining the density of a solid by hydrostatic weighing. Topic 15. Studying the basic law of the dynamics of rotational motion using the Oberbeck pendulum. Topic 16.

	Determining the modulus of elasticity from stretching. Topic 17. Determining the modulus of elasticity from bending. Topic 18. Determining the acceleration due to gravity using a physical pendulum. Topic 19. Determining the moment of inertia of an object using a trifilar pendulum and verifying Steiner's theorem. Topic 20. Determining the shear modulus from torsion Laboratory exercises in molecular physics Topic 1. Technical safety. Error theory. Procedures for conducting experiments. Determining the gas laws. Topic 2. Observing the liquid-gas phase transition at the critical point. Topic 3. Determining the temperature of a water mixture. Topic 4. Determining the coefficient of volumetric expansion of a liquid. Topic 5. Determining the latent heat of formation of water vapor. Topic 6. Measuring the temperature dependence of the coefficient of linear expansion of solids Topic 7. Determining the specific heat capacity of solids. Topic 8. Determining the adiabatic index Cp/Cv for air using the Richard method Topic 9. Determination of the coefficient of internal friction of a liquid by the Stokes method Topic 10. Determination of the coefficient of surface tension by the method of weighing a drop Topic 11. Determination of the coefficient of surface tension of a liquid by the method of separating a ring from a liquid. Topic 12.

	Determination of the coefficient of surface tension by the height of the liquid rising in capillary tubes Topic 13. Determination of the universal gas constant. Topic 14. Determination of the coefficient of internal friction of air and the length of the mean free path of molecules. Topic 15. Determination of the coefficient of thermal conductivity by the single plate method Laboratory exercises in electricity and magnetism Topic 1. Introduction. Technical safety. Electrical measuring instruments. Error theory. Procedures for conducting experiments. Topic 2. Measurement of medium resistances. Measurement of resistances using a Wheatstone bridge Topic 3. Study of the electrostatic field. Study of the electrostatic field using an electrolytic bath Topic 4. Measurement of large resistances using the double bridge method Topic 5. Charging and discharging of capacitors. Study of the charging and discharging process of capacitors. Topic 6. Electrolysis phenomena. Determination of the electrochemical equivalent for copper Topic 7. Vacuum diode. Study of the volt-ampere characteristic of a vacuum diode Topic 8. Study of ampere forces. Measuring the force acting on a current-carrying conductor in a magnetic field of the magnetic field of the Earth Topic 9. The Earth's magnetic field. Measuring the Earth's magnetic field using a rotating coil Topic 10. The magnetic field of an inductive coil. Studying the magnetic field of an inductive coil without a magnetic core. Topic 11.

	Magnetization of a ferromagnet. Studying the curve of ferromagnetic magnetization and the hysteresis phenomenon Topic 12. Studying the magnetic field. Measuring the magnetic field of a straight conductor and a rotating ring. Magnetic field of current-carrying conductors. Measuring the magnetic field of a conductor and a rotating ring Topic 13. Earth's magnetism. Determining the horizontal component of the Earth's magnetic field. Topic 14. Alternating currents. For alternating currents. Studying Ohm's Law Topic 15. Free Electromagnetic Oscillations. Laboratory exercises from the Department of Optics Topic 1. Technical safety. Error theory. Procedures for conducting experiments. Spherical aberration in lenses. Topic 2. Determining the focal length of converging and diverging lenses. Topic 3. Newton's experiments on dispersion and recombination of white light. Topic 4. Diffraction at double slits and multiple slits - recording and calculation using a videocom Topic 5. Creating interference using a He-Ne laser in a Fresnel mirror. Topic 6. Newton's rings in transmitted and reflected white light. Determining the radius of curvature of the lens. Topic 7. Measuring the refractive index of air with a Max-Zehnder interferometer. Topic 8. Determining the wavelength of He-Ne laser light using a Michelson interferometer. Topic 9. Determining the wavelength of light using a diffraction grating. Topic 10. Obtaining a transmission hologram in a laser optics device.

	Topic 11. Reversing the plane of polarization with a sugar solution. Topic 12. Stefan-Bolsmann law: measuring the temperature dependence of the intensity of "black body" radiation. Topic 13. Measuring the line spectra of inert gases and metal vapors using a prism spectrometer. Topic 14. Determining the refractive index of dispersed liquids. Topic 15. Studying Lloyd's reflection experiment with a He-Ne laser. Laboratory exercises from the Department of Atomic Physics Topic 1. Determination of the Stefan-Bolsmann constant Topic 2. Determination of the Planck constant with a compact measuring device Topic 3. Frank and Hers' experiment with mercury - measurement and evaluation with Cassy Topic 4. Study of the laws of the photoelectric effect Topic 5. Determination of the work function of an electron Topic 6. Determination of the wavelength of the electrons from the Balmer series of hydrogen Topic 7. Determination of the specific charge of an electron Topic 8. Determination of the magnitude of the elementary electric charge by the Milliken method Topic 9. Observation of the Compton effect Topic 10. Study of the dependence of the splitting of the cadmium red line on the magnitude of the magnetic field in a Fabry-Perot spectrometer Laboratory exercises from the Department of Atomic Nucleus and Elementary Particle Physics Topic 1. Investigation of the dependence of the intensity of beta radiation on distance. Topic 2.

	Determination of the half-life of the radioisotope cesium-137. Topic 3. Determination of the energy of gamma rays by the absorption method. Topic 4. Determination of the activity of a beta-radioactive source. Topic 5. Demonstration of particle tracks using a Wilson camera. Topic 6. Alpha spectroscopy of radioactive samples. Topic 7. Determination of gamma radiation using a scintillation counter. Topic 8. Determination of the energy of beta particles by the absorption method. Topic 9. Determination of the half-life of a long-lived radioactive isotope.
Media employed	Presentations, videos, simulations, electronic resources and others
Study and examination requirements and forms of examination	Oral Examination: For this exam, the student is given 20 minutes for preparation to answer the questions. The answers to the questions are graded as follows: 1. If detailed and complete answers are provided for all questions – 5 (Excellent) 2. If answers are provided for all questions (some of them partially) or complete answers are given for 2/3 of the questions – 4 (Good) 3. If answers are given to some of the questions or partial answers are provided for 2/3 of the questions – 3 (Satisfactory) 4. If no answers are provided or the answers do not correspond to the questions – 2 (Unsatisfactory)
Reading list	Asosiy adabiyotlar 1. Strelkov S.P. Mexanika - Toshkent, O'qituvchi 1977 y. 2. Sivuxin D.P. Umumiy fizika kursi. 1-tom. Mexanika, Toshkent, O'qituvchi, 1981 y. 3. Strelkov S.P. va boshqalar. Umumiy fizika kursidan masalalar to'plami. Mexanika. Toshkent, O'qituvchi, 1981 y. 4. Chertov A., Vorobev A. Umumiy fizika kursidan masalalar to'plami. Toshkent, O'zbekiston, 1997 y.

	5. Volkenshteyn S.V. Umumiy fizikadan masalalar to'plami. Toshkent 2008 y. 6. Tursunmetov K.A. va boshqalar. Umumiy fizika kursidan praktikum. Mexanika. Universitet. T.-1998 u. 7. Kikoin A.K., Kikoin I.K. Umumiy fizika kursi. Molekulyar fizika, O'qituvchi, Toshkent-2004. 8. Jearl Uoker, Devid Xollidey., R.Resnik. Fizika asoslari. ISBN 978- 8808-08797 2014 yil. 9. JEARL WALKER. FUNDAMENTAL FIZIKA, 2007, CERN 10. Duglas C. Jankoli. Ilovalar bilan fizikaviy tamoyillar. 2014 yil 11. Sivuxin D.V. Umumiy fizika kursi. Termodinamika va molekulyar fizika. O'qituvchi, Toshkent-1984, 526 bet. 12. Sedrik M.S. Umumiy fizika kursidan masalalar to'plami. Toshkent, O'qituvchi, 1991 y. 13. Qorabayeva M.A. Molekulyar fizika. T. Universitet-2014. 298 b. 14. Kalashnikov S.G. Umumiy fizika kursi. Elektr. Oliy o‘quv yurtlarinin fizika ixtisosi bo‘yicha o‘quv qo‘llanma. O‘qituvchi, Toshkent-1979, 615 bet 15. Jearl Walker, Devid hallidey, R.Resnick. Fundamentals of physics. ISBN 978-8808-08797-3.2014 16. Sivuxin D.V. Elektrichestvo, Kurs obщey fiziki Uchebnoe posobie dlya studentov fizicheskix spesialnostey vыsshix uchebnыx zavedeniy Nauka, M.2004. 17. Douglas C.Jiancoli. Physic sprinciples with applications. 2014. 18. Sedrik M.S. Umumiy fizika kursidan masalalar to‘plami. Toshkent. O‘qituvchi, 1991 y. 19. THIRD EDITION "ELECTRICITY AND MAGNETISM" EDWARD M. PURCELL DAVID J. MORIN Harvard University, Massachusetts 2013. ISBN 978-1-107- 01402-2 20. Landsberg G.S. "Optika" T.: «O‘qituvchi».-1981y. – 944 b. 21. Kaliteevskiy N.I. "Volnovaya optika". M.: 2006g. - 467 s. 22. Sivuxin D.V. «Optika», «Fizmat» M.: 2005g. -792 c. 23. Qo‘yliyev B.T. “Optika”, “Fan va texnologiya” T.: 2014 y. -272 b. 24. Sh. Sodiqova, Sh. Otajonov, M. Kurbanov. “Lazerlar va ularning amaliyotdagi o‘rni”. “Fan texnologiya”, Toshkent, 2019 y. 215b.

	25. Axmedova G., Mamatqulov O.B., Xolbaev I. Atom fizikasi. O‘quv qo‘llanma. T.: Istiqlol, 2013. - 416 b. 26. Sivuxin D. V. Obщiy kurs fiziki. Ucheb. posobie: Dlya vuzov. V 5 t. T. V. Atomnaya i yadernaya fizika. M.: Fizmatlit;Izd-vo MFTI, 2002.-784 s. 27. Yu.N.Kolmakov, Yu.A.Pekar, L.S.Lejneva, V.A.Semin, Osnovы kvantovoy teorii i atomnoy fiziki, Ucheb. posobie, Tula, 2003. - 144 s. 28. C.J. FOOT. Atomic Physics. Department of Physics. University of Oxford. Oxford University press 2005.pg-346. 29. Muminov T.M., Xoliqov A.B., Xolmurodov Sh.X. Atom yadrosi va zarralar fizikasi. -T.: O'zbekiston faylasuflar jamiyati, 2009. 30. Muxin K.N. Eksperimentalnaya yadernaya fizika: Uchebnik. V 3-x tt. T. 1. Fizika atomnogo yadra. 7-ye izd., ster. - SPb.: Izd-vo «Lan», 2009. - 384 s. 31. Bekjonov R.D. Atom yadrosi va zarralar fizikasi.-T.:O‘kituvchi, 1994. -576 b. 32. Polvonov S.R., Ruzimov Sh.M., Mamajusupova M.I. Atom va yadro fizikasidan laboratoriya ishlari. T. “UNIVERSITET”, 2020. -120 b.
Reviewers	L. Meyliyev - Associate Professor of the Department of "General Physics" of Karshi State University.
Confirmed place and time	Developed and approved by Karshi State University (Report №1 30.08.2024)

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MECHANICS

MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODULE REFERENCES

Module name:	Mechanics
Code, if applicable:	ME1106
Semesters in which the module is taught:	1
Lecturer:	Intern teacher of the Department of General Physics Dilmurodov Shavkat Dilmurod o'g'li
Language	Uzbek
Relation to curriculum:	1. Compulsory
Type of teaching, contact hours:	Lecture, practical
Workload:	6 ECTS (180 hours): For the course load Classroom sessions lecture 60 hours practical training 30 hours Independent study: 90 hours
Credit points:	6
Recommended prerequisites:	Mathematical analysis
Module objectives Intended learning outcome	As a result of mastering the subject, the student will: • Have knowledge of the basic laws of mechanics and their formulas; • Have knowledge of the meaning, content, laws of motion and analysis of their graphs of basic physical processes • Have knowledge of the meaning, units and comparison of physical quantities;
Contents	Lectures Topic 1. Introduction. Fundamentals of kinematics. Mechanical motion. Concepts of space, time, and number systems. Straight-line motion. Straight-line uniform motion. Straight-line uniform variable motion. Topic 2. Curved motion. Velocity and acceleration in curved motion. Circular motion. Motion of a body thrown vertically upward and freely falling. Topic 3. Motion of a body thrown horizontally and obliquely to the horizon and their equations of motion. Flight time of a body, flight distance, height of rise. Total, normal, and tangential accelerations. Topic 4. Interaction of bodies. Force. Measurement of forces. Addition of forces. Condition of equilibrium of forces acting on a point.

	Newton's I - law. Mass. General view of Newton's I law. Inertial reference systems. Topic 5. Newton's 3rd law and its application. Free fall of bodies. Weight. Weightlessness. Overload. Topic 6. Non-free motion of a body. Impulse. Force and body momentum. Law of conservation of momentum. Topic 7. Motion of a body with a variable mass. Derivation of the Meshchersky equation. Work of a force. F.I.K. Topic 8. Mechanical energy. Kinetic energy. Total energy of a body. Law of conservation of energy. Potential energy of a body in the gravitational field of the Earth. Completely inelastic and elastic collisions. Topic 9. Deformation and its types. Elastic forces. Mechanical stress. Strength. Elastic modulus. Strain. Energy of a deformed body. Topic 10. Motion of a body in a non-inertial system. Inertial forces in a rotating system. Relationship between angular velocity and linear velocity vectors. Cariolis acceleration and force. Foucault pendulum. Beer's law. Topic 11. Types of friction and friction forces. Viscous friction. Stokes formula. Dry friction. Sliding friction. Rolling friction. Topic 12. Translational and rotational motion of a rigid body. Equilibrium condition of a body with a fixed axis. The law of rotational motion of a body around a fixed axis and its equation. Topic 13. Momentum. Law of change of moment of momentum. Center of gravity and inertia, methods of determining it. Law of conservation of moment of momentum. Topic 14. Steiner's theorem and its application. Law of motion of the center of inertia of a rigid body. Topic 15. Basic laws of dynamics for the motion of a rigid body. Kinetic energy of a body moving in rotation and translation. Topic 16. Free axes of rotation. Gyroscopes. Motion of a free gyroscope axis. Gyroscopic forces. Topic 17. Law of universal gravitation. Potential energy of gravity. Basic laws of cosmic mechanics and their proofs. Kepler's laws. Topic 18. Motion of satellites and spacecraft.

	I, II, III - cosmic velocities. Topic 19. Aggregate states of matter. Stationary flow of a fluid. Basic law of dynamics for an ideal fluid particle. Topic 20. Law of conservation of energy in fluid flow. Bernoulli's equation. Effect of a fluid or gas flow on a body. Reynolds number. Topic 21. Torricelli's formula. Magnus effect. Lifting force. Topic 22. Periodic processes. Harmonic oscillatory motion, its parameters. Concepts of amplitude, frequency, period of oscillations. Mathematical pendulum and its kinematics, dynamics. Mathematical pendulum laws. Topic 23. Physical pendulums, types, their equations of motion. Spring pendulum, its equation of motion, laws of oscillations. Application of Kyo's theorem. Topic 24. Energy change in specific oscillations and its graph. Damped oscillatory motion. Damping decrement. Topic 25. Forced oscillations. Forced oscillations and its equation of motion. Resonance. Topic 26. Addition of oscillations. Bienie (vibration). Addition of mutually perpendicular oscillations. Lissajous figures. Topic 27. The concept of a wave. Transverse and longitudinal waves. Wave surface and front. Vibration of a net. Topic 28. Plane sinusoidal wave. Wave motion energy. Wave energy flow. Wave vector. Wave intensity. Topic 29. Wave interference. Standing waves. Elements of acoustics. Sound parameters: power, pitch, timbre. Sound pressure. Sound intensity. Sound power (hardness). Topic 30. Doppler effect. Ultrasound and methods of its generation. Applications of ultrasound The following topics are recommended for practical exercises: 1. Mechanical motion. Rectilinear motion. Rectilinear uniform motion. Rectilinear uniform variable motion.

	Curvilinear motion. Circular motion. Motion of a body thrown vertically upwards. 1. Motion of bodies thrown horizontally and obliquely to the horizon and their equations of motion. 2. Interaction of bodies. Newton's laws. Newton's I - law. Overview of Newton's II - law. Newton's III - law and its application. Resistance and friction forces. 3. Free fall of bodies. Weightlessness. Overload. Non-free motion of a body. 4. Impulse. Force and body momentum. Motion in non-inertial reference frames. 5. Law of conservation of momentum. Reactive motion. Motion of a body with a variable mass. 6. Power. Work of force. Mechanical energy. Total mechanical energy of a body. F.I.K. of mechanisms. Conservation laws. Completely inelastic and elastic collisions. 7. Translational and rotational motion of a rigid body. The law of rotational motion of a body around a fixed axis and its equation. Steiner's theorem and its application. 8. Momentum and its conservation law. The law of motion of the center of inertia of a rigid body. Kinetic energy of a body moving in rotation and translation 9. The law of universal gravitation. Potential energy of gravity. The basic laws of universal mechanics. 10. Deformation. Hooke's law. Deformation energy and energy density. Strength limit and strength curve. 11. Fluid mechanics. The effect of a fluid or gas flow on a body. 12. Mechanical waves. Doppler effect in mechanical waves. Fluid mechanics. Archimedes and Pascal's laws. Bernoulli's equation. 13. Damped and forced mechanical vibrations. Resonance phenomenon. Mechanical waves. Doppler effect in mechanical waves. 14. Periodic processes. Kinematics and dynamics of harmonic vibrations. Addition of vibrations.
Media employed	Presentations, videos, simulations, electronic resources and others
Study and examination requirements and forms of examination	Oral Examination: For this exam, the student is given 20 minutes for preparation to answer the questions. The answers to the questions are graded as follows: 1. If detailed and complete answers are provided for all questions – 5 (Excellent) 2. If answers are provided for all questions (some of them partially) or complete answers are given for 2/3 of the questions – 4 (Good) 3. If answers are given to some of the questions or partial answers are provided for 2/3 of the questions – 3 (Satisfactory)

	4. If no answers are provided or the answers do not correspond to the questions – 2 (Unsatisfactory)
Reading list	Referens 1. Strelkov S.P. Mexanika Toshkent, O'qituvchi, 1977. 2. Aleshkevich V. A., Dedenko L. G., Karabaev V. A.. Mexanika. M.: Izd. Sentr «Akademiya», 2004. 480 s. 3. Jearl Walker, David Hallidey., R.Resnisk. Fundamentals of physics. ISBN 978-8808-08797-3.2014. 4. Sivuxin D.P. Umumiy fizika kursi. 1-jild. Mexanika. Toshkent, O'qituvchi, 1981 yil. 5. Tursunmetov K. A., Daliyev X.S. Mexanika 1-qism. Toshkent., Universitet 2000 y. 6. Douglas C. Giancoli. Physic sprinciples with applications.2014 7. ChertovA., Vorobev A. Umumiy fizika kursidan masalalar to'plami. Toshkent, O'zbekiston, 1988 yil. 8. Sedrik M. S. Umumiy fizika kursidan masalalar to'plami. Toshkent, O'qituvchi, 1991 y. 9. Matveev A. N. Mexanika va nazariya o'rtasidagi munosabat. M. Izd. Dom "Oniks 21-asr", 2003. - 432 p. 10. Tursunmetov K.A. va boshqalar. Umumiy fizika kursidan fizpraktikum. Mexanika. Universitet. T.-1998.
Reviewers	B. Khayriddinov – Karshi State University, Professor of the Department of "General Physics" L. Meyliyev - Associate Professor of the Department of "General Physics" of Karshi State University.
Confirmed place and time	Developed and approved by Karshi State University (Report №1 30.08.2024)

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MOLECULAR PHYSICS
MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODUL REFERENCES

Module name:	Molecular physics
Code, if applicable:	MF1206
Semesters in which the module is taught:	2
Lecturer:	Assistant Professor of the Department of General Physics Batirov Hayotjon
Language	Uzbek
Relation to curriculum:	1. Compulsory
Type of teaching, contact hours:	Lecture, practical
Workload:	6 ECTS (180 hours): For the course load Classroom sessions lecture 60 hours practical training 30 hours Independent study: 90 hours
Credit points:	6
Recommended prerequisites:	Mechanics Mathematical analysis
Module objectives Intended learning outcome	As a result of mastering the subject, the student will: be able to do/produce The student should be able to determine the state parameters of a gas based on the ideal gas laws and the equation of state, calculate the internal energy change, work done, and heat in various processes. • The student should know the distribution of gas molecules by velocity, the causes of migration phenomena in gases and liquids, and the meaning of migration coefficients. On this basis, the student should be able to calculate the mean free path, migration coefficients, and state parameters of a real gas. • The student should be able to explain the basic laws of thermodynamics, the principle of operation of heat engines, the causes of anisotropy in crystals, calculate the parameters of the unit cell, and determine the planes and directions in crystals.
Contents	Lecture topics Topic 1. Introduction. Introduction to molecular physics. Development of molecular-kinetic concepts of matter and classical and quantum physics models of its structure. Topic 2. Properties of matter. Dynamic, statistical and thermodynamic methods in the study of the properties of matter. Topic 3. Ideal gas pressure. The main equation of the molecular-kinetic theory of gas. Topic 4. Temperature. Ideal gas laws. Ideal gas equation of state. Topic 5. Velocities of gas molecules. Stern experiment. Brownian motion.

	Topic 6. Barometric formula. Perrin experiment. Bolesmann's law. Topic 7. Probability. Some concepts of probability theory and operations on them. Topic 8. Distribution function. Distribution of gas molecules by components. Topic 9. Distribution of molecules by velocities. Maxwell-Bolsmann distribution Topic 10. Maxwell distribution of relative velocities. Arithmetic mean and most probable velocities of gas molecules Topic 11. Experimental verification of the distribution law. Concept of Fermi-Dirac and Bose-Einstein statistics. Topic 12. Internal energy of an ideal gas. Amount of heat. 1st law of thermodynamics. Topic 13. Heat capacity of ideal gases. Heat capacity of monoatomic gases. Topic 14. Heat capacity of gases. Heat capacity of gases and degrees of freedom of molecules. Topic 15. Diatomic and polyatomic gases. Law of equal distribution. Heat capacities of diatomic and polyatomic gases. Topic 16. Work done when changing the volume of a gas. Adiabatic process. Work done in an adiabatic process. Polytropic process. Topic 17. Molecular motion and migration phenomena. Effective cross-sectional area. Mean free path. Diffusion and mass transfer Topic 18. Non-stationary and stationary diffusion. Topic 19. Heat transfer phenomenon. Fourier's law. Stationary and non-stationary heat transfer. Topic 20. Viscosity. Relationship between migration coefficients. Topic 21. Intermolecular interaction forces. Liquefaction of gases. Experimental isotherms. Topic 22. Equation of state of a real gasVan der Waals isotherms. Topic 23. Phase transition. Phase diagrams. Topic 24. Critical state and critical parameters. Comparison of the van der Waals equation with experimental data. The given van der Waals equation. The law of corresponding states. Topic 25. Reversible and irreversible processes. The second law of thermodynamics. Cyclic process and Carnot cycle. Topic 26. Entropy. Entropy change in reversible and irreversible processes. Clausius inequality. Topic 27. Entropy and probability. Entropy and disorder. The third law of thermodynamics. Negative temperatures.

	Topic 28. Volumetric properties of liquids. Forces in liquids. Phenomena occurring at the liquid boundary. Surface tension. Capillarity phenomenon Topic 29. Crystal lattices and their types. Brave classification of spatial lattices. Polymorphism. Anisotropy of crystals.. Topic 30: Thermal expansion of solids. Mechanisms of diffusion in metals. Heat capacity of metalsII. Practical training Recommended topics for organizing practical training: 1. The content of molecular physics. Solving problems on calculating the amount of substance, molar mass and relative molecular mass, concentration and number of molecules 2. Kinetic theory of ideal gases. Pressure of an ideal gas. Solving problems on the relationship between the average kinetic energy of gas molecules and the absolute temperature of the gas. 3. Determining the state parameters of a gas using the ideal gas laws. Solving problems on the application of the state parameters of an ideal gas. 4. Calculating the molar mass and state parameters of gas mixtures. Solving problems on the application of the barometric formula and the Bolsman distribution. 5. Distribution of molecules by velocities and kinetic energies. Solving problems on the calculation of the characteristic velocities of molecules. 6. Elementary kinetic theory of migration processes. Solve problems on the mean free path of molecules and the number of collisions of molecules. 7. Heat conduction and energy transfer. Problems on Fourier's law. 8. Calculation of diffusion flux and diffusion coefficient. Solving problems on calculating viscosity and momentum coefficient. 9. Heat flow. Solving problems on the relationship between heat conduction coefficients 10. Elements of the kinetic theory of heat and thermodynamics. Solving problems on the calculation of the internal energy of an ideal gas and solving problems on the equal distribution of internal energy over the degrees of freedom. 11. Solving problems on the calculation of the amount of heat supplied to a gas, the relationship between the work of the gas and the change in its internal energy, and the work done when the volume of the gas changes.

	12. Calculating the heat capacities of ideal gases. Solving problems on calculating heat engines and their useful work coefficients (EFC) and entropy changes in ideal gas processes. 13. Real gases and liquids. Solving problems on calculating the state parameters and internal energy of real gases. 14. Solving problems on surface tension and capillary phenomena of liquids. 15. Solids. Problems on lattice parameters and heat capacities of solids
Study and examination requirements and forms of examination	Oral Examination: For this exam, the student is given 20 minutes for preparation to answer the questions. The answers to the questions are graded as follows: 1. If detailed and complete answers are provided for all questions – 5 (Excellent) 2. If answers are provided for all questions (some of them partially) or complete answers are given for 2/3 of the questions – 4 (Good) 3. If answers are given to some of the questions or partial answers are provided for 2/3 of the questions – 3 (Satisfactory) 4. If no answers are provided or the answers do not correspond to the questions – 2 (Unsatisfactory)
Media employed	Presentations, videos, simulations, electronic resources and others
Reading list	Main books 1. Kikoin A.K., Kikoin I.K. Umumiy fizika kursi. Molekulyar fizika, O'qituvchi, Toshkent-2004. 2. Jearl Walker, David Halliday, R. Resnick. Fundamentals of Physics. ISBN 978-8808-08797-3. 2014. 3. JEARL WALKER FUNDAMENTALS OF PHYSICS, 2007, CERN 4. Douglas C. Giancoli. Physical Principles with Applications. 2014 5. Sivuxin D.V. Umumiy fizika kursi. Termodinamika va molekulyar fizika. O'qituvchi, Toshkent -1984, 526 bet. 6. Chertov A.A., Vorobyev A. Umumiy fizika kursidan masalalar tuplami. O'qituvchi, Toshkent, 1988 y. 7. Sedrik M.S. Umumiy fizika kursidan masalalar to'plami. Toshkent, O'qituvchi, 1991 y.

	8. Karabayeva M.A.Molekulyar fizika. T. Universitet-2014. 298 b. 9. Nazirov E.N. va boshkalar. Mexanika va molekulyar fizikadan praktikum. O'zbekiston, T.-2001 y.
Reviewers	B. Khayriddinov - Professor of the Department of General Physics, Karshi State University,
Confirmed place and time	Developed and approved by Karshi State University (Report №1 30.08.2024)

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ELECTRICITY AND MAGNETISM
MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODULE REFERENCES

Module name:	ELECTRICITY AND MAGNETISM
Code, if applicable:	EM1306
Semesters in which the module is taught:	3
Lecturer:	Assistant Professor of the Department of General Physics Batirov Hayotjon
Language	Uzbek
Relation to curriculum:	2. Compulsory
Type of teaching, contact hours:	Lecture, practical
Workload:	ECTS 6 (180 hours): For the course load Classroom sessions lecture 60 hours practical training 30 hours Independent study: 90 hours
Credit points:	6
Recommended prerequisites:	Molecular Physics Mathematical Analysis
Module objectives Intended learning outcome	As a result of mastering the subject, the student will: be able to do/produce • Have an idea of the basic laws of electricity and magnetism, the essence of physical processes and phenomena, physical quantities and their measurement quantities; • Know and use the basic laws of electricity and magnetism to analyze and solve physical problems, process and analyze experimental results; • Have the skills to plan experiments, select applicable circuits and elements in them, experimentally measure the main parameters and properties of electrical circuits, and acquire the basic laws of electricity and magnetism and their application in physical electronics.
Contents	Lectures Topic 1: Introduction. Electric field and its main characteristics The task and sources of the course of electricity and magnetism. Linear, surface and volume densities of charges. The law of interaction of electric charges. Coulomb's law. Electric field. Electric field strength. Superposition principle. Electric dipole. Graphical representation of the electric field. Topic 2: Electric displacement vector. Gauss's theorem. Electrostatic field induction vector and its flux. Calculation of the electric field. Ostrogradsky-Gauss theorem. Integral and differential forms of the Ostrogradsky-Gauss theorem. Work done in an electrostatic field. Potential. Potential difference. Potential gradient. General problems of electrostatics.

	Topic 3: General problems of electrostatics. Poisson and Laplace equations. Earnshaw's theorem. Conductors in an electric field. Electrical capacity of conductors. Units of capacity. Capacitance of capacitors. Electric field energy and its density. Topic 4: Dielectrics in an electric field. .Dielectrics in an electric field. Polarization of dielectrics. Polarization vector. Dielectric absorption and permittivity. Dielectric absorption and permittivity of the medium. Their interconnection. Topic 5: Direct electric current. Characteristics of electric current. Conductivity electric current. Electrical resistance and its dependence on temperature. Ohm's law. Work and power of electric current. Differential representation of Ohm's law. Ohm's law for a closed circuit. Work, power and thermal effects of electric current. Useful work coefficient of a current source. Branched circuits. Kirchhoff's rules. Special cases of calculation of branched circuits. Topic 6: Nature of electrical conductivity in metals. Electrical conductivity in metals. Experiments of Ricke, Mandelstam-Papaleksi and Stewart-Tolman. Classical electron theory of electrical conductivity. Explanation of Ohm's and Joule-Lens, Wiedemann-France laws based on the classical electron theory of electrical conductivity in metals. Topic 7: Electric current in a vacuum. Electric current in a vacuum. Thermoelectron emission and its Volt-Ampere characteristic. Temperature dependence of saturation current. Topic 8: Electric current in liquids. Semiconductors. Electrical conductivity of semiconductors. Pure and mixed electrical conductivity. Topic 9: Direct current magnetic field. Mutual magnetic effect of currents. Magnetic field induction vector. Current element. Biot-Savart-Laplace law. Magnetic field strength. Magnetic field of a moving charged particle. Magnetic field of currents. Magnetic field of parallel currents. Calculation of the magnetic field strength of direct currents and alternating currents. Distribution of magnetic field strength along the axis of a solenoid. Mutual magnetic effect of parallel currents. Topic 10: Magnetic phenomena. Dia-para-ferromagnets. Ferromagnets. Magnetic flux. The force acting on a charged particle moving in a magnetic field. Circulation of magnetic field strength. Conductor with current in a magnetic field. Hall effect. Magnetic properties of substances. Molecular currents. Magnetization vector. The process of magnetization of ferromagnets. Hysteresis loop. Residual magnetization and coercive force. Explanation of ferromagnetism. Understanding of domain theory.

	Topic 11: Magnetic circuits. The phenomenon of electromagnetic induction. Magnetic circuits. Branching of magnetic flux. The phenomenon of electromagnetic induction. Electromagnetic induction. Faraday's experiments. Lenz's law. The basic law of electromagnetic induction. The phenomenon of self-induction. Topic 12: Magnetic field energy. Inductance. Inductance of a solenoid. Magnetic constant of the medium. Magnetic field energy and density. Topic 13: Electromagnetic oscillations. Electrical oscillations in the presence of a current. The equation of specific electrical oscillations. Electrical oscillations in the absence of a current. Electrical oscillations in the presence of a current. Forced electrical oscillations. Topic 14: Alternating current. Active resistance, capacitance and inductance in an alternating current circuit. Vector diagram method. Power, work of alternating current. Branching in alternating current circuits. Voltage and current resonance. Topic 15: Electromagnetic waves. The relationship between electric and magnetic fields. Electromagnetic field. Maxwell's postulates. Electromagnetic field. Shear current. Properties of electromagnetic waves. Umov-Poyting vector. The following topics are recommended for practical exercises: 1. Interaction of point charges. Strength of the charge field distributed along point charges, a ring and a sphere. Strength of the charged linear conductor, a charged plane field. 2. Force acting on a charge in an electric field. Potential. Potential energy of point charges and field potential. Potential of a field of charges distributed linearly, along a surface, and throughout a volume. Potential gradient and its connection with field strength 3. Capacitance. Capacitance of a conducting sphere, a flat capacitor, and spherical capacitors. Connecting capacitors. Electric field energy of a flat capacitor and a charged sphere 4. Basic laws of alternating current. Ohm's law for a part of a circuit. Ohm's law for a complete circuit 5. Kirchhoff's rules. Work and power of current 6. Nature of electrical conductivity. Current in metals, liquids and gases 7. Magnetic field of alternating current. Magnetic field of alternating current and solenoid 8. Force acting on a current-carrying conductor in a magnetic field. Ampere force. Magnetic moment. Contour in a magnetic field. Magnetic dipole

	9. Force acting on a current-carrying conductor in a magnetic field. Lorentz force. Motion of charged particles in combined electric and magnetic fields 10. Law of complete current. Magnetic flux. Magnetic induction in ferromagnets. Magnetic circuits 11. Work done when moving a current-carrying conductor in a magnetic field. Electromagnetic induction. Inductance. Lorentz force. 12. Self-induction and mutual induction. Extracurrents in connection and separation. 13. Magnetic field energy. Energy of the magnetic field of a solenoid and a toroid. Volumetric energy density. 14. Magnetic properties of matter. Magnetization. Magnetic susceptibility. Dia and paramagnetism. Ferromagnetism. 15. Electric vibrations and waves.
Media employed	Presentations, videos, simulations, electronic resources and others
Study and examination requirements and forms of examination	Oral Examination: For this exam, the student is given 20 minutes for preparation to answer the questions. The answers to the questions are graded as follows: 1. If detailed and complete answers are provided for all questions – 5 (Excellent) 2. If answers are provided for all questions (some of them partially) or complete answers are given for 2/3 of the questions – 4 (Good) 3. If answers are given to some of the questions or partial answers are provided for 2/3 of the questions – 3 (Satisfactory) 4. If no answers are provided or the answers do not correspond to the questions – 2 (Unsatisfactory)
Reading list	Main books 1. V.A.Aleshkevich. Elektromagnetizm. Fizmatlit, 2014, 404 s. 2. A.N.Matveev. Elektrichestvo i magnetizm. M., Vыsshaya shkola, 1983, 463 s. (Pereizdana izdatelstvom «Lan», 2010 god, 463 s.) 3. D.V.Sivuxin. Obщiy kurs fiziki. T.3., Fizmatlit, 2004, 656 s. 4. S.G. Kalashnikov. Elektrichestvo. M.: Nauka, 1985.624 c 5. Kalashnikov S.G. Umumiy fizika kursi. Elektr. Oliy o‘quv yurtlarining fizika ixtisosi bo‘yicha o‘quv qo‘llanma. O‘qituvchi, Toshkent-1979, 615 bet 6. Douglas C.Jiancoli. Physic sprinciples with applications. 2014 917 p. 7. Sedrik M.S. umumiy fizika kursidan masalalar to‘plami. Toshkent. O‘qituvchi,1991 y.

Reviewers	B.E. Khayriddinov - Karshi State University, Professor of the Department of "General Physics" G.S. Uzokova - Karshi State University, Professor of the Department of General Physics
Confirmed place and time	Developed and approved by Karshi State University (Report №1 30.08.2024)

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OPTICS
MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODULE REFERENCES

Module name:	Optics
Code, if applicable:	OA1406
Semesters in which the module is taught:	4
Lecturer:	Head of the Department of General Physics Professor Kuyliyev Bahron Tokhliyyevich, Ph.D.
Language	Uzbek
Relation to curriculum:	1. Compulsory
Type of teaching, contact hours:	Lecture, practical
Workload:	6 ECTS (180 hours): For the course load Classroom classes lecture 60 hours practical training 30 hours Independent study: 90 hours
Credit points:	6
Recommended prerequisites:	Electricity and Magnetism Linear Algebra and Geometry
Module objectives Intended learning outcome	As a result of mastering the subject, the student will: be able to do/produce - Understand the basic physical laws related to optics, their role in practice, application to science and technology, formulas representing physical processes, analysis of graphs and drawing appropriate conclusions, the physical nature and properties of light, the corpuscular and electromagnetic wave properties of light, application of the laws of optics to the study of the structure of environments, determination of the composition and quantity of elements in medicine, ecology, geological samples by optical methods, innovations in the field of optics, scientific research works of scientists of the Republic of Uzbekistan, their role in practice, the laws of interaction of electromagnetic waves with atoms and molecules of the environment; • knows and can use the propagation of electromagnetic radiation, phenomena at the boundary of two media, fiber optics based on the phenomenon of total internal reflection of light and its practical application, physical processes related to the law of absorption of light, laws of interference and diffraction of light and their practical application, interferometers and diffraction gratings, polarization of light, laws of thermal radiation, holography, optical quantum generators, the formation of absorption and scattering spectra of light in media and the properties of atoms and molecules with their help, the phenomenon of the photoelectric effect and its practical application, the importance of laws related to the field of optics and their practical application;

	• will acquire the skills to describe physical experiments, demonstrations and phenomena based on physical laws and principles, to apply the science of optics and its laws in the development of science and formulas characterizing physical processes in practice, to compare existing theories with experimental results, to analyze and draw appropriate conclusions, and to use experimental devices operating on the basis of the laws of optics
Contents	Lectures Topic 1. Introduction to the history of the development of optics. The history of the development of optics and its relationship with other branches of physics. Problems in the study of science, methodological guidelines. The role of optics in the study of physics and other natural sciences. Application of the laws of optics to practice, science and technology. Scientific achievements and Internet news in the field of optics and spectroscopy in scientific research institutes of the Academy of Sciences of the Republic of Uzbekistan and scientific laboratories of higher education institutions. Tasks of science. Topic 2: Electromagnetic waves. Maxwell's system of equations for electromagnetic waves. General appearance and properties of electromagnetic waves. Maxwell's equations characterizing the connection between electric and magnetic quantities. Equations expressing the optical, electric and magnetic properties of the medium. Limitations of Maxwell's theory: Main conclusions. Topic 3: Plane electromagnetic wave and its properties. Plane electromagnetic wave equation. Electromagnetic wave spectrum. Electromagnetic nature of light phenomena. Speed of light in vacuum and in medium. Electromagnetic wave energy. Umov-Poynting vector. Electromagnetic wave intensity. Light pressure and electromagnetic wave impulse. Photometric quantities. Units used in light measurements. Photometers. Topic 4: Propagation, refraction and reflection of electromagnetic waves. Reflection and refraction of electromagnetic waves at the boundary of two media. Total internal reflection of light and Brewster angle. Fiber optics and its role in practice. Mirror. Thin lenses. Camera. Projection device. Optical device of the eye. Optical devices that arm the eye. Topic 5: Dispersion of light. Absorption of light. Normal and anomalous dispersion. Electronic theory of light dispersion. Absorption of light. Bouguer-Lambert-Beer

	law. Group and phase velocities of light. Rayleigh formula. Topic 6: Interference of light. Interference. Coherent waves and their addition. Optical path difference and phase difference. Methods of obtaining interference. Young's experiment, Fresnel's bimirror, bilens and biprism methods. Interference band width. Interference resulting from transmitted and reflected rays (thin film, Newton's rings, wedge). Main conclusions. Topic 7: The role of the interference phenomenon in practice. Two-beam interferometers. Jamin and Michelson interferometers. Fabry-Perot interferometer. Checking the quality of lenses. Main conclusions. Topic 8: Diffraction of light. Huygens-Fresnel principle. Fresnel's zone method. Zone plates. Diffraction in a circular slit, a circular obstacle, a rectilinear slit and a rectilinear obstacle. Fraunhofer diffraction. Main conclusions. Topic 9: The role of the diffraction phenomenon in practice. Diffraction grating and its main characteristics. Dispersion, linear and angular dispersion, resolving power. Spectral devices and their classification. Main conclusions. Topic 10: Polarization of light and crystal optics. Natural and polarized light. Linearly polarized light. Malus's law. Uniaxial and multiaxial crystals. Birefringence of light. Polarization devices. Obtaining and examining linearly, elliptically and circularly polarized light. Main conclusions. Topic 11: Sunly optical anisotropy. Anisotropy resulting from deformation. Kerr effect. Rotation of the plane of polarization. Devices for recording the rotation of the plane of polarization. Main conclusions. Topic 12: Thermal radiation. The ability of objects to emit and absorb light. Absolute black body radiation. Laws of thermal radiation Kirchhoff's law, Stefan-Bolsmann law, Wien's displacement law, Planck's formula. Main conclusions. Topic 13: Application of the laws of thermal radiation. Photoelectric effect Optical pyrometers. Light sources. Photoluminescence, phosphorescence and fluorescence. Photoelectric effect. Internal and external photoelectric effect. Einstein's formula for the external photoelectric effect. Practical application of photoelectric effect phenomena. Main conclusions. Topic 14: Scattering of light. Molecular and spectral analysis. Scattering of light in optically inhomogeneous media. J. Rayleigh theory. Molecular scattering of light from media. Molecular scattering of light. Expression of density fluctuations by the number of molecules. A. Einstein's theory. Combinatorial scattering of light. Classical theory of combinatorial scattering of light. Quantum theory of combinatorial scattering of light.

	Compton effect. Wave properties of microparticles. Electron diffraction. Main conclusions. Topic 15: Magneto-optics and electro-optics. Nonlinear effects. Zeeman effect. Faraday effect. Artificial anisatropy associated with the field. Artificial anisatropy. Birefringence of light in an electromagnetic field. Kerr magneto-optical effect. Doppler effect for a light wave. General information about lasers. Absorption and amplification of radiation propagating in the medium. Operation of lasers. Continuously operating helium-neon laser. Laser technology. Nonlinear optics. Multi-photon processes. Stimulated combinatorial scattering of light The following topics are recommended for practical training: 1. Geometric optics. The path of rays in lenses and prisms. Image formation. Optical power of lenses. The law of reflection and refraction of light. 2. Photometric quantities. Luminous intensity, illuminance, clarity, luminous flux. 3. Propagation, refraction and reflection of electromagnetic waves. Fresnel equations. Amplitudes and intensities of electromagnetic waves reflected and refracted from the boundary of two media. 4. Absorption of light. Dependence of the absorption coefficient on frequency and concentration of the medium. Bouguer-Lambert-Beer laws. 5. Dispersion of light: Phase and group velocities of electromagnetic waves. Dispersion laws. Normal and anomalous dispersion. Dispersion phenomena at the absorption boundary of light. 6. Interference of light. Maximum and minimum conditions of coherent rays. Interference in a thin plate. Path and phase difference. Newton's rings. Calculation of the radius of curvature of lenses using interference rings. 7. Interference phenomena in a Fresnel mirror and biprism. Finding the refractive index and concentration of media using interference patterns in interferometers. 8. Diffraction of light. Calculation of its characteristics in various slits and obstacles. Resolution, linear and angular dispersion. 9. Polarization of light. Types of polarized rays and their production. Dependence of the intensity of polarized light on the angle of polarization. 10. Malus's law. Brewster's law. Path of light in polarizers. 2/2 and 2/4 plates. Rotation of polarization planes. 11. Thermal radiation. Laws of thermal radiation. Absolute black body radiation. Dependence of radiation energy on

	ambient temperature and radiation wavelength. Wien, Stefan - Bolsmann, Planck laws. 12. Photoelectric effect. Internal and external photoeffects. Output work. Einstein's formula. Basic characteristics of photomultipliers and photocells.
Media employed	Presentations, videos, simulations, electronic resources and others
Study and examination requirements and forms of examination	Oral Examination: For this exam, the student is given 20 minutes for preparation to answer the questions. The answers to the questions are graded as follows: 1. If detailed and complete answers are provided for all questions – 5 (Excellent) 2. If answers are provided for all questions (some of them partially) or complete answers are given for 2/3 of the questions – 4 (Good) 3. If answers are given to some of the questions or partial answers are provided for 2/3 of the questions – 3 (Satisfactory) 4. If no answers are provided or the answers do not correspond to the questions – 2 (Unsatisfactory)
Reading list	Asosiy Adaboyotlar 1. Landsberg G.S. "Optika" T., “O’qituvchi”-1981, -944 b. 2. Matveev A.N. Optika. M. "Vыsshaya shkola". 1985.- 354 s.. 3. Sivuxin D.V. Obщiy kurs fiziki. Tom 4. OPTIKA. 3-ye izd. M. "Fizmatlit". 2005. - 792 s.4. Sivuxin D.V. «Optika» «Fizmat» M. 2005 4. Qo‘yliyev B.T. "Optika" "Fan va texnologiya" T. 2014. -272 5. Otajonov Sh., Ramazanov A.X., Umumiy fizika Optika. O'quv qo'llanma. "Durdona nashriyoti-2024.- 200 b.
Reviewers	B. Khayriddinov – Karshi State University, Professor of the Department of "General Physics" L. Meyliyev - Associate Professor of the Department of "General Physics" of Karshi State University.
Confirmed place and time	Developed and approved by Karshi State University (Report №1 30.08.2024)

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ATOMIC PHYSICS
MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODUL REFERENCES

Module name:	Atomic Physics
Code, if applicable:	AF 1506
Semesters in which the module is taught:	5
Lecturer:	Senior lecturer of the Department of "General Physics", Karshi State University. Jamila. Khojamberdiyeva.
Language	Uzbek
Relation to curriculum:	2. Compulsory
Type of teaching, contact hours:	Lecture, practical
Workload:	6 ECTS (180 hours): For the course load Classroom sessions lecture 60 hours practical training 30 hours Independent study: 90 hours
Credit points:	6
Recommended prerequisites:	Electricity and magnetism Optics Mathematical analysis
Module objectives Intended learning outcome	As a result of mastering the subject, the student should: - have an idea of the basic physical laws related to the field of atomic physics, their role in practice, their application to the fields of science and technology, analyze formulas and graphs representing physical processes and draw appropriate conclusions, and apply basic physical laws and principles to microcosm phenomena; - be able to set up laboratory work studying the main properties of the atom and its shell system, perform measurements and calculate their results, calculate experimental errors and conclude on the quality of the experiment, and be able to describe the principles of operation of nuclear physics instruments and devices based on physical laws and use them; - plan experiments, operate measuring instruments and devices in atomic physics, solve and analyze problems of general demand; have the skills to use mathematical calculation methods in calculating problems and experimental results in atomic physics in different systems of measurement units.
Contents	Lecture topics Lectures Topic 1: Introduction Atomic physics. History of atomic physics and its development stages. Dimensions of the microworld. Constants. Modern atomic science Topic 2: Chapter I. Thermal radiation Thermal radiation. Kirchhoff's law. Stefan-Bolsmann law and Wien's displacement law. Rayleigh-Jeans law.

	Planck's hypothesis. Planck's formula. Pyrometers and their types. Optical pyrometry Topic 3. Chapter II. Corpuscular properties of electromagnetic radiation Short-wave limit of the X-ray spectrum. External photoeffect and its basic laws. Bote's experiment. Photons. Compton effect X-ray diffraction in crystals. Methods of observing the diffraction phenomenon in crystals. Application of X-ray diffraction. X-ray photography. Laporte's rule Topic 4: Chapter III. Bohr theory of the hydrogen atom Regularities in the spectrum of the hydrogen atom. Spectral terms. Combination principle. Thomson's atomic model. Rutherford experiments. Rutherford's formula. Nuclear model of the atom. Bohr's postulates. Frank and Hers experiments. Topic 5: Chapter III. Bohr's theory of the hydrogen atom Pickering series. Bohr's theory of the hydrogen atom. Relativistic generalization of the Bohr atomic model. Isotopic shifts of atomic levels. Muon atom of hydrogen. Main shortcomings of the Bohr theory Topic 6: Chapter IV. Particles and waves De Broglie's hypothesis. Wave properties of particles. Davisson-Jermer and Thomson-Tartakovsky experiments. Biberman, Fabrikant and Sushkin experiments Properties of the de Broglie wave. Wave packet. Statistical interpretation of the Broglie wave Uncertainty relation. Practical application of the wave properties of particles. Diffraction of neutrons in crystals. Neutronography Topic 7: Chapter V. Fundamentals of quantum mechanics Wave function and its properties. Discrete spectrum and continuum. Schrödinger equation. Basic operators used in atomic physics. Hamiltonian operator. Properties of operators Topic 8: Chapter VI. Particles passing through a potential barrier Free motion of microparticles. Rectangular potential depth. Energy quantization. Linear harmonic oscillator. Particles passing through a potential barrier. Tunneling effect. Tunnel microscope. Cold emission of electrons from metals. Alpha decay of nuclei Topic 9: Chapter VII. One-electron atoms Hydrogen atom. Orbital mechanical and magnetic moments of the electron. Stern and Gerlach experiment. Alkali metal spectrum. Multiplet of the spectrum. Uhlenbeck and Gaudsmith hypothesis. Topic 10: Chapter VII. One-electron atoms. Electron spin. Electron specific magnetic moment. Electron total mechanical and magnetic moment.

	Topic 11: Chapter VII. One-electron atoms. Spin-orbital interaction. Fine and ultrafine structure of atomic spectra. Fine structure of the spectrum of hydrogen and hydrogen-like atoms. Exactly similar particles. Topic 12. Chapter VIII. Many-electron atoms Pauli principle. Electron configuration. Filling of atomic electron shells with electrons. Hund's rule. Mendeleev's periodic system. Terms of many-electron atoms. Mechanical and magnetic moments of atoms Topic 13: Chapter IX. X-ray spectra Characteristic X-ray radiation. X-ray spectra. Mosley's law. Auger effect. Interaction of X-rays with matter. X-ray photography. Topic 14: Chapter X. Atom in an external force field Atom in a magnetic field. Zeeman effects. Simple and complex Zeeman effects. Selection rule for spectral transitions. Paschen-Buck effects. Electron paramagnetic resonance (EPR). Atom in an electric field. Stark effect. Practical applications of electron paramagnetic resonance Topic 15: Chapter XI. Molecules Hydrogen molecular ion. Hydrogen molecule. Geithner-London theory. Terms for diatomic molecules. Chemical bonding. Covalent and ionic bonds. Metallic bonds. Franck-Candon principle. Molecular bonding. Molecular energy. Valence. Molecular spectraII. Practical training The following topics are recommended for practical exercises: 1. Thermal radiation. Kirchhoff's law. Stefan-Bolsmann's law and Wien's displacement law, Rayleigh-Jeans law. Planck's hypothesis. Solving problems on Planck's formula 2. Photons. Short-wave limit of the X-ray spectrum. Solving problems on the external photoelectric effect and its basic laws, Compton effect 3. Regularities in the hydrogen atomic spectrum. Bohr's postulates. Solving problems on the Bohr theory of the hydrogen atom 4. Particles and waves. De Broglie waves. Solving problems on the uncertainty principle 5. Wave function and its properties. Schrödinger equation, basic operators used in atomic physics. Solving problems on 6. Free motion of microparticles. Rectangular potential depth. Solving problems on a linear harmonic oscillator

	7. Hydrogen atom. Orbital mechanical and magnetic moments of the electron. Stern and Gerlach experiment. Solving problems on the spectrum of alkali metals 8. Multiplet of the spectrum. Uhlenbeck and Gaudsmith hypothesis. Spin of the electron. Solving problems on the specific magnetic moment of the electron 9. Spin-orbital interaction. Solving problems on the fine structure of the spectrum of hydrogen and hydrogen-like atoms 10. Bosons and fermions. Pauli principle. Solving problems on Fermi and Bose particle systems 11. One-electron state. Solving problems on filling atomic states with electrons 12. Solving problems on the transition of internal electrons in an atom 13. Solving problems on characteristic X-ray radiation 14. Mosley's law. Solving problems on the Auger effect 15. Atom in a magnetic field. Zeeman effects. Paschen-Buck effects. Electron paramagnetic resonance (EPR). Atom in an electric field. Solving problems about the Stark effect
Study and examination requirements and forms of examination	Oral Examination: For this exam, the student is given 20 minutes for preparation to answer the questions. The answers to the questions are graded as follows: 1. If detailed and complete answers are provided for all questions – 5 (Excellent) 2. If answers are provided for all questions (some of them partially) or complete answers are given for 2/3 of the questions – 4 (Good) 3. If answers are given to some of the questions or partial answers are provided for 2/3 of the questions – 3 (Satisfactory) 4. If no answers are provided or the answers do not correspond to the questions – 2 (Unsatisfactory)
Media employed	Presentations, videos, simulations, electronic resources and others
Reading list	Asosiy adabiyotlar 1. Popov A.M., Tixonova O.V. Leksii po atomnoy fizike, M.: Fiz.fak. MGU, 2007. 2. Matveev A.N. Atomnaya fizika, M.: Vыsshaya shkola, 1989 1988. 3. Vixman E., Kvantovaya fizika, M.: Nauka, 1974. 4. Sivuxin D. V. Obщiy kurs fiziki. Ucheb. posobie: Dlya vuzov. V 5 t. T. V. Atomnaya i yadernaya fizika. M.: FIZMATLIT;Izd-vo MFTI, 2002.- 784 s.

	5. Axmedova G., Mamatqulov O.B., Xolbaev I. Atom fizikasi. O‘quv qo‘llanma. T.: Istiqlol, 2013. - 416 b. 6. Yu.N.Kolmakov, Yu.A.Pekar, L.S.Lejneva, V.A.Semin, Osnovы kvantovoy teorii i atomnoy fiziki, Ucheb. posobie, Tula, 2003. - 144 s. 7. C.J. FOOT. Atomic Physics. Department of Physics. University of Oxford. Oxford University press 2005.pg-346
Reviewers	B. Khayriddinov - Professor of the Department of General Physics, Karshi State University,
Confirmed place and time	Developed and approved by Karshi State University (Report №1 30.08.2024)

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ATOMIC NUCLEUS AND ELEMENTARY PARTICLE PHYSICS
MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODULE REFERENCES

Module Name	Atomic Nucleus And Elementary Particle Physics
Code (if applicable)	AY1606
Semesters Taught	4
Lecturer	Odilova Nilufar Juraevna– Senior Lecturer of the Department of "Theoretical and Experimental Physics"
Language of Instruction	Uzbek
Relation to Curriculum	Mandatory subject
Type of Teaching, Contact Hours	Lecture, Practical Sessions
Total Workload	180 hours
Contact Hours	90 hours (Lecture – 60 hours, Practical – 30 hours)
Independent Study	90 hours
Credit Points	6
Recommended Prerequisites	Chemistry, Mechanics, Molecular Physics, Electricity and Magnetism, Optics,Atomic physics

Module objectives / intended learning outcome	CONTENT OF THE SUBJECT The content and regularities of this curriculum, recommended for the subject of atomic nucleus and elementary particle physics, were developed with ensuring continuity and consistency. One of the main tasks of the program is to reflect information about the large-scale reforms being implemented in Uzbekistan, positive changes, and the enormous opportunities being created for young people in the working curriculum of the discipline. When forming the curriculum, the widespread use of the results of research work by well-known scientists of our republic working in the fields of optics, spectroscopy, and photonics was also taken into account. Purpose of teaching the subject The purpose of teaching the discipline is to teach students the theoretical foundations, basic concepts, laws, and principles of nuclear and elementary particle physics, as well as to develop skills in applying them in practice. Tasks of the subject: The objectives of teaching the discipline are to teach students to analyze various problems, to think independently, to provide information about the atomic nucleus, nuclear reactions, radioactive decays, the interaction of nuclear radiation with matter and the properties of elementary particles, and to calculate the quantities representing these properties. It also consists of teaching the use of nuclear-physical devices in technology and everyday life, measuring the main parameters and characteristics of modern detectors based on experiments, studying and comparing their laws.

Content	Topics 1. Topic 1: Introduction to the discipline "Physics of the Atomic Nucleus and Elementary Particles" 2. Topic 2: Basic properties of atomic nuclei 3. Topic 3: Nuclear forces 4. Topic 4: Nuclear models 5. Topic 5: Radioactivity 6. Topic 6: Interaction of nuclear radiation with matter 7. Topic 7:Passage of charged light particles through matter 8. Topic 8: Interaction of gamma radiation and neutrons with matter 9. Topic 9: Nuclear reactions 10. Topic 10: Elementary particles 11. Topic 11: Universe. III. Guidelines and Recommendations for Practical Classes The department develops guidelines and recommendations for organizing practical classes. In these, students reinforce the knowledge and skills gained from the main lecture topics through practical problems and case studies. Additionally, based on textbooks and educational materials, students are recommended to: • Consolidate their knowledge, • Use reference materials, • Enhance their understanding through scientific articles and theses, • Solve problems, • Prepare presentations and visual aids on topics, • Use normative and legal documents as references. Practical exercises are carried out by solving problems in the relevant sections. Examples and problems to be solved in practical classes are selected based on the following principles: a certain number of examples and problems are selected that develop skills in solving typical examples and problems, represent the essence of the subject, and express the connection between the topics. Practical Tasks 1. Mass and binding energy of the nucleus. Nuclear spin. Magnetic dipole moment of the nucleus. Size and density of the nucleus. Electric quadrupole moment of the nucleus. 2. Isotopic spin of particles and nuclei. Isotopic invariance of nuclear forces. 3. Nuclear models. Droplet model. Fermi-gas model. Shell model. Generalized Nuclear Model. 4. Basic laws of radioactive decay. Sequential decay. Alpha decay. Beta decay. Radioactive series and transuranium elements. 5. Gamma radiation of nuclei. Description of gamma transitions. Selection rules. 6. Interaction of charged heavy and light particles with matter. The passage of gamma radiation through matter. Interaction of neutrons with matter. Neutron deceleration. Biological effects of radiation and protection from it. 7. Kinematics of nuclear reactions. Conservation Laws in Nuclear Reactions. Cross-section and yield of nuclear reactions. Mechanism of nuclear reactions. Direct nuclear reactions. 8. Photo-nuclear and electronuclear reactions. Nuclear reactions involving neutrons Nuclear reactions involving heavy ions. 9. Main properties and classification of elementary particles. Particles and antiparticles. Elementary particles and conservation laws. Quarks. Quark structure of light baryons and mesons Practical classes should be conducted in a classroom equipped with an electronic board by a professor or instructor for one academic group. Classes should be conducted actively and interactively, applying appropriate pedagogical methods and information technologies.

	Forms and Content of Independent Study Purpose of Independent Study: The purpose of independent study is for students to consolidate the knowledge and skills acquired during the learning process under the guidance of a teacher using textbooks, study guides, educational-methodical complexes, Internet resources, and visual and multimedia materials. There are various forms of independent study, with the main focus on students working independently outside the classroom on assigned topics (practical problems, tasks, and case studies), studying them, and deepening their knowledge and skills in this direction. These forms include: • Studying chapters and topics of the subject in textbooks or study guides; • Mastering parts of lectures through distributed materials; • Working with automated teaching and testing systems; • Working on sections or topics of the subject using specialized literature; • In-depth study of sections and topics related to students' research and scientific work; • Independently completing case studies and educational projects; • Mastering practical lessons that use active and problem-based teaching methods. Recommended Independent Work Topics: 1. Radioactive background. 2. Technogenic radionuclides 3. Cluster splitting. 4. The Mössbauer effect and its application. 5. Biological effects of radiation and protection from it 6. Artificial synthesis of superheavy elements. 7. Thermonuclear reactions. 8. Nuclear reactors and their applications. 9. Synchrotron radiation and its application. 10. Methods of nuclear-physical analysis 11. Quarks. 12. Quantum chromodynamics. 13. Big Bang. 14. Cosmic rays. 15. Expansion of the Universe. Hubble's Law. Additionally, for topics studied independently, students are recommended to prepare project work, theses, and reports, and present them as part of their learning process.
Study and examination requirements and forms of examination	Written Examination: In this exam, the student is given 80 minutes to write answers to the questions. The answers to the questions are graded as follows: 1. If detailed and complete answers are written for all questions – 5 (Excellent) 2. If answers are provided to all questions (some of them partially) or complete answers are given for 2/3 of the questions – 4 (Good) 3. If answers are given to some of the questions or partial answers are provided for 2/3 of the questions – 3 (Satisfactory) 4. If no answers are provided or the answers do not match the questions – 2 (Unsatisfactory)
Media employed	Presentations, videos, simulations, electronic resources and others
Reading list 1	1. Muminov T.M., Kholikov A.B., Kholmurodov Sh.Kh. Atomic Nucleus and Particle Physics. -T.: Uzbekistan Philosophers Society, 2009. 2. Mukhin K.N. Experimental Nuclear Physics: Textbook. V 3-x tt. Vol. 1. Physics of the Atomic Nucleus. 7th ed., ster. - St. Petersburg: Lan Publishing House 3. Bekjonov R.D. Atomic Nucleus and Particle Physics.-T.:O'qituvchi, 1994. 4. Sivukhin D.V. General Course of Physics. Textbook: For universities. In 5 vols. Vol. V. Atomic and Nuclear Physics. - M.: FIZMATLIT; MFTI Publishing House, 2002.

	5. Krance K.C. Introductory nuclear physics. Oregon State University, John Wiley and Sons, New York, 1988.
Reviewers	A.Tashatov - Karshi State University, Professor of the Department of "Theoretical and Experimental Physics" G.Allayarova – Karshi State University, Associate Professor of the Department of Theoretical and Experimental Physics
Confirmed place and time	Developed and approved by Karshi State University (Report №1 30.08.2024)

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TRENDS AND MODERN APPROACHES IN CONTINUING EDUCATION
MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODUL REFERENCES

Module name:	Trends and Modern Approaches in Continuing Education
Code, if applicable:	UT 1704
Semesters in which the module is taught:	7
Lecturer:	Professor of the Department of General Physics, Karshi State University, Uzoqova Gulnoza Saydullayevna
Language	Uzbek
Relation to curriculum:	3. Compulsory
Type of teaching, contact hours:	Lecture, seminar
Workload:	4 ECTS (120 hours): For the course load Classroom sessions lecture 30 hours seminar 30 hours Independent study: 60 hours
Credit points:	4
Recommended prerequisites:	General physics course
Module objectives Intended learning outcome	As a result of mastering the subject, the student will: have an understanding of the foundations, structure, theoretical, didactic and methodological foundations of approaches to the use of trends in continuing education, know modern approaches to their use, have an idea that trends in continuing education are a set of unique experiences; (knowledge) future teachers will be able to use theoretical issues of trends in continuing education, approaches to their study, methods of using trends in preschool and school education, secondary specialized and vocational education, specialized and creative education and higher pedagogical education, trends in the education systems of foreign countries and their specific features, the importance of educational trends in the work of a teacher; (skills). must be aware of traditional, modern and innovative approaches to using educational, training, methodological and technological trends in continuing education, have an individual methodology for studying trends in continuing education, and have the skills to rationally use educational trends in their future activities.
Contents	Main theoretical part (lectures) The subject includes the following topics: Topic 1. Educational policy. Global challenges in the field of education and directions and basic principles of

	educational policy in Uzbekistan. Processes of modernization of education in foreign countries. Principles of higher education reform in Europe and the interrelation of integration processes in the field of education. Directions of educational policy in developed countries. Topic 2. Internationalization and globalization of education. Trends and features of internationalization and globalization of education. New requirements for higher education. International rating agencies for assessing the activities of higher education organizations. Topic 3. Current state, problems and development directions of preschool, general secondary, vocational education. Preschool education and preparation for school. General secondary education. Vocational education. Main directions of modernization of general secondary and vocational education in European countries. Topic 4. Main trends in changes in higher education General description of the state of modern higher education in foreign countries. General principles of developing higher education programs in foreign countries and conditions for organizing admission processes. Organization of pedagogical education. Main trends in the modernization of higher education in Germany and France. Topic 5. Postgraduate education and training of scientific and pedagogical personnel. Postgraduate education programs and qualification requirements in foreign countries Structure and forms of doctoral studies. Problems and prospects of reforming doctoral studies. Mechanisms for stimulating scientific research activities: problems and solutions. Scientific research methodology. Requirements for the quality of education for dissertations. Topic 6. Assessment and control of the quality of education General principles of assessing the quality of education and the specifics of modern approaches. Competence as a priority approach to educational development. Peculiarities of national systems for assessing the quality of education. Internationalization of indicators and forms of assessing the quality of

	education. Formation of international infrastructures for assessing the quality of higher education. Topic 7. PIRLS, TIMSS, PISA, EGRA, EGMA international assessment programs. Basic information about the PIRLS international assessment program. The content and history of the PIRLS international assessment program. Basic information about the TIMSS international assessment program. The content and history of the TIMSS international assessment program. Basic information about the PISA international assessment program. The content and history of the international assessment program. Basic information about the EGRA international assessment program. The content and history of the EGRA international assessment program. About the EGMA international assessment program, the main assessment program content, essence, information. The EGMA international assessment program content, essence, history of implementation. Topic 8. STEAM educational technology and design Competencies listed in the TALIS international assessment program standards (FrameWork). Content essence. Content and essence of STEAM educational technology. The need to use STEAM educational technology in general secondary education. The importance of STEAM educational technology in general secondary education. The essence of the project and planning. Principles of designing the pedagogical process. The use of projects in the implementation of STEAM educational technology. Topic 9. Modernization of educational legislation A general description of the conditions and main directions of the modernization of educational legislation in developed countries. Regulatory and legal support for the participation of European countries in the Bologna processes. Experience of codifying education in France. Topic 10. Pedagogical innovations in the development of the lifelong learning system Educational innovations, Innovative approaches to organizing the educational process. Specific features of teaching in the credit-module system. Technologies of collaborative teaching. Person-centered education.

	Topic 11. Development directions of pedagogy Development of modern pedagogy. Art pedagogy. Theater pedagogy. Medical pedagogy. Neuropedagogy. Music pedagogy. Androgogy. Geronto(elderly) pedagogy. Hospital pedagogy. Topic 12. Education system in economically developed countries. Integration of foreign and Uzbek education systems The uniqueness of the education system in developed foreign countries. Harmony of the education system of the Republic of Uzbekistan with the education system of foreign countries. International cooperation. The following topics are recommended for seminar sessions: 1. Comparative analysis of the development of education in the world. 2. Trends in the state of financing education at different levels. 3. Changes in the system of primary, general secondary, vocational education. 4. Bologna processes and their role in the modernization of education. 5. Leading trends in the assessment of the professional development of teachers. 6. General principles and mechanisms of educational management. 7. Out-of-school education. 8. International educational services market. 9. The basics of PISA educational technologies; the formation of school-age children in a developing environment 10. The basics of STEAM educational technologies; the formation of school-age children in a developing environment 11. The basics of PIRLS, TIMS educational technologies; the formation of school-age children in a developing environment 12. The content, essence and history of the EGRA and EGRA international assessment programs. 13. Development trends in pedagogy

	14. The education system in economically developed countries. 15. The education system in the USA, Great Britain, Japan, and Finland.
Study and examination requirements and forms of examination	Oral Examination: For this exam, the student is given 20 minutes for preparation to answer the questions. The answers to the questions are graded as follows: 1. If detailed and complete answers are provided for all questions – 5 (Excellent) 2. If answers are provided for all questions (some of them partially) or complete answers are given for 2/3 of the questions – 4 (Good) 3. If answers are given to some of the questions or partial answers are provided for 2/3 of the questions – 3 (Satisfactory) 4. If no answers are provided or the answers do not correspond to the questions – 2 (Unsatisfactory)
Media employed	Presentations, videos, simulations, electronic resources and others
Reading list	Main literature 8. Xodjayev B.X., Choriyev A., Saliyeva Z.T. Pedagogik tadqiqotlar metodologiyasi. Darslik.-T:-IQTISODIYOT DUNYOSI, 2018. 9. Ro'ziyeva D.I., Tolipov O'.Q., Pedagogik texnologiyalar va pedagogik mahorat. -T.: INNOVATSIYA-ZIYO, 2019. 10. Tendentsii razvitiya vysshego obrazovaniya v mire i v Analiticheskiy hisobot-daydjest. Moskva 2021. 198 s. rossi.
Reviewers	B. Koyliyev - Professor of the Department of General Physics, Karshi State University,
Confirmed place and time	Developed and approved by Karshi State University (Report №1 30.08.2024)

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PHYSICS AND ASTRONOMY TEACHING METHODOLOGY
MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODUL REFERENCES

Module name:	Physics and astronomy teaching methodology
Code, if applicable:	FO1404
Semesters in which the module is taught:	4
Lecturer:	G.S. Uzokova - Professor of the Department of "General Physics" at Karshi State University.
Language	Uzbek
Relation to curriculum:	1. Compulsory
Type of teaching, contact hours:	Lecture, seminar
Workload:	4 ECTS (120 hours): For the course load Classroom sessions lecture 30 hours seminar 30 hours Independent study: 60 hours
Credit points:	4
Recommended prerequisites:	General physics course
Module objectives Intended learning outcome	As a result of mastering the subject, the student should: The methodology of teaching physics and astronomy is of great scientific and practical importance, as it is a key factor in the development of science and society, especially in the study of the history of scientific achievements, the development of laws of physics, the enrichment of the theory of knowledge, and especially in the current period. The methodology of teaching physics for the preparation of highly qualified specialists includes the goal of forming skills and abilities in the use of innovative technologies in teaching science, that is, the use of pedagogical and information technologies, modern educational tools. The content and objectives of education are also considered in connection with the structure of the physics course, the integration of disciplines, and at the same time the opportunities for developing active thinking skills in students. Issues such as the creation of lesson plans based on modern innovative technologies, methods of applying pedagogical and information technologies to physics, theoretical foundations of physics teaching methods, types of educational experiments in physics and their tasks, research in the field of physics and astronomy in Uzbekistan, the history of the formation and development of physics and astronomy education, and methods of solving problems in physics are studied.
Contents	Lectures on the subject of teaching methods of physics and astronomy The subject includes the following topics:

	Topic 1. Teaching methods of physics and astronomy as a pedagogical subject, its subject and research methods. The purpose of the subject. The emergence and development of teaching methods of physics. As a science, its scientific research methods. Technologies and means of teaching physics. The role of science in training specialists. Interdisciplinary connections in the field of physics and astronomy. The connection of physics teaching methods with physics, astronomy, philosophy, psychology and pedagogy. The tasks of physics as a subject of education in secondary general education and secondary specialized schools. Analysis of the current state of teaching astronomy in secondary general education schools. Topic 2. Innovative technologies in education. Application of innovative technologies in education and teaching theoretical and practical knowledge on the methodology of teaching physics and astronomy in continuity and continuity Topic 3. Psychological and didactic foundations of teaching physics and astronomy. Psychological and didactic foundations of teaching physics. Biological and physiological features of human mental development. Scientific thinking and creative abilities. Thinking, analysis, comparison, synthesis, abstraction, generalization and conclusion. Empirical thinking, emotional images and imagination. Theoretical thinking. Didactic principles in physics and astronomy lessons. The principle of consciousness and activity, the principles of scientificity and demonstrativeness: The principle of systematicity and regularity. The principle of thorough mastery and sequence. Topic 4. Teaching methods and requirements for them. Analysis of the structure of physics education. Classification of teaching methods. Methods of organizing and implementing teaching-learning activities. Stimulation and motivation of learning activities; Methods of checking the effectiveness of learning activities and self-control Topic 5. Methods of applying information technologies to physics subjects. The role of modern information technologies in increasing the effectiveness of physics education. The use of modern information technologies in organizing physics lessons. Modern technologies in organizing astronomy lessons. Demonstration experiments in physics and astronomy education, the use of educational films, virtual laboratories, multimedia electronic manuals, the use of visual materials from the Internet, methods of activating cognitive activity. The use of virtual and multimedia tools in training. Topic 6. Formation of physical concepts. Formation of physical concepts. Sources of concepts. The content and

	scope of physical concepts related to astronomy. Theory of emotional and logical cognition. Definition of concepts: Justification of real definition, classification. Definition, Genetic definition or inductive definition. Errors in the assimilation of physical and astronomical concepts, ways to eliminate them. Topic 7. The structure and content of physics and astronomy education in secondary general education schools. The structure and content of the physics course in the secondary general education system. The structure and content of astronomy in the secondary general education system. Issues of improving physics and astronomy education in the general education system Topic 8. The content and objectives of teaching physics in the higher education system. The role of the lecture in teaching physics. Specific features of lecture types Methods of organizing lecture sessions in higher education institutions. Stages of the lecture, passing new material using visual and didactic materials, having a clear ideological search in the lecture. Organizing the lecture effectively using methods and techniques appropriate to the nature of the education. Taking into account the personal characteristics of the lecture students. Topic 9. Lessons in physics and astronomy, methodological requirements for them. The main form of teaching is the lesson. Methodological requirements for lessons in physics. Forms of organizing lessons in astronomy. Types of lessons. Lessons for learning new material, forming knowledge, deepening and generalizing knowledge. Combined lesson. Topic 10. Methodological requirements for planning educational materials in physics and astronomy. Educational and normative documents necessary for the educational process. Teacher preparation for lessons. Modern lessons and educational and normative documents necessary for the lesson. The level of teacher preparation for the lesson, the set of knowledge necessary for the teacher. Topic 11. Educational methods and technologies that serve to increase the effectiveness of physics education. Activation of cognitive activity of students. Teaching methods and technologies that help increase the effectiveness of physics education. Types of organization and management of the educational process based on educational technologies. Comparison of traditional and technological approaches to teaching. Principles of person-oriented education. Understanding and knowing, Understanding the principles of explanation. Principles of activating students' cognitive activity in the process of teaching physics

	Topic 12. Methods of solving physics problems. Criteria for selecting problems related to astronomy. Methods and techniques of conducting physics educational experiments Classification of physics problems. Methods of solving various types of physics problems. Methods of solving qualitative and quantitative problems in physics. Methods of solving graphical and experimental problems in astronomy lessons. Methods and techniques of preparing and showing demonstration experiments. Educational experiments related to astronomy. Topic 13. Types of organization and control of independent work in physics and astronomy. Types and significance of students' independent work in physics (textbook, popular science literature, handouts, programmed tasks). Methods of organizing and managing students' independent work. Different forms of testing students' skills and abilities in physics, knowledge and their significance. Independent mastery of certain topics of astronomy using educational literature, work with educational resources. Independent preparation for practical, seminar and laboratory classes and creative work. Methodological requirements for preparing abstracts, term papers, theses and reports on topics. Topic 14. Criteria for testing and controlling students' knowledge. System of assessing knowledge orally, in writing and by checking the results of laboratory work. Assessment of training sessions. Assessment of students' knowledge, skills and abilities. Designing an assessment of students' knowledge, skills and competencies. Types and forms of assessment. Topic 15. Methods and techniques of conducting pedagogical practice. The goals and objectives of qualified pedagogical practice. The content of qualified pedagogical practice. The main principles of organizing qualified pedagogical practice. Criteria for evaluating work during qualified pedagogical practice Topic 8: Chapter VI. Particles passing through a potential barrier Free motion of microparticles. Rectangular potential depth. Energy quantization. Linear harmonic oscillator. Particles passing through a potential barrier. Tunneling effect. Tunnel microscope. Cold emission of electrons from metals. Alpha decay of nuclei Instructions and recommendations for organizing seminars Topics of the seminar: Topic 1. Features of step-by-step teaching of physics. Analysis of the physics course construction system, Radial teaching in physics teaching. Concentric teaching

	in physics teaching. Step-by-step structure in physics teaching Topic 2. Didactic principles in physics teaching. Didactic principles in physics teaching. Principles of consciousness and activity, scientificity and demonstrativeness. Systematicity and regularity, Principles of thorough mastery and sequence. Topic 3: Use of modern pedagogical technologies in the process of teaching physics. Use of modern pedagogical technologies in organizing physics lessons. The relevance of introducing pedagogical technology into the educational process. Topic 4: State educational standard in physics and astronomy of the general secondary education system. Principles of developing a state standard. Fundamentals of the implementation of the state standard. The basic curriculum of the state educational standard of general secondary education. Topic 5 Lesson planning and teacher preparation for it. Regulatory documents necessary for planning physics lessons. Methodological requirements for lesson planning. Forms of organizing training sessions in astronomy. Use of textbooks and methodological guides on the topic being covered. The level of teacher preparation for the lesson, the set of knowledge necessary for the teacher. Topic 6. Structure and content of the physics and astronomy curricula of the general secondary education system. Fundamentals of structuring the curriculum of the general secondary education system in physics. Scientific methodological analysis of the physics curriculum of the general secondary education system. Scientific methodological analysis of the astronomy curriculum for the general secondary education system. Topic 7. Scientific and methodological analysis of physics and astronomy programs for academic lyceums. The goals and objectives of physics teaching in the secondary specialized education system. The basis for compiling academic lyceum curricula and programs. Analysis of the state of physics and astronomy teaching in the academic lyceum education system. Minimum requirements for solid knowledge, qualifications and skills in physics and astronomy in academic lyceums that graduates must possess. Topic 8. The use of modern information technologies in teaching physics and astronomy. The role of modern

	information technologies in increasing the efficiency of physics and astronomy education. The use of demonstration experiments in teaching, educational films, virtual laboratories, multimedia electronic manuals. The use of visual materials from the Internet, a method of activating cognitive activity. Topic 9. Various methods of using educational experiments in physics and astronomy. Types of educational experiments in physics. Laboratory practicum in teaching physics. The importance of demonstration experiments in teaching physics. Various methods of using educational experiments in astronomy. Topic 10. Organization and control of independent work in physics and astronomy. Methods of organizing and managing independent work. Independent mastering of certain topics of science using educational literature, working with educational resources. Independent preparation for practical, seminar and laboratory classes and creative work. Topic 11. Foreign experiences in teaching physics and astronomy. The structure and content of physics and astronomy in developed countries, advanced practices in teaching it. Requirements for the system of physics and astronomy knowledge in Japan. Structure of the South Korean education system Topic 12. Methods of conducting virtual laboratory work in the department of mechanics. Educational experiments in physics, various methods of using. virtual laboratory work Topic 13. Methods of conducting virtual laboratory work in the department of electricity. Methods of using demonstration experiments, educational films, virtual laboratories, multimedia electronic manuals in teaching the electrical department. Topic 14. Using media resources in conducting practical classes on astronomy. Methods of using educational films on astronomy, virtual laboratories, multimedia electronic manuals in practical and laboratory classes. Topic 15. Criteria for checking and assessing students' knowledge. Designing assessment of training sessions. Assessing students' knowledge, skills and qualifications. Types and forms of assessment.
Study and examination requirements and forms of examination	Oral Examination: For this exam, the student is given 20 minutes for preparation to answer the questions. The answers to the questions are graded as follows:

	1. If detailed and complete answers are provided for all questions – 5 (Excellent) 2. If answers are provided for all questions (some of them partially) or complete answers are given for 2/3 of the questions – 4 (Good) 3. If answers are given to some of the questions or partial answers are provided for 2/3 of the questions – 3 (Satisfactory) 4. If no answers are provided or the answers do not correspond to the questions – 2 (Unsatisfactory)
Media employed	Presentations, videos, simulations, electronic resources and others
Reading list	Main literature 1. Izabel Gedgrave "Fizikaning zamonaviy ta'limi". 2009 2. Bushok G.F., Venger E.F. Metodika prepodovaniya obshchey fiziki v vysshey shkole. -Kiyev, 2000 yil 3. Uzoqova G.S. "Fizika o'qitish metodikasi"- Qarshi, "Intellekt", 2025 4. Uzoqova G.S. "Fizika o'qitish metodikasi asoslari"- Qarshi, "Intellekt", 2023. 5. Uzoqova G.S, Tursunov Q.SH. Qurbonov M. "Fizika o'qitishning nazariy asoslari".-T., O'zbekiston, 2008. 6. DJorayev, M., Sattorova B. Fizika va astronomiya o'qitish nazariyasi va metodikasi. -T., "Fan va texnologiya", 2015. 7. Mamadazimov M. Astronomiya. Al va kasb-hunar kollejlari uchun darslik-T., "O'qituvchi", 2008.
Reviewers	Koyliev B.T. - Head of the Department of "General Physics" of Karshi State University, Professor Tursunov K. Professor of the Department of Physics and Electronics of the State Technical University, Doctor of Pedagogical Sciences (DSc)
Confirmed place and time	Developed and approved by Karshi State University (Report №1 30.08.2024)

KARSHI
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MINISTRY OF HIGHER EDUCATION,

SCIENCE AND INNOVATIONS OF THE REPUBLIC OF UZBEKISTAN

KARSHI STATE UNIVERSITY

INCLUSIVE EDUCATION. HOSPITAL PEDAGOGY
MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODUL REFERENCES

Module name:	Inclusive education. Hospital pedagogy
Code, if applicable:	IT 1704
Semesters in which the module is taught:	7
Lecturer:	Professor of the Department of "General Physics", Karshi State University. Uzoqova Gulnoza
Language	Uzbek
Relation to curriculum:	4. Compulsory
Type of teaching, contact hours:	Lecture, seminar
Workload:	4 ECTS (120 hours): For the course load Classroom sessions lecture 30 hours seminar 30 hours Independent study: 60 hours
Credit points:	4
Recommended prerequisites:	Physics and astronomy teaching methodology
Module objectives Intended learning outcome	- knowledge and skills such as the essence of inclusive education, integrated education and social rehabilitation, the essence of the global recognition of inclusive education and the openness of this education system to all, the principles of inclusive education management, and working with parents, families and the community to involve children in need in the education system; -must have the skills to eliminate the barrier between children in need of help and healthy children, to meet the needs of children and adolescents in need of special education and to introduce them to an education system that is aimed at their adaptation to social life and represents full involvement and inclusion in the general education process.
Contents	Lecture sessions The subject includes the following topics: Topic 1. The essence, subject, goals and objectives of inclusive education. Estimated statistical data on children with disabilities. Special preschool education. Individual education at home. Integration groups at preschool educational institutions. Speech therapy centers at general education schools. Integration classes. The concept of a disabled child. The concept of a child with a disability in physical and (or) mental development. The essence of inclusive education. The difference between inclusive education and integration education. The concept of social rehabilitation. Principles of inclusive education. Needs for inclusive education. Reasons for inclusive education. Education

	of children with disabilities in general education schools. Stages of involvement in inclusive education. Legal basis of inclusive education. Creating conditions for the child in inclusive education. The tasks of the school and school management in the education of children with disabilities in inclusive educational institutions. Topic 2. Problems of implementing inclusive education. Fundamentals of inclusive education. The concept of inclusive education, History of the development of inclusive education. Culture of inclusive education, Integrated education. Problems of implementing inclusive education. History of the development of inclusive education. Inclusive education in foreign countries. Topic 3. Principles of inclusive education. Recognition of inclusive education. The principle of inclusive education being open to all. The principle of harmonization of education. The principle of cooperation. The principle of decentralization. The principle of an integrated approach in inclusive education. The principle of flexibility in inclusive education. The principle of professional competence of specialists. The need for inclusive education. Topic 4. Western European experience of involving children with special educational needs in integrated educational conditions. The main features of integration policy. Organization of support for integrated students. (Experience of European countries) The main features of integration policy. Organization of support for integrated students. (European experience) Theoretical and practical support of inclusive education policy at the global level. Internationally: Education, the institution of the family, the policy of supporting parents. Limitation, isolation of people with disabilities, environmental factors causing disability. Organization of pedagogical and psychological support for families with disabled children. Tasks of a social pedagogue and social worker. Social model of disability. Medical approach to disability. Topic 5. Main features of integration policy.

	Implementation of inclusive education in the Central Asian regions, Eastern, Southern Europe and CIS countries. Main features of integration policy. Organization of support for integrated students. (Experience of Central Asian regions, Eastern, Southern and CIS countries) Constitution of the Republic of Uzbekistan. The laws of the Republic of Uzbekistan "On Education", the laws of the Republic of Uzbekistan "On Social Protection of Persons with Disabilities in Uzbekistan", the laws of the Republic of Uzbekistan "On Guarantees of the Rights of the Child" as a legal guarantee of education for every child. Topic 6. Uzbekistan's experience in organizing inclusive education. Organizational and regulatory framework for supporting inclusive education in the Republic of Uzbekistan. "Interim Regulation on Inclusive Education for Children and Adolescents with Disabilities". Tasks for the development of inclusive education in the Concept of Development of the Public Education System of the Republic of Uzbekistan until 2030. The role of inclusive education in the Concept of Development of the Preschool Education System of the Republic of Uzbekistan until 2030. Main features of integration policy. Organization of support for integrated students. (Experience of Uzbekistan) Topic 7. State, non-governmental organizations and international cooperation in the implementation of inclusive education. Preliminary pilot work on the implementation of inclusive education. Pilot work on inclusive education. International projects on inclusive education. National model of implementing inclusive education in the Republic of Uzbekistan. Cooperation projects with the "Social Initiatives Support Fund" and the International Educational Service. State, non-governmental organizations and international organizations in the implementation of inclusive education: Cooperation

	with UNESCO, UNICEF, Asian Development Bank, USAID, etc. Topic 8. Forms of organizing inclusive education and necessary conditions for education. Organizational and methodological work necessary for the implementation of inclusive education in practice. Participants in inclusive education. Forms of organizing inclusive education and necessary conditions for education. Ways to explain the equality of children with disabilities with healthy peers. Individual development program for children involved in inclusive education. Necessary measures for the implementation of inclusive education. Individual development plans. Tasks of the Inclusive Education Resource Center. Preparing members of society for inclusive education and instilling a positive attitude. Topic 9. Organization of the educational process in the inclusive education system. Methods of adapting the educational process in the education of children with special needs in general education. Organization of the educational process in the inclusive education system. Adaptation of the lesson process in the inclusive education of children with visual impairments. Adaptation of the lesson process in the inclusive education of children with hearing impairments. Adaptation of the lesson process in the inclusive education of children with problems with the main motor organs. Adaptation of the lesson process in the inclusive education of children with mild mental development problems. Adaptation of the educational content to the needs and capabilities of children Topic 10. Fundamentals of hospital pedagogy. Organization of social pedagogical work with sick children. Working with parents, family and the community in involving sick children in the education system. Tasks and goals of a resource teacher and social pedagogue working with sick children. Methods of providing organizational, legal, methodological and practical assistance in organizing pedagogical work in the education system for sick children.

	Topic 11. Education of sick children. Rehabilitation and adaptation processes of sick children. Organization of education of sick children. Hospital school and home education. Western European experience of providing assistance to sick children in integrated educational conditions. Introduction of inclusive education in the regions of Central Asia, Eastern, Southern and CIS countries. Organizational and normative foundations of supporting inclusive education in the Republic of Uzbekistan. Topic 12. Problems facing the education of sick children and ways to overcome them. Methods of adapting the educational process in the education of sick children in general education settings. Problems facing the education of sick children and their solutions. Recognition of the right of every child to education in the Convention on the Rights of the Child. The Law of the Republic of Uzbekistan "On Guarantees of the Rights of the Child" recognizes the social rights of children in need of social protection, including the right to education. Guidelines and recommendations for seminar sessions. The following topics are recommended for seminar sessions: 1. Problems of implementing inclusive education. 2. Principles of inclusive education. 3. UN Declaration on the Rights of Persons with Mental Retardation. 4. Education, the institution of the family, policy of supporting parents. Factors causing marginalization, isolation of persons with disabilities, environmental disability. 5. Main features of integration policy. Organization of support for integrated students. 6. Tasks of the school and school management in the education of children with disabilities in inclusive educational institutions 7. Development of the concept of inclusive education among students in classes and groups.

	8. Methods of adapting the educational process in the education of sick children in general education settings 9. Special education for children with disabilities. 10. Factors that cause exclusion, isolation of people with disabilities, and environmental disabilities. 11. Organization of support for integrated students. 12. Pilot work on inclusive education. 13. Preparing community members for inclusive education and fostering a positive attitude. 14. Working with parents, families, and the community to engage sick children in the education system. 15. Hospital school and home education.
Study and examination requirements and forms of examination	Oral Examination: For this exam, the student is given 20 minutes for preparation to answer the questions. The answers to the questions are graded as follows: 1. If detailed and complete answers are provided for all questions – 5 (Excellent) 2. If answers are provided for all questions (some of them partially) or complete answers are given for 2/3 of the questions – 4 (Good) 3. If answers are given to some of the questions or partial answers are provided for 2/3 of the questions – 3 (Satisfactory) 4. If no answers are provided or the answers do not correspond to the questions – 2 (Unsatisfactory)
Media employed	Presentations, videos, simulations, electronic resources and others
Reading list	Asosiy adabiyotlar 11. Alyoxina S.V. «Inklyuzivnoe obrazovanie: istoriya i sovremennost», Uchebno-metodicheskoe posobie, M., 2013 12. Yemelyanova I.D., Markova S.V., Sergeeva A.A. «Sovremennыe problemы nauki i spesialnogo obrazovaniya, Uchebnoe posobie, Yeles, 2018 13. Qaxarova D.S. Inklyuziv talim texnologiyasi.T:. "Fan va texnologiya" ISBN 978-9943-4269-2-4/2019-192 b. 14. Qodirova F.U. Po‘latova D.A. Inklyuziv ta'lim va metodika. Ch-"Chirchiq"-2020. 331 b.
Reviewers	B. K uyliyev - Professor of the Department of General Physics, Karshi State University,
Confirmed place and time	Developed and approved by Karshi State University (Report №1 30.08.2024)

KARSHI STATE UNIVERSITY

MINISTRY OF HIGHER EDUCATION, SCIENCE AND INNOVATIONS OF THE REPUBLIC OF UZBEKISTAN

KARSHI STATE UNIVERSITY

DIFFERENTIAL EQUATIONS
MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODULE REFERENCES

Module name:	Differential Equations
Code, if applicable:	DT1306
Semesters in which the module is taught:	3
Lecturer:	Z.Sh. Yangiboyev - Associate Professor of the Department of "Mathematical Analysis and Differential Equations", D.A. Toshkulova - Teacher of the Department of "Mathematical Analysis and Differential Equations"
Language	Uzbek
Relation to curriculum:	Compulsory
Type of teaching, contact hours:	Lecture, practical
Workload:	4 ECTS (120 hours): For the course load Classroom sessions lecture 30 hours practical training 30 hours Independent study: 60 hours
Credit points:	4
Recommended prerequisites:	Linear Geometry
Module objectives Intended learning outcome	have an idea of information, methods of its storage, processing and transmission, mathematical and software support of computing systems, the features of their application in scientific fields, production and education, computer software, types and properties of programs; to develop high-level programming languages, software, programming technologies, algorithms for solving problems in applied and computational mathematics, to study object-oriented programming concepts, encapsulation, inheritance, and polymorphism rules, and to acquire skills in solving practical problems using them; Must have the skills to create an algorithm for solving applied problems, build a mathematical (computer) model and create its software, create linear lists, summarize data in a structure, and work with pointers.
Contents	Lectures Topic 1. Introduction. Basic concepts of the theory of ordinary differential equations. Topic 2. Differential equations with separated variables and their derivatives Differential equations. Topic 3. Linear differential equations and their derivatives. Bernoulli equation. Topic 4. Total differential equations and their derivatives.

	Topic 5. Cauchy problem for a first-order equation. Existence and uniqueness of the solution. Topic 6. Smoothness of the solution of a differential equation. Dependence of the solution of a differential equation on parameters and initial conditions. Special solutions. Topic 7. Unsolved first-order differential equations with respect to the derivative and their integration methods. Theorem on the existence of a solution. Topic 8. Higher-order differential equations. Initial conditions. Theorem on the existence and uniqueness of a solution. Topic 9. Equations that can be reduced in order. The case where the unknown function and its derivatives are not explicitly involved in the equation. Topic 10. Linear differential equations of the nth order. Wronsky determinant. System of fundamental solutions. Topic 11. Linear differential equations with constant coefficients. Topic 12. System of linear differential equations. Linear non-homogeneous system of equations. Topic 13. System of non-homogeneous differential equations with constant coefficients. Topic 14. First-order linear equation with special derivatives and its general solution. Topic 15. Quasilinear first-order differential equations with special derivatives. III Practical training haswick The following topics are recommended for practical sessions: 1. Formulate differential equations based on given curves in the plane. Construct an integral curve representation of the equation. 2. Differential equations with separated variables and their derivatives. Orthogonal trajectories. 3. Homogeneous equations with respect to variables and their derivatives. Methods of integrating generalized homogeneous equations. 4. First-order linear differential equations. Variation of constants and other methods. 5. Bernoulli and Riccati equation. 6. Complete differential equations. 7. Finding the integrating factor. Changing variables. 8. Study of the Cauchy problem for first-order differential equations. 9. First-order differential equations that are not solved

	with respect to the derivative. 10. First-order differential equations unresolved with respect to the derivative. Integration of equations unresolved with respect to some derivatives that are integrable in quadrature. 11. Reducing the order of higher-order differential equations. 12. Methods of integrating higher-order linear differential equations with constant coefficients. 13. Solving linear differential equations with constant coefficients whose right-hand side is in a special form. 14. Solving higher-order linear differential equations with constant coefficients by the method of variation of the constant. 15. Euler's equation. Methods of integrating linear differential equations with variable coefficients 16. Methods of integrating systems of differential equations with constant coefficients 17. System of linear homogeneous equations. Ostrogradsky-Liouville formula. 18. Cauchy problem for a normal system of differential equations. 19. Cauchy problem for a normal system of differential equations. 20. General solution of a system of linear homogeneous equations. Wronsky determinant. 21. General solution of a system of linear homogeneous equations. Wronsky determinant. 22. General solution of a system of linear non-homogeneous equations. 23. Solving a system of linear differential equations with constant coefficients whose right-hand side is in a special form. 24. Solving boundary problems 25. Green's function. On the existence and uniqueness of the Green's function. 26. Sturm-Livull problem. The concept of eigenvalues and eigenfunctions 27. System of linear equations in matrix form. 28. Autonomous systems. Types of equilibrium states. 29. Finding the general solution of first-order partial differential equations. Cauchy problem. 30. Finding the general solution of quasi-linear differential equations with first-order partial derivatives. Cauchy problem.
Media employed	Presentations, videos, simulations, electronic resources and others
Study and examination requirements and forms of examination	Written Exam: In this exam, the student is given 90 minutes to answer the questions. The answers to the questions are evaluated as follows:

	1. If all questions are answered in detail and completely – 5 (Excellent) 2. If all questions are answered (some of them partially) or 2/3 of the questions are answered completely – 4 (Good) 3. If some questions are answered or 2/3 of the questions are answered partially – 3 (Satisfactory) 4. If no answers are given or the answers do not correspond to the questions – 2 (Unsatisfactory)
Reading list	Referens 1. Dilmurodov, N. Differensial tenglamalardan misollar, masalalar va mustaqil ishlar: o'quv qo'llanma\ N.Dilmurodov-Qarshi: Nasaf, 2014. 2. Оддий дифференциал тенгламалар: дарслик М.С. Насритдинов-2-қайта нашрғ Тошкент Ўзбекистон, 1994. 3. Салохиддинов, М, Математик физика тенгламалар: дарслик Тошкент; Узбекистон, 2022.
Reviewers	J. Jumayev - teacher of the department of "Mathematical Analysis and Differential Equations" B.Baratov - Senior Lecturer of the Department of "Mathematical Analysis and Differential Equations".
Confirmed place and time	Developed and approved by Karshi State University (Report №1 30.08.2024)

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KARSHI STATE UNIVERSITY

COMPUTER MODELING OF PHYSICAL PROCESSES
MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODUL REFERENCES

Module name:	Computer modeling of physical processes
Code, if applicable:	FJ1404
Semesters in which the module is taught:	4
Lecturer:	R.Pirova - KarshiSU, Department of "Applied Mathematics" D.Phil.PhD. Associate Professor, etc.
Language	Uzbek
Relation to curriculum:	1. Compulsory
Type of teaching, contact hours:	Lecture, practical
Workload:	4 ECTS (120 hours): For the course load Classroom sessions lecture 30 hours practical training 30 hours Independent study: 60 hours
Credit points:	4
Recommended prerequisites:	Differential equations Mechanics Electrodynamics Thermodynamics and statistical physics Optics
Module objectives Intended learning outcome	As a result of mastering the subject, the student will: Principles of modeling physical systems and processes: basics of creating computer models of physical phenomena with a good understanding of their essence; basics of modeling methodology; have an idea of the basics of programming languages; The basics of numerical methods for solving differential equations; the ability to represent data graphically; the ability to clearly visualize physical processes, create mathematical models and programs for these processes, find solutions, and analyze them; Must have the skills to plan experiments, solve research and methodological problems using computers, and apply modern information technologies to physical phenomena and processes.
Contents	II. Main theoretical part (lectures) II.I. The subject includes the following topics: Topic 1. Basic concepts of computer modeling and the Java programming language. Computer modeling. Physical models. Important aspects of implementing computer modeling of physical processes and phenomena. Advantages of computer modeling of physical processes and phenomena compared to natural

	experiments. Technologies of the Java programming language. Program structure in Java. Variables and constants in Java. The process of assigning values. Writing arithmetic operations and mathematical functions. Topic 2. Performing operations. Comparing quantities. Logical expressions. Precedence of operations. Control literals. Working with bits. Assigning values to variables 3- Topic. Organization of operators. Organization of branching using the if operator. Alternative branching. Organization of branching using the selection operator. For operator. While loop operator. Do-while loop operator. Using break and continue operators. Return of control Topic 4. Working with standard types and arrays. Casting a type to another type. Creating an array variable. Changing the value of array elements. Multidimensional arrays. Exception handling 5- Topic. Working with characters and strings. Working with strings. Comparing strings. Searching for a part of a string. Handling characters. Arguments of the Main() method 6- Topic. Classes in Java. As a collection of program-methods. Scope. Using a collection of classes. Extending an existing class. Creating a class object. Creating a copy of an object. Encapsulation of properties. Creating object data. 7- Topic. Importing Java packages. Working with files. Reading input in console mode. Reading from a file. Writing to a file. Sorting array elements. Creating a list array. Working with dates and times. Formatting numbers. 8- Topic. Creating user interfaces. Creating an applet. Creating a window. Adding buttons. Adding labels. Adding a text field. Adding selection items. Adding radio buttons to a graphical interface. Changing the appearance of the interface. Placing components Topic 9. Graphics in Java Graphics support. Creating graphic primitives. Resizing graphics. Working with colors Topic 10. Computer modeling of solving equations and systems of equations. Solving simple mathematical problems. Rounding numbers. Generation of random

	numbers. Numerical solution of systems of algebraic equations. Numerical solution of ordinary differential equations. 11- Topic. Modeling the free fall of an object. Free fall motion of an object. Problem statement. Model preparation in the Java programming language environment. Computational experiment 12- Topic. Modeling the motion of an object thrown at an angle to the horizon. Motion of an object thrown at an angle to the horizon. Problem statement. Model preparation in the Java programming language environment. Computational experiment. 13- Topic. Modeling the uniformly accelerated motion of an object. Uniformly accelerated motion of an object. Problem statement. Model preparation in the Java programming language environment. Computational experiment. Topic 14. Oscillatory processes Oscillatory processes. Problem formulation. Model development in the Java programming language environment. Computational experiment. Topic 15. Random processes Monte Carlo method. Problem formulation. Model preparation in the Java programming language environment. Computational experiment. Practical training The following topics are recommended for practical training: 1. Computer modeling. Physical models. 2. Install JDK (Java Environment Kit). Download and launch Eclipse IDE. Install and launch NetBeans IDE. 3. Variables and constants in Java. Writing arithmetic operations and mathematical functions. 4. Branching algorithms 5. Loops. Using the for loop operator 6. Loops. Using while and do-while loop operators 7. Arrays and algorithms related to them. Using one-dimensional arrays 8. Arrays and algorithms related to them. Using multidimensional arrays 9. Working with strings. String type 10. Creating a class and creating objects

	11. Creating graphic primitives in Java. Working with applets. 12. Building a visual model of mathematical equations in the Java programming language environment 13. Study of modeling the motion of an object thrown at an angle to the horizon 14. Modeling of oscillatory processes 15. Modeling of stochastic processes pedagogical
Study and examination requirements and forms of examination	Written exam: In this exam, the student is given 90 minutes to write answers to questions. The answers to the questions are graded as follows: 1. If detailed and complete answers are provided for all questions – 5 (Excellent) 2. If answers are provided for all questions (some of them partially) or complete answers are given for 2/3 of the questions – 4 (Good) 3. If answers are given to some of the questions or partial answers are provided for 2/3 of the questions – 3 (Satisfactory) 4. If no answers are provided or the answers do not correspond to the questions – 2 (Unsatisfactory)
Media employed	Presentations, videos, simulations, electronic resources and others
Reading list	Asosiy adabiyotlar 1. Harvey Gould, Jan Tobochnik, Wolfgang Cristian. "An introduction to computer simulation methods. Applications to Physical Systems". Pearson Education, Inc., publishing as Addison Wesley.2007 2. Bakhvalov N.S. Chislennye metody. Resheniya zadach i uprajneniya: Uchebnoe posobie / N.S. Bakhvalov, A.A Kornev, E.V. Chijonkov. M.: Binom, 2016. - 352 p. – 3. Zenkov A.V. Chislennыe metodы: ucheb. posobie Yekaterinburg: Izdvo Ural. un-ta, 2016.- 124 s. 4. Krasov V.I., Krinberg I.A., Papernыy V.L. Kompyuternыe texnologii v fizike. Chast 1. Kompyuternoe modelirovanie fizicheskix protsessov. Uchebnoe posobie. Irkutsk: IGU, 2006. - 99 s 5. Lapchika M.P. Chislennыe metodы. M.: Academia, 2017.608c. 6. MakGrat M. «JAVA: Programmirovanie dlya nachinayuщix» Pyatoe izdanie. Moskva 2016. 193 str. 7. Xorstmann K. S., Kornell G. Izdatelskiy dom «Vilyams», 2007 - 896 s. 7-oe izdanie. Java 2. Tom 1. Osnovы Java. M:

	8. Xorstmann K. S., Kornell G. Java 2. Tom 2. Tonkostы programmirovaniya. M: Izdatelskiy dom «Vilyams», 2014 1874 s. 9-oe izdanie. 9. X.Guld, Ya.Tobochnik. Kompyuternoe modelirovanie v fizike. M.: Mir, 1990 10. Shildt G. «Java. Polnoe rukovodstvo» 8-oe izdanie. Yazыk russkiy. M: Izdatelskiy dom «Vilyams», 2012, -1104. 11. E.A. Eshboyev, F.G.Klicheva. Java tilida dasturlash asoslari. O`quv uslubiy qo`llanma, Qarshi 2018, 206 b. 12. E.A. Eshboyev, F.G.Klicheva, R.Q.Pirova Fizik jarayonlarni kompyuterda modellashtirish. O'quv qo'llanma, Qarshi 2023, 180 b.
Reviewers	E.Eshboyev (KarshiSU, Associate Professor, Department of "Applied Mathematics") B.Shovaliyev (KarshiSU, Senior Lecturer, Department of "Applied Mathematics")
Confirmed place and time	Developed and approved by Karshi State University (Report №1 30.08.2024)

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THEORETICAL MECHANICS
MODULE HANDBOOK

Field of Knowledge: 500000 – Natural Sciences, Mathematics, and Statistics

Field of Education: 530000 – Physics and Natural Sciences

Field of Study: 60530500 – Physics (by branches and specializations)

MODULE REFERENCES

Module Name	Theoretical mechanics
Code (if applicable)	NM1406
Semesters Taught	4
Lecturer	Yuldash Babajanov – Associate Professor of the Department of Industrial Engineering Karimova Salima – Lead Instructor Department of Industrial Engineering
Language of Instruction	Uzbek
Relation to Curriculum	Mandatory subject
Type of Teaching, Contact Hours	Lecture, Practical Sessions
Total Workload	180 hours
Contact Hours	90 hours (Lecture – 30 hours, Practical – 60 hours)
Self-study	90 hours
Credit Points	6
Recommended Prerequisites	Chemistry, Physics

Module objectives / intended learning outcome	CONTENT OF THE SUBJECT The main content of teaching this subject is for students to study the general laws of the mechanical motion of material bodies and the forces they exert on each other. The subject of theoretical mechanics is divided into three parts depending on the perspective from which mechanical problems are considered: statics, kinematics, and dynamics. The equilibrium of material bodies, the application and decomposition of forces acting on them, and the replacement of these forces by an equivalent system of forces with the same effect are studied in the statics section of theoretical mechanics. The study of the motion of bodies, considering only geometric aspects and without taking into account their mass or the forces acting on them, belongs to the kinematics section. Dynamics studies the motion of material bodies together with the forces that cause this motion. Purpose of teaching the subject: The purpose of teaching this subject is to provide students with the opportunity to study mechanical motions occurring in nature, to create new mechanisms used in production, to study and analyze the motion of celestial bodies, and, in general, to study physical processes in nature using the laws and principles of mechanics.

	Tasks of the subject: The tasks of the subject are to enable future specialists to independently solve various mechanical problems and issues that may arise in their future industrial and scientific-technical activities, to implement new modern technologies in the production process, to manage production processes, and to develop the worldview, general culture, and intellectual abilities of future engineers.
Content	Topics Topic 1: Introduction. Numbering system. Coordinate system. Topic 2: Lagrange formalism. Topic 3: Principle of relativity. Topic 4: The first law of thermodynamics and thermodynamic processe Topic 5: Lagrange functions of physical systems. Topic 6: Laws of conservation. Topic 7: Integration of equations of motion. Topic 8: Collision of particles. Topic 9: Linear small oscillations. Topic 10: Canonical formalism. Topic 11: Hamilton–Jacobi method for describing a physical system. Topic 12: Motion of a rigid body. Topic 13: Calculation of the moments of inertia of a rigid body. Topic 14: Equations of motion of a rigid body; Euler equations. Topic 15: Concept of continuum mechanics. Practical Tasks Problems related to the geometric equilibrium condition of intersectin force systems. Dynamics of a point. Construction of Lagrange functions and equations. Finding equivalent Lagrange functions. Laws of conservation. Integration of equations of motion. Kepler problems. Particle collisions. Small oscillations. Canonical equations, Hamilton function. Poisson brackets. Hamilton–Jacobi equations. Kinetic moment and energy of a rigid body. Calculation of the kinetic energy of a rigid body. Motion in a central field.

Study and examinatio requirements and forn of examination	Written Examination: In this exam, the student is given 80 minutes to wr answers to the questions. The answers to the questions are graded as follov 1. If detailed and complete answers are written for all questions – (Excellent) 2. If answers are provided to all questions (some of them partially) complete answers are given for 2/3 of the questions – 4 (Good) 3. If answers are given to some of the questions or partial answers provided for 2/3 of the questions – 3 (Satisfactory) 4. If no answers are provided or the answers do not match the questions (Unsatisfactory)
Media employed	Presentations, videos, simulations, electronic resources and others
Reading list 1	1. Rashidov T.R. et al. Theoretical Mechanics. Tashkent: VNESHINVESTPROM, 2020. 2. To‘rayev X., Tilavov A. Theoretical Mechanics. Vol. 1. Tashkent: Noshir, 2012. 3. Bukholts N.N. Fundamental Course of Theoretical Mechanics. Par 1 & 2. St. Petersburg: Lan, 2021, 2023. – 448 pp. – 336 pp. (electronic version) 4. Shokhaydarova P. et al. Theoretical Mechanics. Tashkent: O‘qituvchi, 1990. 5. Meshersky I.V. Collection of Problems in Theoretical Mechanics. Tashkent: O‘qituvchi, 1989. 6. Tom W.B. Kibble, Frank H. Berkshire, Classical Mechanics. Imperial College Press, 2004. 7. Fayzullayev B. Theoretical Mechanics. Tashkent, 2023.
Reviewers	Anver Teymurkhanov – Associate Professor, Department of Industrial Engineering, PhD in Technical Sciences O. Eshqobilov – Professor, Karshi State University, Doctor of Technical Sciences
Confirmed place and ti	Developed and approved by Karshi State University (Report №1 30.08.2024)

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ELECTRODYNAMICS
MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODULE REFERENCES

Module Name	Electrodynamics
Code (if applicable)	EL1506
Semesters Taught	5
Lecturer	Mallaev Amin Sayfullaevich – Associate Professor of the Department of Theoretical and Experimental Physics Nurmatova Dildora Jumabayevna – Senior Lecturer of the Department of Theoretical and Experimental Physics
Language of Instruction	Uzbek
Relation to Curriculum	Mandatory subject
Type of Teaching, Contact Hours	Lecture, Practical Sessions
Total Workload	180 hours
Contact Hours	90 hours (Lecture – 30 hours, Practical – 60 hours)
Independent Study	90 hours
Credit Points	6
Recommended Prerequisites	Mechanics, Molecular Physics, Electricity and Magnetism, Optics, Atomic Physics

Module objectives / intended learning outcome	CONTENT OF THE SUBJECT The main content of teaching this subject is to provide students with an understanding of the general laws governing the interaction between charged particles and electromagnetic fields, as well as their motion. In electrodynamics, problems are typically divided into three main parts depending on the perspective of study: electrostatics, magnetostatics, and general electrodynamics. The electrostatics section studies the interaction of stationary charges, electric field intensity, potential, and the distribution of electric forces. The magnetostatics section deals with steady currents and the magnetic fields they produce, as well as the effects of magnetic forces. General electrodynamics examines time-varying electric and magnetic fields, electromagnetic waves, and the motion of charged particles under the influence of these fields. Purpose of teaching the subject: To introduce students to and teach them how to work with modern methods of electrodynamics; To develop skills in analyzing electromagnetic phenomena using modern methods; To introduce students to the derivation of the basic equations of electrodynamics from first principles; The theory of special relativity; Aims to master the basics of microscopic and macroscopic electrodynamics.

	Tasks of the subject: It aims to teach students to think independently; to work with idealized models; to apply these models to solve various theoretical problems that arise in real conditions; to propose new models; and to apply theoretical knowledge to the analysis of experimental results, taking into account that physics is an experimental science.
Content	Topics Topic 1: Introduction. Historical background. Particles and charges. Topic 2: Special theory of relativity. Topic 3: Relativistic mechanics. Topic 4: Microscope electrodynamics. Topic 5: Electromagnetic field tensor. Topic 6: Electromagnetic field equations. Topic 7: A constant electromagnetic field. Topic 8: Electromagnetic field in space. Topic 9: Electromagnetic field of charges in voluntary motion. Topic 10: Macroscopic electrodynamics. Topic 11:. Electrostatic field in the environment. Topic 12: A constant magnetic field Topic 13: Quasi-stationary electromagnetic field. Topic 14: High-frequency fields. Topic 15: Nonlinear electrodynamics. Practical Tasks 1. Basic formulas of vector and tensor calculus 2. Specific time. 3. Lorentz substitutions 4. Velocity substitution 5. Four-dimensional vector and tensor 6. Decomposition of relativistic particles 7. Momentum and energy of a particle in the theory of relativity 8. Lorentz substitutions for electromagnetic field magnitudes 9. Electromagnetic field invariants 10. Coulomb's law. Multipole moments 11. Magnetic field of stationary currents 12. Magnetic moment 13. Doppler effect 14. Polarization of a wave 15. Dipole radiation 16. Radiation reaction 17. Natural width of a radiation line 18. Boundary conditions 19. Application of the coupling and Maxwell equations 20. Special methods for solving electrostatic problems 21. Linear conductors with constant current 22. Skin effect. Dispersion of light

Study and examination requirements and forms of examination	Written Examination: In this exam, the student is given 80 minutes to write answers to the questions. The answers to the questions are graded as follows: 1. If detailed and complete answers are written for all questions – 5 (Excellent) 2. If answers are provided to all questions (some of them partially) or complete answers are given for 2/3 of the questions – 4 (Good) 3. If answers are given to some of the questions or partial answers are provided for 2/3 of the questions – 3 (Satisfactory) 4. If no answers are provided or the answers do not match the questions – 2 (Unsatisfactory)
Media employed	Presentations, videos, simulations, electronic resources, and others Presentations, videos, simulations, electronic resources, and others resources and others
Reading list	1. Abdumalikov A.A, Elektrodinamika, “Cho‘lpon”, T., 2011, 344b. 2. Landau L.D, E.M.Lifshchits, Teoriya polya. – Izdanie 8-e,sterotipnoe.- M.: Fizmatlit, 2006.- 534s.-(“Teoreticheskaya fizika”, II-tom) 3. Landau L.D., E.M.Lifshchits, Elektrdinamika sploshnix sred.- Izdanie 4-e, stereotipnoe.-M.: Fizmatlit, 2003.- 656s.- (“Teoreticheskaya fizika”, VIII-tom). 4. Toptygin I.N.Sovremennaya elektrodinamika.- Moskva – Ijevvsk,2002. -736s. Elektronnaya biblioteka MFTI. 5. Vekshteyn E.G. «Sbornik zach po elektrodinamike». M.,1966
Reviewers	A.Tashatov - Professor of the Department of "Theoretical and Experimental Physics" of Qarshi State University
Confirmed place and time	Developed and approved by Karshi State University (Report №1 30.08.2024)

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ELECTRONICS AND SIGNAL PROCESSING
MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODULE REFERENCES

Module Name	Electronics and signal processing
Code (if applicable)	ES1506
Semesters Taught	8
Lecturer	Dovranov Kuvondik Turakulovich – Associate Professor of the Department of Theoretical and Experimental Physics Jumanov Shokir Eshimovich - teacher of the Department of Theoretical and Experimental Physics
Language of Instruction	Uzbek
Relation to Curriculum	Mandatory subject
Type of Teaching, Contact Hours	Lecture, laboratory exercises
Total Workload	180 hours
Contact Hours	90 hours (Lecture – 30 hours, laboratory – 90 hours)
Independent Study	90 hours
Credit Points	6
Recommended Prerequisites	Electricity and Magnetism (EM1306)

Module objectives / intended learning outcome	CONTENT OF THE SUBJECT The purpose of teaching the subject - "Fundamentals of Radio Electronics" is a subject that represents a wide range of areas of science and technology, and the mastery of this subject by students is to teach the possibilities and physical properties of transmitting information over long distances using electromagnetic waves for humans. The task of the subject - Its task is to teach the physical foundations of the operation of complex circuits, starting from the processes of generating, transmitting, processing and storing information, and the application of electronic circuits in technology and life, to measure the main parameters and characteristics of radio-electronic devices assembled on semiconductor elements on the basis of experiments, to study the laws in them, and to compare them.

Content	Topics
	Topic 1: Introduction M1 "Introduction to RF Electronics" Basic concepts of radio electronics. General concepts of information transmission, reception, processing systems. "Applications in communications, radar and sensors". Topic 2 "Alternating Current (AC) Analysis and Impedance Reconsideration" Mathematical description of signals. Signal spectra. "Power in AC circuits". Topic 3 "Mathematical models of signals and spectral analysis". Mathematical description of signals. Signal spectrum. Signal spectrum width. Signals with and without a bounded spectrum. Transmission and reception of data through discrete signal values. "Digital communication systems and theoretical foundations of data transmission". Topic 4 "Coupled resonators and RF filters" Types of coupled circuits and transmission coefficients. "Fundamentals of designing frequency filters (f/q, b/p, b/s)". Topic 5 "Radio frequency oscillation circuits and resonance" Series and parallel oscillation circuits. Voltage and current resonance. "Quality factor (Q), frequency bandwidth" Topic 6 "RF characteristics of semiconductor devices" Band theory. Semiconductor materials. "Operation of diodes (Varactor, PIN) and transistors at high frequencies". Topic 7 "Frequency mixers (Mixer) and frequency conversion" Signal modulation and detection. "Diode and transistor mixer circuits, principle of operation". Topic 8 "Semiconductor rectifiers and smoothing filters". Half-cycle and two-cycle rectifiers. Smoothing filters in rectifier systems. Quantities determining the quality of rectification: cutoff angle, ripple coefficient. "Fundamentals of power supply design and application in frequency conversion circuits". Topic 9 "Structure and characteristics of bipolar and field-effect transistors". Types of transistors. Structure, types, operation, static characteristics and parameters of bipolar transistors. Structure, types, operation, statistical characteristics and parameters of field-effect transistors. "Modern amplifiers and as basic devices of microelectronic circuits". Topic 10

	"RF amplifiers: stability and amplification" Amplification of electrical signals. Basic characteristics and parameters of amplifiers. "Design of small-signal RF amplifiers". Topic 11 "Feedback in amplifiers and its importance" Feedback in amplifiers: positive and negative. "Stability, effect on input-output impedance". Topic 12 "RF generators and sources of oscillation" Harmonic oscillation generators. Generation conditions. "LC and crystal generators, stability requirements". Topic 13 "Noise in RF systems" Factors affecting the quality of signal processing and transmission. "Types of noise (thermal, shot), noise number and noise temperature". Logic element combinations. De Morgan's theorem and its application to digital circuits. Topic 14 Structure of radioelectronic microcircuits and electrical circuits. "Transmission lines and matching" Electrical circuit elements and their properties. Topic 15 "Radioelectronic microcircuits (RFIC) and modern devices" Structure of radioelectronic microcircuits and electrical circuits. "RF systems on a single chip (SoC) and their advantages". III. Guidelines and Recommendations for Seminar Classes Laboratory classes should be conducted by one professor for each academic group in an auditorium equipped with virtual models, multimedia and experimental measuring devices. It is recommended that classes be conducted using active and interactive methods, using appropriate pedagogical and information technologies. "Volt-ampere characteristics and applications of semiconductor diodes" Study of the operation of diodes. "Experimental determination of the role of a diode in rectifier and stabilizer circuits". "Amplification properties and static characteristics of bipolar transistors" Study of the operation of bipolar transistors. "Measuring the amplification factor in a common-emitter configuration". "Control properties of field-effect transistors (MOSFETs)" Study of the operation of field-effect transistors. "Using MOSFETs as analog switches and amplifiers". "Analysis of half- and full-wave rectifier circuits" Rectification of alternating current. "Measuring the ripple factor and observing its reduction using filters". "Frequency response of a BJT-based cascode amplifier" Amplifier built on resistors. "Measuring gain and frequency range".

	"The effect of feedback on amplifier parameters" Insertion in amplifiers. "Analysis of the effect on stability, gain and output resistance". "Principles of operation of transistor multivibrators" Study of a transistor as a functional generator. "Obtaining rectangular pulses using an astable multivibrator". "Efficiency of operation of voltage stabilizers" Study of the principle of operation of an electronic stabilizer. "Comparison of the load characteristics of Zener diode and transistor stabilizers". "Frequency selectivity of resonant amplifiers" Study of the principle of operation of transistor and resonant amplifiers. "Measuring Q factor and determining bandwidth". "Basic configurations of operational amplifiers" Study of the principle of operation of an operational amplifier. "Comparison of inverting and non-inverting amplifier circuits". "Switching characteristics of transistor switches" Study of the operation of a transistor as an electronic switch. "Measurement of on/off time and saturation state". "Stability of RC and LC generators" Application of a transistor as a sinusoidal generator. "Experimental verification of Barkhausen conditions". "Frequency stability of autogenerators" Study of electrical oscillations of RC and LC autogenerators. "Study of frequency sensitivity to temperature and power supply changes". "Operation of combinational logic circuits" Study of logic circuits. "Assembling and testing decoder and multiplexer circuits". "Schematic verification of De Morgan's laws" Analysis of De Morgan's laws in a diagram. "Schematic representation of logical equations and proof of their equivalence".
Study and examination requirements and forms of examination	Written Examination: In this exam, the student is given 80 minutes to write answers to the questions. The answers to the questions are graded as follows: 1. If detailed and complete answers are written for all questions – 5 (Excellent) 2. If answers are provided to all questions (some of them partially) or complete answers are given for 2/3 of the questions – 4 (Good) 3. If answers are given to some of the questions or partial answers are provided for 2/3 of the questions – 3 (Satisfactory) 4. If no answers are provided or the answers do not match the questions – 2 (Unsatisfactory)
Media employed	Presentations, videos, simulations, electronic resources, electronic resources and others
Reading list 1	Core Textbooks 1. Colin D.Simpson. Principles of electronics. Prentice-Hall. 2002. 2. V.K.Mehta. Principles of electronics. 11 th Edition Tata Mgraw Hill.2006.

	3. Nigmatov X. Radioelektronika asoslari. Toshkent, “O‘zbekiston” , 1994 4. Borzdov V.M. Osnovы radioelektroniki: Kurs leksiy. Mn.: BGU, 2003. 196 s. 5. Baskakov S. I. Radiotexnicheskie sepi i signalы / S. I. Baskakov. Moskva : Vыsshaya shkola, 2005. 536 s. 6. Tixonov V. I. Statisticheskaya radiotexnika : ucheb. pos. /V. I. Tixonov. Moskva Sovetskoe radio, 1982. 678 s. 1.
Reviewers	A. Tashatov –Professor, Professor of the Department of Theoretical and Experimental Physics, D. Normurodov – Associate Professor of the Department of Theoretical and Experimental Physics
Confirmed place and time	The curriculum was approved by Qarshi State University in 2025 by protocol No. 1 dated ’30.08’ and authorized for confirmation.”

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ASTRONOMY AND ASTROPHYSICS
MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODUL REFERENCES

Module name:	Astronomy and Astrophysics
Code, if applicable:	AA 1604
Semesters in which the module is taught:	6
Lecturer:	Senior lecturer of the Department of "General Physics", Karshi State University. Jamila. Khojamberdiyeva.
Language	Uzbek
Relation to curriculum:	5. Compulsory
Type of teaching, contact hours:	Lecture, practical
Workload:	6 ECTS (180 hours): For the course load Classroom sessions lecture 60 hours practical training 30 hours Independent study: 90 hours
Credit points:	6
Recommended prerequisites:	Electricity and magnetism Optics Mathematical analysis
Module objectives Intended learning outcome	Within the framework of the issues to be addressed in the process of mastering the science of astronomy and astrophysics, the bachelor: -Explain the composition and structure of planet Earth and its surrounding space; to provide an understanding of the general picture of the universe; coordinate systems used to describe the motion of celestial bodies; the processes of sunrise and sunset that occur in everyday life; the concept of time and its types; -the basics of spherical trigonometry; to give students a general understanding of the Sun, Moon, planets, satellites, and to introduce them to stars, galaxies, To have knowledge and imagination of the contents and structures of the universe;.
Contents	Main theoretical part (lectures) The subject includes the following topics Topic 1. Fundamentals of applied astronomy Elements of spherical astronomy. Apparent and real motions of luminaries. Fundamentals of spherical trigonometry. Precession and nutation phenomena. Parallactic triangle. Refraction. Parallax. Apparent and real motions of planets. Planetary configurations. Elements of planetary orbits. Determination of the masses of celestial bodies. Special motions of stars. Laws of eclipses and occultations. Topic 2. Fundamentals of observational astrophysics

	Modern branches of astrophysics and the spectrum of electromagnetic radiation. Photometric concepts. Multi-beam photometry. Spectral analysis. Laws of radiation. Methods for determining the temperature of luminaries. Topic 3. Practical astronomical instruments Astrophysical telescopes and their functions. Types of telescopes, their installation, main characteristics. Radiation receivers: electric multipliers, CCD matrices. Topic 4. Solar physics Main physical parameters of the Sun. Solar spectrum and chemical composition. Composition of the Sun's electromagnetic radiation. Energy distribution in the solar spectrum. The solar atmosphere, small structures in it. The mechanism of heating the chromosphere and corona layers. The internal structure of the Sun. The magnetic field and activity of the Sun. Topic 5. Physics of planets and interstellar bodies: Terrestrial planets Features of studying bodies entering the solar system. Physical conditions in the atmosphere, circulation and dissipation. Atmosphere of terrestrial planets. Internal structure of terrestrial planets. Topic 6. Physics of planets and interstellar bodies: Giant planets Atmosphere of giant planets. The internal structure of giant planets. Planetary satellites and rings. Physics of asteroids and comets. Meteors and their streams. The origin of the solar system Topic 7. Normal stars Stationary (normal) stars. Physical parameters of stationary stars. Stellar spectra and spectral classes. Relationships between the general physical parameters of stars. Stellar atmospheres. G-R diagram. Methods for determining the sizes of stars. The internal nature and structure of stars. Topic 8. Evolution of stars Planetary nebulae. Binary stars. Nonstationary stars. Pulsating stars. Relativistic compact objects. Eruptive stars: new and supernovae. Pulsars and neutron stars. Black Black holes. Evolution of stars Topic 9. Interstellar gas and dust and the physics of the Milky Way Interstellar gas and dust. Distribution of neutral hydrogen. Structure of the Milky Way. Star clusters and

	associations. Gas and dust nebulae. Molecular clouds of our galaxy. Attenuation of light in the interstellar medium. Physical state and changes of interstellar matter. Composition of the galaxy. Galactic corona and magnetic field Topic 10. Physics of galaxies Types of galaxies and their structure. Classification of galaxies into classes. Determination of distances to galaxies. Distribution of galaxies in space. Redshift in the spectrum of galaxies and Hubble's law. Composition and physical properties of galaxies. Topic 11. Active galaxies with nuclei Active galaxies: Seyfert galaxies, radio galaxies, quasars. Gravitational lenses: refraction of light in a gravitational lens and the formation of abstract images, lens equation, Einstein radius, difference from optical lens. Topic 12. Models of the Universe: modern issues of cosmology Non-stationary Universe and scale factor. Cosmological principle. Critical density. Cosmological models. Boiling Universe model. CMB radiation. Composition of the Universe. Dark matter. Dark energy and accelerating expansion of the Universe. The following topics are recommended for seminar classes: 1. Celestial sphere. Celestial coordinate system. 2. Starry sky projection map. Calculation of Julian days 3. Fundamentals of spherical trigonometry. Culmination. Refraction. 4. Determining the rise and set of luminaries. 5. Parallax. Determining the distance to celestial bodies. 6. Elements of celestial mechanics. Planetary motion. 7. Determining the masses of celestial bodies 8. Electromagnetic radiation spectrum and solar physics 9. Determining the physical characteristics of stars. 10. Binary and variable stars, compact stars 11. Galaxies and star clusters. Galaxies 12. Cosmogony and cosmology

Study and examination requirements and forms of examination	Oral Examination: For this exam, the student is given 20 minutes for preparation to answer the questions. The answers to the questions are graded as follows: 1. If detailed and complete answers are provided for all questions – 5 (Excellent) 2. If answers are provided for all questions (some of them partially) or complete answers are given for 2/3 of the questions – 4 (Good) 3. If answers are given to some of the questions or partial answers are provided for 2/3 of the questions – 3 (Satisfactory) 4. If no answers are provided or the answers do not correspond to the questions – 2 (Unsatisfactory)
Media employed	Presentations, videos, simulations, electronic resources and others
Reading list	Asosiy adabiyotlar 15. S.N.Nuritdinov, M.Mamadazimov, I.U. Tadjibayev // Umumiy astronomiya (o'quv qo'llanma) // T.: Ma'rifat, 2024, 314 b. 16. Karttunen H. et al. // Fundamental Astronomy // Springer, 2017, 540 p., ISBN 978-3-662-53044-3 17. Mamadazimov M. Umumiy astronomiya. T., 2008 18. S.N. Nuritdinov, I.U. Tadjibayev, R.F. Ziyaxanov // Umumiy astronomiyadan masalalar to'plami // T., O'zbekiston, 2013
Reviewers	Kuyliev B.T. - Head of the Department of "General Physics" of Karshi State University, Professor
Confirmed place and time	Developed and approved by Karshi State University (Report №1 30.08.2024)

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FOREIGN LANGUAGE (ENGLISH)

MODULE HANDBOOK

Field of knowledge	500 000	Natural sciences, mathematics and statistics
Field of education	540 000	Mathematics and statistics
Field of study	60530500	Physical

MODULE REFERENCES

Module name:	Foreign language (English)
Code, if applicable:	XT2504
Semesters in which the module is taught:	5
Lecturer:	Elmurodova Sohiba, lecturer
Language	Uzbek / English
Relation to curriculum:	Elective
Type of teaching, contact hours:	Practical
Workload:	120 hours Contact hours: 60 hours; Practical – 60 hours Independent study: 60 hours
Credit points:	4
Recommended prerequisites:	English Lexicology English Grammar Practice of reading and writing

Module objectives Intended learning outcome	The module aims to develop the four core language skills - reading comprehension, listening comprehension, writing, and speaking - in an integrated manner, enhance communication abilities in various contexts, improve both practical and theoretical knowledge of the target language, and ensure that students can freely apply their acquired knowledge, skills, and competencies in real-life activities. The task of the subject is to provide students with the necessary language skills, in accordance with internationally recognized standards, to achieve a B1 level of proficiency in the target foreign language through an integrated approach, and to develop their communicative competence. The objectives of the course based on this curriculum are as follows: • to develop students' ability to use English effectively for practical communication purposes; • to raise students' awareness of the nature of language and language learning skills; • to develop transferable skills that complement other areas of the curriculum; • to support students' personal development; During the course, the students will: • write and speak properly; • be able to use all language skills orally and verbally for effective professional communication and collaboration; • be able to competently express his speeches in Russian and foreign languages;

	• be able to read, interpret and analyze scientific data; • be able to learn and generalize the description of technologies, events, processes and give conclusions; • be able to read special texts, understand their content and translate them into their native languages; • knowledge of the English language as required; • using language to conduct monologues and dialogues on everyday topics; • be able to write informal letters, e-mails, reports, proposals and recommendations;
Content	Semester 1 1. Reading: Text: Hi! Introducing people. Vocabulary relating to countries & nationalities; ordinal/cardinal numbers; jobs. Grammar skills: Indefinite articles A/AN; The verb "Be"; 2. Speaking: Asking for personal information; talking about land marks. 3. Listening: Names of places. 4. Writing: Project about your family. (Family, jobs, physical descriptions, numbers) Grammar skills: Personal pronouns; the verb "Be"; the verb "Have got"; Possessives; Capital letters; Full stops; the conjunction "and" 5. Reading: Text: A friend in need. Internet advertisements for pen-friends. Vocabulary relating to people's appearance, abilities and colours. Grammar skills: The verb "Have got"; the verb "can" (abilities, polite requests) 6. Speaking: Describing people; radio programme about missing people. 7. Listening: Getting to know each other 1 8. Writing: An article about a famous person (countries; nationalities; colours; physical/character descriptions) Grammar skills: Modal verb "can"; the verb "Be"; the verb "Have got"; Possessives; the conjunctions "and"/"but" 9. Reading: Text: Home Sweet Home. Advertisement for houses. Vocabulary relating to houses/homes; furniture&appliances. Grammar skills: There is/are; this/that/these/those; plurals; prepositions of place (in front of, in, on, next to, behind, under) 10. Speaking: Describing a house; talking to an estate agent 11. Listening: Getting to know each other 2 12. Writing: An advertisement for a sports center (sports and sports center) Grammar skills: There is/are; prepositions of place 13. Reading: Text: Like Father Like Son. Letters to pen-friends. Vocabulary relating to family relationships; free time activities; days of the week. Grammar skills: Possessive case; possessive adjectives/pronouns; whose/who's; the Present Simple 14. Speaking: Days you like/hate; talking about a person.

	15. Listening: Numbers. Cardinals. 1 16. Writing: An article about your favourite season (the weather; activities) Grammar skills: The Present Simple tense; Prepositions of time; Adverbs of frequency. 17. Reading: Text: An Early Bird Or A Night Owl? An article about people's daily routine. Vocabulary relating to daily routines; telling the time; months; pros and cons. Grammar skills: Adverbs of frequency; prepositions of time (in, on, at) 18. Speaking: (Enterprise. Beginner level.) Daily routine; Interviewing a celebrity. 19. Listening: (Basic IELTS listening) Numbers. Cardinals. 2 20. Writing: A postcard to a friend from a holiday resort. Grammar skills: The Present Continuous tense; Reflexive pronouns. 21. Reading: Text: Dolphins. Facts about animals. Vocabulary relating to animals, colours, sizes. Grammar skills: Question words; irregular nouns. 22. Speaking: Describing animals; quiz about animals; 23. Listening: Numbers. Ordinals. 24. Writing: Writing a recipe (Food. Ways of cooking) Grammar skills: The imperative; uncountable nouns; how much/how many; some/any; plurals 25. Reading: Text: Holidays. Postcards to friends while on holiday. Vocabulary relating to weather conditions/climate; clothes. Grammar skills: The Present Continuous tense. The Present Simple vs. the Present Perfect Continuous tense. 26. Speaking: Describing clothes. Making comments on clothes. 27. Listening: Numbers. Decimal fractions. 28. Writing: An article about a celebrity's daily routine (daily routine; telling the time; leisure activities) Grammar skills: The Present Simple tense; adverbs of frequency; sequence links (first, then, after that, next) 29. Reading: Text: Laura's restaurant. Advertisements for a restaurant. Vocabulary relating to types of food/drinks; meals; restaurants. Grammar skills: Plurals; countable and uncountable nouns; a/an/some; how much/how many; a few/ a little' some/any 30. Speaking: Ordering food at a restaurant; talking about fast food restaurants. Semester 2 1. Listening: Numbers. Money. 2. Writing: A story (emotions/reactions; adverbial phrases of time) Grammar skills: The Past Simple tense; time links showing sequence (later, before, after, when)

	3. Reading: Text: An Article About A Place Then And Now. Vocabulary relating to places/building in a town; giving directions; abilities. Grammar skills: Was/were; had; could; prepositions of place (in front of, opposite, next to, on, between) 4. Speaking: Talking about changes in a place; talking about past abilities. 5. Listening: Numbers. Time. 6. Writing: An article giving good and points about keeping a cat as a pet. Grammar skills: Comparative/superlative form of adjectives; links of addition/contrast (also, what's more, however, on the other hand) 7. Reading: Text: A Fairy Tale Princess. Diana Spencer biography. Back Street boys. Vocabulary relating to famous people and their achievements. Grammar skills: The Past Simple tense; asking questions. 8. Speaking: Painters and paintings/composers and music. 9. Listening: Numbers. The telephone. 10. Writing: A film review; terminology of films/drama; expressing opinion, reaction; recommending. Grammar skills: The Present Simple (historic present); links of addition, contrast, reason 11. Reading: (Enterprise. Beginner level.) Text: The Boy Who Saved The Netherlands. Vocabulary relating to feelings/relations; danger/emergencies. Grammar skills: The Past Simple tense; Joining sentences; Prepositions of movement; adjectives and adverbs. 12. Speaking: Telling a story. 13. Listening: Numbers. Dates. 14. Writing: A letter giving advice to a friend (travel preparations, home safety) Grammar skills: Must/mustn't; should/shouldn't; the imperative; clauses of purpose/reason 15. Reading: Text: Los Angeles – the City Of Angels. Vocabulary relating to towns/cities/transport/holidays. Grammar skills: Comparisons; quite, too, very, much 16. Speaking: Geography quiz; Deciding on a hotel. 17. Listening: Survival English 1 18. Writing: A story Grammar skills: The Past Simple; adjectives/adverbs; similes; punctuation of indirect speech. 19. Reading: Text: A letter to a friend about summer plans. Horoscopes. Vocabulary relating to future plans/intentions; arrangements; future predictions. Grammar skills: Be going to; will; the present continuous tense (future meaning); it/there will be 20. Speaking: Asking for personal information; Talking about tomorrow's weather forecast.

	21. Listening: Survival English 2 22. Writing: A letter to a friend about your holiday plans (sightseeing; tourist attractions/activities) Grammar skills: The Present Continuous tense (future meaning); going to; infinitive of purpose 23. Reading: Text: Helping the environment. A leaflet giving advice on how to protect the environment. Vocabulary relating to the environment; health tips; house rules; school rules. Grammar skills: Should/shouldn't (advice); must (obligation); mustn't (prohibition); can (giving permission); can't (refusing permission) 24. Speaking: Giving advice about healthy living; talking about house rules; school rules. 25. Listening: Survival English 3 26. Writing: A letter to a friend about your preparations for a birthday party Grammar skills: The Present Perfect tense; already, yet, for, since, just, so far, never, ever 27. Reading: Text: Tipping in America. Vocabulary relating to holidays/sightseeing; describing a city. Grammar skills: The Present Perfect tense; revision of all tenses. 28. Speaking: Talking about taking messages/notes. 29. Listening: Survival English 4 30. Writing: An article predicting what life will be like in the year of 2200 (dwellings; transport; education; work; health) Grammar skills: The Future Simple tense (for predictions); variety of link words
Study and examination requirements and forms of examination	Oral Examination: For this exam, the student is given 20 minutes for preparation to answer the questions. The answers to the questions are graded as follows: 1. If detailed and complete answers are provided for all questions – 5 (Excellent) 2. If answers are provided for all questions (some of them partially) or complete answers are given for 2/3 of the questions – 4 (Good) 3. If answers are given to some of the questions or partial answers are provided for 2/3 of the questions – 3 (Satisfactory) 4. If no answers are provided or the answers do not correspond to the questions – 2 (Unsatisfactory)
Media employed	The knowledge, qualifications and skills acquired by students in a foreign language are based on the priority tasks defined in the Resolution of the President of the Republic of Uzbekistan No. PQ-5117 dated May 19, 2021, "On measures to bring the activities of popularizing foreign language learning in the Republic of Uzbekistan to a qualitatively new level," to raise students' proficiency in a foreign language (English) to the B2 level. It also aims to develop the four core language skills - reading comprehension, listening comprehension, writing, and speaking - in an integrated manner,

	enhance communication abilities in various contexts, improve both practical and theoretical knowledge of the target language, and ensure that students can freely apply their acquired knowledge, skills, and competencies in real-life activities. The task of the subject is to provide students with the necessary language skills, in accordance with internationally recognized standards, to achieve a B1-B2 level of proficiency in the target foreign language through an integrated approach, and to develop their communicative competence. Based on the rating system for monitoring the level of knowledge, skills and qualifications of the student, the mastery of the subject by the student is presented in points. The progress of students in the subject during the semester is assessed from 1 to 5 grades, of which: Interval grading exam - grades 3-5 and Final grading exam - grades 3-5.
Reading list	1. Evans Virginia, Dooley Jenny. Enterprise 1, 2, 3, 4 series. Express Publishing (2000) 2. Louis Rogers and Jennifer Wilkin, Dorothy E. Zemach. Skillful Reading and writing. Macmillan. (2012) (1-2 kurs) 3. McCarthy, M. and O'Dell, F., Redman, S. English Vocabulary in Use. Elementary, Pre-intermediate and Intermediate. Cambridge: CUP (3rd edition) UK, 2012 4. Malcolm Mann, Steve Taylor-Knowles. Destination Grammar & vocabulary (book 1&2) (2013) Macmillan Education, UK 5. Li Ya Bin. Basic IELTS listening. Beijing Language and Culture University Press. Vietnam 2010. 6. Virginia Evans, Jenny Dooley. Reading and Writing Targets (Books 1, 2, 3). Express publishing 1998. 7. Oxeden C., Latham. (2008) New English Files. Oxford University Press. Elementary and pre-intermediate (1 kurs) 8. Richards J. C., Grant Trew. Tactics for Listening. (Basic, Developing, Expanding) Oxford University Press, 2010 9. Subject – link. Curriculum Integration Reading Program. USA, Philadelphia. Buil&Grow 10. KEY ENGLISH TEST 1, 2, 3, 4, 5, 6. Cambridge University Press. 11. PRELIMINARY ENGLISH TEST 1, 2, 3, 4, 5, 6. Cambridge University Press. 12. FIRST CERTIFICATE OF ENGLISH 1, 2, 3, 4, 5, 6. Cambridge University Press.
Reviewers	A. G. Alikulov – Associate Professor of the Interfaculty English Department, Candidate of Philological Sciences.

	M. K. Omonova – Associate Professor of the Linguistics Department, Doctor of Philosophy in Philological Sciences (PhD).
Confirmed place and time	Developed and approved by Karshi State University (Report № 1 30. 08. 2024)

KARSHI
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MINISTRY OF HIGHER EDUCATION,

SCIENCE AND INNOVATIONS OF THE REPUBLIC OF UZBEKISTAN

KARSHI STATE UNIVERSITY

PRACTICAL ENGLISH
MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODULE REFERENCES

Module name:	Practical English
Code, if applicable:	AIT2504
Semesters in which the module is taught:	5
Lecturer:	A. Kh. Azimov – Head of the Department of Interfaculty English. Associate Professor.
Language	Uzbek
Relation to curriculum:	Elective
Type of teaching, contact hours:	practical
Workload:	4 ECTS (120 hours): For the course load Classroom sessions practical training 60 hours Independent study: 60 hours
Credit points:	4
Recommended prerequisites:	Foreign Language
Module objectives Intended learning outcome	-to learn the main foreign language being studied at level B2 according to the Common European Framework of Reference for Languages; -to acquire reading and writing skills in the foreign language being studied by using various strategies; - to gradually master the methods of working with different types of texts for understanding and discussion; - to express their thoughts and opinions in writing clearly and logically based on the topics of the linguistic course; - to know and be able to use various strategies to understand the text; - to obtain language certificates at level B2 by the end of the course;
Contents	I Practical training haswick The following topics are recommended for practical sessions: 1 ● **Reading comprehension & Vocabulary skills:** **Text: The Ice Hotel.** Words and expression related to the text. ● **Grammar & writing & speaking skills:** **Grammar:** Personal & Possessive pronouns. Be & have got. **Writing:** A family project. Words and expression related to family. **Speaking:** My family. ● **Listening comprehension:** Names & places 2 ● **Reading comprehension & Vocabulary skills:** **Text: Food firsts.** Words and expression related to the text. ● **Grammar & writing & speaking skills:** **Grammar:** Modal verb: *Can / can't*. Be & have got. **Writing:** Describing a celebrity. Words and expressions related to person's appearance, character and nationality.

	Speaking: My favorite actor (actress / singer / artist) ● **Listening comprehension:** Names & places 3 ● **Reading comprehension & Vocabulary skills:** **Text: Hurricane who?** Words and expression related to the text. ● **Grammar & writing & speaking skills:** **Grammar:** There is / are. Prepositions of place. **Writing:** *An advertisement for a sports center*. Words and expressions related to sports and activities. **Speaking:** *My favorite sports center*. ● **Listening comprehension:** Numbers. Cardinal & ordinal numbers 4 ● **Reading comprehension & Vocabulary skills:** **Text: How did those get in there?** Words and expression related to the text. ● **Grammar & writing & speaking skills:** **Grammar:** The Present Simple tense. Adverbs of frequency. Prepositions of time. **Writing:** *Summer is great*! Words and expressions related to seasons, nature and weather. 5 **Reading comprehension & Vocabulary skills:** **Text: A bug's sleep.** Words and expression related to the text. **Grammar & writing & speaking skills:** **Grammar:** The Present Continuous tense. Stative verbs. Words and expressions related to leisure and holidays. **Writing:** *A holiday postcard to a friend!* **Speaking:** *My day off (holiday).* **Listening comprehension:** Numbers. Money. 6 ● **Reading comprehension & Vocabulary skills:** **Text: Tiger's tale.** Words and expression related to the text. ● **Grammar & writing & speaking skills:** **Grammar:** Imperatives. Singular and plural nouns. Uncountable nouns. How much & how many. Some & any. **Writing:** A recipe of *Mediterranean Omelette!* Words and expressions related to meals and ways of cooking. **Speaking:** *My favorite dish!* ● **Listening comprehension:** Numbers. Time. Telephone. 7 ● **Reading comprehension & Vocabulary skills:** **Text: Not the normal news.** Words and expression related to the text. ● **Grammar & writing & speaking skills:** **Grammar:** Telling the time. The Present Simple tense for daily routines. **Writing:** *A daily routine of a person you know well or a famous person!* Words and expressions related to routines and lifestyle. **Speaking:** *My daily routine*!

	● **Listening comprehension:** Numbers. Time. Clock 8 ● **Reading comprehension & Vocabulary skills:** **Text: The Wright way to fly.** Words and expression related to the text. ● **Grammar & writing & speaking skills:** **Grammar:** Regular and irregular verbs. The Past Simple tense. Time connectors *first, then, later, after that, next, before, after, when*. **Writing:** *An event happened with Jasur!* Words and expressions related to past events & experiences. **Speaking:** *An event in my life!* ● **Listening comprehension:** Introduction & names. 9 ● **Reading comprehension & Vocabulary skills:** **Text: Don't trust me.** Words and expression related to the text. ● **Grammar & writing & speaking skills:** **Grammar:** Comparative & Superlative adjectives. Connectors *firstly, secondly, also, what is more; however, on the other hand; because, as.* **Writing:** *Cats Can make the Best Pets!* Words and expressions related to animals and their characters. **Speaking:** *My favorite pet!* ● **Listening comprehension:** Describing people. 10 ● **Reading comprehension & Vocabulary skills:** **Text: Bugs for sale.** Words and expression related to the text. ● **Grammar & writing & speaking skills:** **Grammar:** Modal verbs *should / shouldn't, must / mustn't*. Imperatives. **Writing:** a film review about the film *ET the Extra Terrestial!* Words and expressions related to travelling. **Speaking:** *The film which I love very much*! ● **Listening comprehension:** Clothes. 11 ● **Reading comprehension & Vocabulary skills:** **Text: Mona who?** Words and expression related to the text. ● **Grammar & writing & speaking skills:** **Grammar:** Adjectives with *-ed* and *-ing*. The Present Simple tense for Reviews / Dramatic narrative. Connectors *and, because, so.* **Writing:** *a letter of advice to a friend!* Words and expressions related to movies and types of movies. **Speaking:** *Travelling abroad!* ● **Listening comprehension:** Routines. 12 ● **Reading comprehension & Vocabulary skills:** **Text: Borrowed words.** Words and expression related to the text. ● **Grammar & writing & speaking skills:**

	Grammar: Wh- questions. Adjectives & adverbs. Direct speech. Similes. **Writing:** *a story using the pictures!* Words and expressions related to past events and experiences. **Speaking:** *An interesting event which happened with me!* ● **Listening comprehension:** Dates. 13 ● **Reading comprehension & Vocabulary skills:** **Text: Growing deserts.** Words and expression related to the text. ● **Grammar & writing & speaking skills:** **Grammar:** *Be going to* for plans & intentions. The Present Continuous tense for fixed arrangement for the future. Infinitive of purpose. **Writing:** *a letter to a friend about where you are going on your holiday!* Words and expressions related to holidays & holiday plans. **Speaking:** *My holiday plans!* ● **Listening comprehension:** Jobs. 14 ● **Reading comprehension & Vocabulary skills:** **Text: Growing deserts.** Words and expression related to the text. ● **Grammar & writing & speaking skills:** **Grammar:** *Be going to* for plans & intentions. The Present Continuous tense for fixed arrangement for the future. Infinitive of purpose. **Writing:** *a letter to a friend about where you are going on your holiday!* Words and expressions related to holidays & holiday plans. **Speaking:** *My holiday plans!* ● **Listening comprehension:** Jobs. 15 ● **Reading comprehension & Vocabulary skills:** **Text: Animals forecasters.** Words and expression related to the text. ● **Grammar & writing & speaking skills:** **Grammar:** The Future Simple tense with *will*. **Writing:** *a letter to a friend about where you are going on your holiday!* Words and expressions related to events which are predicted to happen in the future. **Speaking:** *My holiday plans!* ● **Listening comprehension:** Sports & exercises.
Media employed	**Presentations, videos, simulations, electronic resources and others**
Study and examination requirements and forms of examination	Oral Exam: In this exam, the student is given 20 minutes to answer the questions. The answers to the questions are evaluated as follows: 1. If all questions are answered in detail and completely – 5 (Excellent)

	2. If all questions are answered (some of them partially) or 2/3 of the questions are answered completely – 4 (Good) 3. If some questions are answered or 2/3 of the questions are answered partially – 3 (Satisfactory) 4. If no answers are given or the answers do not correspond to the questions – 2 (Unsatisfactory)
Reading list	Referens 1. Casey Malarcher, Andrea Janzen. Reading Challenge (Books 1,2,3) Compass Publishing, 2015. 2. Li Ya Bin. Basic IELTS listening. Beijing Language and Culture University Press. Vietnam, 2010. 3. Virginia Evans, Jenny Dooley. Reading and Writing Targets. (Basic). Express publishing 2015. 4. Richards J. C., Grant Trew. Tactics for Listening. (Basic) Oxford University Press, 2010
Reviewers	Aliqulov A.G. Associate Professor of the Department of Interfaculty English, Ph.D. Baymuradova L.K. Associate Professor of the Department of Interfaculty English, PhD
Confirmed place and time	Developed and approved by Karshi State University (Report №1 30.08.2024)

MINISTRY OF HIGHER EDUCATION, SCIENCE AND INNOVATIONS OF THE REPUBLIC OF UZBEKISTAN

KARSHI STATE UNIVERSITY

PRACTICAL ETHICS AND AESTHETICS
MODULE HANDBOOK

Bilim sohasi:	500 000-tabiiy fanlar, matematika va statistika
Ta’lim sohasi:	510 000-biologik va turdosh fanlar
Ta’lim yo‘nalishi:	60530400-geografiya
	60530500-fizika

MODULE REFERENCES

Module name:	Practical ethics and aesthetics
Code, if applicable:	AEE2504
Semesters in which the module is taught:	5
Lecturer:	Fazliddin Qodirov
Language	Uzbek
Relation to curriculum:	Elective
Type of teaching, contact hours:	Lecture, practical
Workload:	Total - 120 Contact hours: 60 hours; lecture – 30 hours; practical – 30 hours Self-study: 60 hours
Credit points:	4
Recommended prerequisites:	Philosophy Religion History

Module objectives Intended learning outcome	It is a scientific interpretation of the connection of practical ethics and aesthetics with human activity, their theoretical and practical study, the study of the problems of moralizing spiritual processes, the formation of the aesthetic taste of the individual. Revealing the content of such concepts as aesthetic consciousness, aesthetic perception, aesthetic feeling; - Scientific substantiation of the moral and aesthetic requirements of society and studying issues related to the moral and aesthetic essence of spiritual elevation on the basis of a systematic approach; By improving aesthetic culture, it is aimed at strengthening the scientific foundations of aesthetic perception of the world in students, the ability to distinguish between beauty and ugliness, greatness and baseness, and the organization of life activities in accordance with the requirements of high aesthetic taste.
Content	Training format: lecture 1. The evolution of media literacy and information culture and its importance in society. The role and importance of information in society. The importance of media and information in the activation of citizens in the new Uzbekistan. 2. Competitive environment in the world media and information space. The role of foreign media in the media space. 3. Structure and influence of the media space. Information attacks and threats in social networks.

	4. Identification and systematic study and analysis of the principle of information exchange in social networks. Culture of information dissemination in the media space. Person-oriented information: psychological, religious and cultural threats. 5. Ideological and theoretical foundations of ensuring information security. Spiritual and legal foundations of information security in Uzbekistan 6. The emergence of the Internet and computer games. The impact of virtual games on the minds of young people. Media space and Internet capabilities. Training format: practical training 1. The evolution of media literacy and information culture and its importance in society. The role and importance of information in society. 2. The importance of media and information in the activation of citizens in the new Uzbekistan. 3. Competitive environment in the world media and information space. The role of foreign media in the media space. 4. Structure and influence of the media space. 5. Information attacks and threats in social networks. 6. Identification of the principle of information exchange in social networks and systematic research and analysis. 7. Culture of information dissemination in the media space. 8. Person-oriented information: psychological, religious and cultural threats. 9. Ideological and theoretical foundations of ensuring information security. 10. Moral and legal foundations of information security in Uzbekistan. 11. The emergence of the Internet and computer games. The impact of virtual games on the minds of young people. 12. Media space and Internet capabilities.

Study and examination requirements and forms of examination	a) To receive a grade of 5, the student's level of knowledge must meet the following requirements: can fully explain the essence and content of the subject; maintains scientificity and logic in presenting the topics in the subject, avoiding scientific errors and confusion; has a clear idea of the theoretical or practical significance of the subject materials in the subject; can demonstrate the ability to think independently within the scope of the subject; can answer the questions asked clearly and concisely; has carefully prepared the outline; has completed independent assignments completely and clearly; has fully mastered the laws and other regulatory and legal documents related to the discipline; has published a scientific article on one of the topics related to the discipline; can interpret historical processes; b) To receive a grade of 4, the student's level of knowledge must meet the following requirements: understands the essence and content of the subject, does not allow scientific and logical confusion in explaining the topics in the subject; understands the practical significance of the content of the subject; performs the assigned tasks and assignments within the framework of the curriculum; can correctly answer the questions asked in the subject; has carefully formulated a subject outline; has fully completed independent assignments in the subject; has mastered laws and other regulatory documents related to the subject. c) To receive a grade of 3, the student's level of knowledge must meet the following criteria: has a general understanding of the subject; covers the topics of the subject in a narrow range, with some inconsistencies in the presentation; is not fluent in the presentation; if complex and confusing answers are given to questions on the subject; if the text on the subject is not well-structured. g) In the following cases, the student's level of knowledge may be assessed as unsatisfactory with a grade of 2: if preparation for the subject exercises is not carried out; if the student has no idea about the subject exercises; if it is noticeable that the texts on the subject have been copied from others; if serious errors and confusions are made in the text on the subject; if the questions asked about the subject are not answered; if the subject is not known.
Media employed	Some of the most effective methods of pedagogical technologies are the use of "Problem Situation", "FSMU", "Fish Skeleton", "Cluster" and "Why", "How" organizers in the educational process, presentation, brainstorming Blitz, discussion, question and answer technologies.

Reading list	1. Abdulla Sher. Axloqshunoslik. Darslik. –T.: O'zbekiston faylasuflari milliy jamiyati nashriyoti, 2010. 2.Agzamova N. Etika. Uslubiy qo'llanma. –T.: OOO "NORI", 2013. 3.Alikulov X. Falsafiy meros va ma'naviy-Ahloqiy fikr rivoji. -T.: Falsafa va xukuk institut, 2009. 4.Muhammadjonova L. Amaliy etika va estetika O'quv qo'llanma –T.: "Universitet", 2020. 5.Muhammadjonova L.A., Ortiqova D.O., Abidjanova F.A., Masharipova G.K. Professional etika va etiket. Darslik. - T.: "Adabiyot uchqunlari" 2018. 6.Muhammadjonova L, F.Abidjanova. Etiket. O'quv qo'llanma. T.: Universitet. O'zMU, 2018 7.Nurmatova M., Muhammadjonova L., Ma'naviyatning axloqiy asoslari.–T.: Unversitet, O'zMU. 2013.
Reviewers	Professor of the Department of Philosophy and Sociology Choriyev S.A. Associate Professor of the Department of Social Sciences Ph.D. (DSc) Omonov B.N.
Confirmed place and time	Developed and approved by Karshi State University (Report № 1 30.08.2024)

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KARSHI STATE UNIVERSITY

SOCIAL PHILOSOPHY
MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODULE REFERENCES

Module name:	Social Philosophy
Code, if applicable:	IF2504
Semesters in which the module is taught:	5
Lecturer:	Professor of the Department of Philosophy and Sociology, KarshiSU: Choriev S.A. KarshiSU "Philosophy and Sociology" Department, Associate Professor
Language	Uzbek
Relation to curriculum:	Elective
Type of teaching, contact hours:	Lecture, practical
Workload:	4 ECTS (120 hours): For the course load Classroom sessions Lecture :30 hours practical training 30 hours Independent study: 60 hours
Credit points:	4
Recommended prerequisites:	Philosophy The latest history of Uzbekistan
Module objectives Intended learning outcome	to properly organize professional activities based on world events, to increase social responsibility, to form a sense of involvement in state policy, to independently analyze social processes, and to have an idea of the important features of the current social reality; It consists of philosophical observation of the reality taking place around us, studying things and events on the basis of science and logic, ensuring the harmony of social and social imagination, independent and modern thinking, raising social consciousness in everyday activities, and developing specific skills and abilities in a person in relation to the social processes taking place around him.
Contents	Lectures Topic 1: The subject, goals and objectives of social philosophy Social philosophy is a component of the philosophical culture of humanity. The commonality, distinction, and uniqueness between philosophy and social philosophy. Social philosophy is the doctrine of the essence and principles of society, man, social development, and social cognition. The main principles of social philosophy are: the priority of social values over individual and class values, the fact that a well-rounded person is the main goal of social development, the mutual proportionality of social changes and social stability, the priority of spiritual development over material and economic development,

	and the fact that the state is the initiator and organizer of social reforms. Social philosophy is a humanities discipline. Social sciences as a scientific theory and holistic doctrine of society. The relationship of natural, scientific sciences and humanities in the knowledge of social phenomena. Social philosophy and philosophy of history. Methodological function of social philosophy. Concrete sociological research and their importance in the knowledge of social phenomena. Social philosophy is the theoretical basis of the philosophy of history. Anthropology and social philosophy and their relationship. Differentiation and integration in the development of sciences, their manifestation in social philosophy. Topic 2: History of Social Philosophy. Social philosophy is a component of the history of world philosophy. The first social philosophical views in the Ancient East. Ancient Greek thinkers on the essence of man and society (the social and philosophical teachings of Socrates, Plato and Aristotle). Medieval social philosophy. Social philosophical views of Abu Nasr al-Farabi, Abu Raykhan al-Biruni, and Ibn Sina. Modern social philosophy. The existing literature emphasizes that the development of science as a separate form of activity in Europe dates back to the 16th-17th centuries. During this period, science and philosophy, the philosophy of society, were not sharply separated from each other. They called their works "positive experimental philosophy". The development of science in Europe, especially social philosophy, radically changed people's views on the world. Social philosophical views of the 20th century paid special attention to the human problem. The need to change the social and philosophical worldview in the transition period. Social philosophy in independent Uzbekistan and its development prospects. Topic 3: Society as a holistic system Society as an object of study in social philosophy. Society is a component of objective existence. The problem of the criterion of social development in social philosophical thought. The increasing level of individual freedom as a criterion of social development. Commonality and specificity in the development of human society. Transition to market relations as a general law in the development of human society. Specific features of the information society. The concept, essence and content of social laws. Laws and regularities of the development of society. Regularities of the development of social life and their significance. Classification of the laws of the development of historical processes.

	The alternation of order and disorder, consciousness and unconsciousness, stability and instability in the life of society. The multidimensionality of social life. Spiritual, ideological, economic, social, political, legal, moral, etc. spheres of society. Topic 4: Factors of social life and development The relationship between the life and development of society and nature. The concept of the biosphere. The concept of "geographic environment". The theory of geopolitics. Neo-Malthusianism in the West in the 20th century. Criteria for social stability and instability in social philosophy. Social stability is an important basis for ensuring the material well-being of society, the formation of a harmonious human personality, the creation of a free and prosperous homeland, and free and prosperous living conditions. and instability. The fact that social instability leads to the emergence of social disasters and the escalation of conflicts. Its contradiction with the ideology of development. The coverage of the problems of social instability in the works of I. Karimov. Applied educational technologies: dialogical approach, problem-based learning. Blitz, discussion, question and answer, self-control. Topic 5: Civil Society The concept of "civil society". The essence of the concept of civil society and the problems of its formation in the system of socio-political sciences. The normative aspect of civil society. Democratic state and civil society. The creation of civil society is the main direction of world social life. The place and role of the state in civil society. The need to further improve political and legal culture in the creation of civil society. Specific features of the creation of civil society in Uzbekistan: achievements, opportunities and problems. The principle of "from a strong state to a strong society". Topic 6: Economic life of society The production of material goods is a natural and necessary condition for the development of society. The satisfaction of material needs and interests is the main goal of the economic life of society. Technological method of production. Economic method of production. The economic system of society. Socio-economic relations, a pluralistic economy. The role of labor in the economic and social development of society. The objective necessity of creating various forms of ownership in the conditions of the transition to market relations. The attitude towards property and labor. The inextricable link between economics and spirituality. The

	fact that it is a necessary condition of economic life in conditions of competitive relations. market Topic 7: Social life of society The concept of "social life". Horizontal section of social life: classes, social groups, social strata. Mobility is a characteristic feature of social life in an open democratic society. Vertical section of social life: social stratification, property ownership and propertylessness. Ethnic and demographic composition of society. Educational and professional composition of society. The elite is an important element of the social structure of a democratic society. Problems of social change and ensuring social stability in the social life of society. Strong social protection is one of the main principles of the transition period. The reconstruction of the social life of society during the transition period. Socio-philosophical problems of building civil society. Topic 8: Political life of society The political system of society. The place and role of the state in the political life of society. The place of non-governmental organizations in a democratic society. Power, Political institutions, Political relations, Subjects of political culture. Political parties, public organizations and social movements are an integral part of the political life of a democratic society. The establishment of democratic values is the main goal of political reforms. The place and role of the state in the political life of society. The role of non-governmental organizations in a democratic society. The constitution is an important tool for improving the political and legal life of a democratic society. The role of the education system in improving political and legal culture. Topic 9: Spiritual life of society The concept of "spiritual life". Spiritual competence as the basis of the material and economic life of society. Succession and renewal in the spiritual life of society. <<Social consciousness>> is a structural part of the spiritual life of society. Structural structure of social consciousness. High spirituality. Spiritual poverty. A perfect person is a person who is well-rounded and highly spiritual in every way. Reforming the education system is an important factor in improving the spiritual life of society. Topic 10: The role of science in society Although elements of science and technology originated

	in antiquity, their philosophical assessment changed radically in the 20th century. Science is a special form of social consciousness. Science is a highly organized and specialized activity aimed at producing objective knowledge about the world, including man himself. Science is a specific form of spiritual production. One of the important aspects of science is that it is a social institution with a complex structure. In the 20th century, scientific progress began to outpace technical progress. The role of science in society The impact of science on society has become even greater, as it has become more and more connected with all spheres of life. Nowadays, it is difficult to find any aspect of society that is free from the influence of scientific knowledge. Science is increasingly becoming a leading factor in the life and development of society. Topic 11: Man. Society and the individual product. The highest form of human existence. The development of man and society, the evolution of nature, the development of the universe. Anthropology is the science of man. Early views of man. Mythological and religious views on the origin of man. Scientific hypotheses and evidence, scientific theories on the origin of man. Eastern thinkers on the meaning of human life (Farabi. Beruni, Ibn Sina. Navoi, etc.). Sufi philosophy on the meaning of human life. Existentialism is a philosophical doctrine about the meaning of human life. Human Being. Religious, scientific, and philosophical views on the origin and nature of human consciousness. The transformation of a person into a human being and their integration into society is the result of the process of anthroposociogenesis. Important factors of anthroposociogenesis. Individual, individuality, personality. Personality is a product of the socialization process. Personality types. Society and the individual, their integral connection. Social qualities of the individual. Factors influencing the formation of the individual. Relations between society and the individual. Personal freedom. Voluntarism and fatalism. Independent individual. Cooperation of the family, neighborhood and educational institutions in the formation of the individual. The issue of freedom and necessity in collective philosophy. Personal freedom - as an opportunity to realize historical necessity and achieve spiritual perfection. The inextricable link between personal freedom and responsibility. The individual as a self-educating and self-developing system. Topic 12: Subjects of social development and driving forces

	The problem of social development. Philosophical analysis of historical processes. Laws of development of social life and their significance. Classification of laws of development of historical processes. Formative, civilizational, and multivariate approaches to the development of society are needs, interests, and concerns. The concept of "social progress". In social philosophical thought, the development of society The problem of criteria. Criteria of social progress. The alternation of order and disorder, consciousness and unconsciousness, stability and instability in the life of society. The essence of social development, its subjects, its driving forces. People, classes, nations, great personalities. The concept of the crowd. The place of the individual in history. Topic 13: Culture. Values Definition of the concept of culture. Philosophy recognizes the diversity in culture. Interrelationships between cultural types. Development of the culture of different peoples of Uzbekistan during the years of national independence. Cultural heritage and values. Harmonization of the ideas of nationality and universality. Universal values prevail in the culture of our homeland. Harmony of values, national and universal values. The role of values in the life of a person and society. Topic 14: Civilization Civilization, its essence and forms. Civilization is a universal philosophical concept. Modern French philosophers understood a society that has achieved civilization as a society based on reason and justice. The interdependence and uniqueness of civilization and culture. Civilization and technology. The one-sidedness and error of identifying civilization with formation. Civilization as a specific high stage in the development of human society. The concepts of "civilized man", "civilized people", "civilized society". Eastern and Western civilizations, their interaction and uniqueness. World civilization is local and regional civilizations. The formation of world civilization is a socio-philosophical problem. The most important signs of the formation of world civilization. World civilization is civilizations. Topic 15: Uzbekistan's contribution to world civilization joining Currently, humanity has reached a new stage in its

	development. In today's dangerous world, the preservation of humanity has become the main goal of world civilization. Joining the world community is a natural and legitimate process. As a result of joining world civilization, significant positive changes will occur not only in economic spheres, but also in the spirituality, politics and worldview of peoples. Philosophical and methodological problems of the path of independent Uzbekistan to join world civilization. Restoring the foundations of national statehood is an important factor in cultural and civilizational development. The "Uzbek model" of development. Uzbekistan is a bridge, a link connecting Eastern and Western civilizations. The uniqueness, inimitability and originality of Uzbekistan's social development. The "Uzbek model" of development. The gradualness of social development, compliance with national mentality and competence. Economic reforms and a civilized market Democratic processes in Uzbekistan with world civilization is another possibility for reconciliation. I. Guidelines and recommendations for workshop sessions The following topics are recommended for seminar sessions: 1. The subject of social philosophy is its goals and objectives. 2. History of social philosophy 3. Society - as a holistic system 4. Factors of social life and development 5. Civil society 6. Economic life of society 7. Social life of the community 8, Political life of society 9. Spiritual life of society 10 The role of science in society 11. Man. Society and the individual 12. Subjects and driving forces of social development 13. Culture. Values 14. Civilization 15. Uzbekistan's integration into world civilization.
Media employed	**Presentations, videos, simulations, electronic resources and others**
Study and examination requirements and forms of examination	Oral Exam: In this exam, the student is given 20 minutes to answer the questions. The answers to the questions are evaluated as follows: 1. If all questions are answered in detail and completely – 5 (Excellent) 2. If all questions are answered (some of them partially) or 2/3 of the questions are answered completely – 4 (Good)

	3. If some questions are answered or 2/3 of the questions are answered partially – 3 (Satisfactory) 4. If no answers are given or the answers do not correspond to the questions – 2 (Unsatisfactory)
Reading list	1.Керимов П.к. Социалная фалсафа. Учебник. Электронная-книга. Екатиринбург:»Издателствво Уралского университета», 2018.- 308 с. 2. Назаров Қ ва бошқ. Ижтимоий фалсафа.. Ўзбекистонга ёрдам берманг. 2008. - 85 б. 3.Каримов И.ва бошқ. Ижтимоий фалсафа. Ўқув ёрдамланма. Электрон-китоб.2008.- 120 б
Reviewers	Rustamov R.R. - Karshi State Technical University. Associate Professor of the Department of Social and Humanitarian Sciences, Turayeva A.P. - Karshi State Technical University, Associate Professor of the Department of Philosophy and Sociology.
Confirmed place and time	Developed and approved by Karshi State University (Report №1 30.08.2024)

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MINISTRY OF HIGHER EDUCATION,

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MOLECULAR SPECTROSCOPY
MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODUL REFERENCES

Module name:	Molecular Spectroscopy
Code, if applicable:	MS 2604
Semesters in which the module is taught:	6
Lecturer:	B.T. Kuyliyev – Head of the Department of General Physics, Professor A. Nekboyev – Teacher of the Department of General Physics
Language	Uzbek
Relation to curriculum:	elective
Type of teaching, contact hours:	Lecture, Laboratory
Workload:	4 ECTS (120 hours): For the course load Classroom sessions lecture 30 hours laboratory 30 hours Independent study: 60 hours
Credit points:	4
Recommended prerequisites:	Optics Atomics physics
Module objectives Intended learning outcome	As a result of mastering the subject, the student will: • Have knowledge of the basic laws of the subject of molecular spectroscopy and their formulas; • Have knowledge of the meaning, content, laws of motion of the main physical processes and the analysis of their graphs; • Have knowledge of the meaning, units and comparison of physical quantities; • Have knowledge of the application of basic physical laws and processes to mechanical and thermal phenomena; • Be able to know and use various number systems to solve problems in the subject of molecular spectroscopy.
Contents	Lecture topics Lectures The subject includes the following topics: I. Introduction. The science of molecular spectroscopy and its history of development and modern development traditions The history of the development of molecular spectroscopy and its relationship with other sections. Problems in the study of the science, methodological guidelines. The role of the science of molecular spectroscopy in the study of physics and other natural sciences. Sections and basic units of spectroscopy. II. Main characteristics of energy levels Energy states and natural and Doppler widths of spectral lines. Factors affecting the half-width of spectral line contours. Expansion due to collisions.

	III. Main properties of molecules Symmetry elements of molecules. Electrical properties of molecules. Dipole moment. Anisotropy of polarizability and polarizability tensor. IV. Molecular scattering of light from media Scattering of light. J. Rayleigh theory. Molecular scattering of light. Expression of density fluctuations by the number of molecules. A. Einstein's theory. Combinatorial scattering of light. Classical theory of combinatorial scattering of light. Quantum theory of combinatorial scattering of light. V. Types and spectra of motion in a molecule Components of the total energy of a molecule. Dependence of the electron energy of a molecule on the distance between the nuclei. VI. Rotational and vibrational spectra of diatomic molecules Rotational motion of molecules and rotational spectrum of linear molecules. Vibrations of diatomic molecules. Harmonic oscillator model. Rotational and vibrational spectra of diatomic molecules. Vibrational-rotational spectrum of diatomic molecules. Isotopic effect. VII. Fundamentals of intermolecular interaction spectroscopy Intermolecular interaction forces. Determination of the anisotropy relaxation time in liquids by Rayleigh scattering. Transformation of spectral line contours at high pressures. Study of H-bonding in liquids using the Raman effect. The following topics are recommended for laboratory: Topic 1. Technical safety. Error theory. Procedures for conducting experiments. Spherical aberration in lenses. Topic 2. Determining the focal length of converging and diverging lenses. Topic 3. Newton's experiments on dispersion and recombination of white light. Topic 4. Diffraction at double slits and multiple slits - recording and calculation using a videocom Topic 5. Creating interference using a He-Ne laser in a Fresnel mirror. Topic 6. Newton's rings in transmitted and reflected white light.

	Determining the radius of curvature of the lens. Topic 7. Measuring the refractive index of air with a Max-Zehnder interferometer. Topic 8. Determining the wavelength of He-Ne laser light using a Michelson interferometer. Topic 9. Determining the wavelength of light using a diffraction grating. Topic 10. Obtaining a transmission hologram in a laser optics device. Topic 11. Reversing the plane of polarization with a sugar solution. Topic 12. Stefan-Bolsmann law: measuring the temperature dependence of the intensity of "black body" radiation. Topic 13. Measuring the line spectra of inert gases and metal vapors using a prism spectrometer. Topic 14. Determining the refractive index of dispersed liquids. Topic 15. Studying Lloyd's reflection experiment with a He-Ne laser.
Study and examination requirements and forms of examination	Oral Examination: For this exam, the student is given 20 minutes for preparation to answer the questions. The answers to the questions are graded as follows: 1. If detailed and complete answers are provided for all questions – 5 (Excellent) 2. If answers are provided for all questions (some of them partially) or complete answers are given for 2/3 of the questions – 4 (Good) 3. If answers are given to some of the questions or partial answers are provided for 2/3 of the questions – 3 (Satisfactory) 4. If no answers are provided or the answers do not correspond to the questions – 2 (Unsatisfactory)
Media employed	Presentations, videos, simulations, electronic resources and others
Reading list	1. Yelyashevich M.A. Atomnaya i molekulyarnaya spektroskopiya. M.- 1962 g. 2. Gersberg G. Spektrы i stroenie dvuxatomnыx molekul. M.- 1949 g. 3. Gersberg G. Kolebatelnыe i vrashatelnыe spektr mnogoatomnыx molekul.M.1979 g

	4. Qo‘yliyev B.T.. “Molekulyar spektroskopiyaga kirish” o‘quv qo‘llanma. Qarshi, Fan va ta’lim nashriyoti, Qarshi. 2021-y. 210 b 5. Baxshiev G.L.. Vvedenie molekulyarnuyu spektroskopiyu. L. -1987 g. 6. Kuyliev B., Cpektrы spontannogo kombinatsionnogo rasseyaniya nizkomolekulyarnыx uglevodorodov, “Chulpon”, Toshkent 2018 y, 160 7. Murodov G‘., Xushvaqtov H. Spektroskopiya asoslari. T. “Voris-Nashriyot”, 2015-y. 192-b.
Reviewers	L.O. Meyliyev – Associate Professor of the Department of General Physics
Confirmed place and time	Developed and approved by Karshi State University (Report №1 30.08.2024)

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INTERACTION OF RADIATION WITH MATTER
MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODULE REFERENCES

Module name:	Interaction of radiation with matter
Code, if applicable:	NMO'T2604
Semesters in which the module is taught:	6
Lecturer:	B.T. Koyliyev – Head of the Department of General Physics, Professor A.P. Naumenko – Associate Professor, Kyiv National University
Language	Uzbek
Relation to curriculum:	Elective
Type of teaching, contact hours:	Lecture, practical
Workload:	4 ECTS (120 hours): For the course load Classroom sessions Lecture :30 hours Laborotory: 30 hours Independent study: 60 hours
Credit points:	4
Recommended prerequisites:	Philosophy The latest history of Uzbekistan
Module objectives Intended learning outcome	• To have knowledge of the basic laws of the science of the interaction of electromagnetic radiation with the environment and their formulas; • To have knowledge of the meaning, content, laws of motion of the main physical processes and the analysis of their graphs; • To have knowledge of the meaning, units and comparison of physical quantities; • To have knowledge of the application of basic laws and processes to mechanical and thermal phenomena.
Contents	**Lectures** I. Introduction to the science of the interaction of radiation with matter. The purpose and tasks of the science of the interaction of radiation with matter. The connection of the science with other branches of physics. Problems in the study of the science, methodological guidelines. II. Propagation properties of electromagnetic radiation in various media. Propagation of electromagnetic radiation in absorbing media. III. Quantization of electromagnetic waves Einstein's photon theory. Laws of thermal radiation. IV. Interaction of electromagnetic radiation with plasmons Plasma oscillations - plasmons and plasma frequency. Interaction of plasmons with plane electromagnetic waves. Experimental observation of plasma resonances. V. Interaction of electromagnetic radiation with semiconductors and

	metals Absorption properties of electromagnetic radiation in semiconductors and conductors. Reflection of light from semiconductors and metals. VI. Interaction of electromagnetic radiation with gases and liquids Physical foundations of light scattering by gases. Physical foundations of light propagation in liquids. VII. Scattering of light Molecular scattering of light in liquids. Theoretical views of A. Einstein. The role of combinatorial scattering in the study of media. Fine-structured scattering and its practical significance. Propagation of light in solutions. VIII. Features of light propagation in optical fibers. General theory of light propagation in optical fibers. Practical significance of optical fibers. **Recommended topics of the seminar:** - Practical application of processes occurring in the interaction of electromagnetic radiation with the environment. - Plasma oscillations. Interaction of electromagnetic radiation with plasmons, plasma reflection of light. - Cherenkov radiation. The theory of Tamm and Frank - Properties of reflection of electromagnetic radiation from metals Properties of reflection of electromagnetic radiation from semiconductors. - Mandelstam-Brillouin scattering of light. Mandelstam-Brillouin component - Dispersion of a light pulse in optical fibers. Physical properties of optical fibers - Technology of application of laser radiation in metal processing. The nature of laser beams. Application of laser radiation technology in industry
Media employed	**Presentations, videos, simulations, electronic resources and others**
Study and examination requirements and forms of examination	Oral Exam: In this exam, the student is given 20 minutes to answer the questions. The answers to the questions are evaluated as follows: 1. If all questions are answered in detail and completely – 5 (Excellent) 2. If all questions are answered (some of them partially) or 2/3 of the questions are answered completely – 4 (Good) 3. If some questions are answered or 2/3 of the questions are answered partially – 3 (Satisfactory) 4. If no answers are given or the answers do not correspond to the questions – 2 (Unsatisfactory)
Reading list	1. Н.Б.Делоне – «Взаимодействие лазерного излучения с веществом». М., «Наука»., 1989

	2. Л.В.Тарасов «Введение в квантовую оптику» М. «Выс.шк.», 1987г. 3. Qo'yliyev B.T. "Molekulyar spektroskopiyaga kirish" o'quv qo'llanma. Qarshi, Fan va ta'lim nashriyoti, Qarshi. 2021-y. 210 b
Reviewers	L.O. Meyliyev – Associate Professor of the Department of General Physics B.E. Khayriddinov – Professor of the Department of General Physics
Confirmed place and time	Developed and approved by Karshi State University (Report №1 30.08.2024)

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PHYSICS OF SEMICONDUCTORS AND DIELECTRICS
MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODULE REFERENCES

Module Name	Physics of Semiconductors and Dielectrics
Code (if applicable)	YDF2606
Semesters Taught	6
Lecturer	Tashatov Allanazar Karshiyevich – Associate Professor of the Department of Theoretical and Experimental Physics
Language of Instruction	Uzbek
Relation to Curriculum	elective
Type of Teaching, Contact Hours	Lecture, Practical Sessions
Total Workload	180 hours
Contact Hours	90 hours (Lecture – 30 hours, Practical – 30 hours, laboratory-30 hours)
Independent Study	90 hours
Credit Points	6
Recommended Prerequisites	Electricity and Magnetism, Computer Modeling of Physical Processes

Module objectives / intended learning outcome	CONTENT OF THE SUBJECT Semiconductors are widely used in electronics and microelectronics, and nearly all modern electrical devices—from computers to mobile communication phones—are based on semiconductor technology. The most commonly used semiconductor material is silicon, although other materials are also widely utilized. Semiconductors are materials whose electrical conductivity lies between that of conductors (mainly metals) and insulators (dielectrics). They have the ability to significantly change their physical properties over a wide range under the influence of external factors such as illumination, heating, and others. Semiconductors occupy an intermediate position between materials that conduct electric current well (conductors) and those that practically do not conduct electricity (dielectrics). Many elements located in groups II, III, IV, V, and VI of the Mendeleev periodic table—such as silicon, germanium, boron, diamond, phosphorus, sulfur, selenium, tellurium—as well as a number of their compounds (such as GaAs, GaP, InSb, SiC, ZnS, CdTe, GaSb, etc.) belong to the class of semiconductors. In semiconductors, as in metals, electrical conductivity arises due to the movement of electrons. However, the conditions under which electrons move in semiconductors differ from those in metals. Semiconductors possess the following main properties: The electrical conductivity of semiconductors increases with temperature (for example, when the temperature rises by 1 K, the conductivity may increase by 16–17 times); In addition to free electrons, electrons bound to atoms also participate in electrical conduction (in some cases, bound electrons play a major role); By introducing a small amount of impurity into pure semiconductors, their conductivity can be drastically changed (for example, adding just 0.01% impurity can increase conductivity by up to 10,000 times);

	Purpose of teaching the subject- The aim of the course is to provide students with the necessary body of knowledge in semiconductor physics, and to develop their understanding of the principles and methodologies for the practical application of this knowledge in studying the physical processes occurring in semiconductor materials, which form the fundamental components of modern semiconductor devices and systems. Tasks of the subject-The objectives of the course are to establish both theoretical foundations and practical skills in semiconductor physics; to study the structure of semiconductors and their specific properties; to apply research methods—individually or in combination—for investigating physical processes; and to teach the principles of analytical processing, interpretation, and presentation of measurement and observation results.
Content	TOPICS Topic 1. Introduction to Semiconductor Physics. General information. The role of semiconductors in modern science and technology. Basic concepts. Topic 2. Fundamentals of Semiconductor Physics. Covalent bonds, ionic bonds, and Van der Waals bonds. Bravais crystal lattice. Topic 3. Energy band structures of semiconductors. Topic 4. Statistics of charge carriers in semiconductors. Concentration of electrons and holes. Topic 5. Mechanisms of electrical conductivity in semiconductors. Mobility of charge carriers and scattering mechanisms. The effect of impurities and defects. Topic 6. Kinetic phenomena in semiconductors. Continuity equation. Diffusion and drift currents. Einstein relation. Galvanomagnetic, thermoelectric, and thermomagnetic phenomena in semiconductors. Topic 7. Optical phenomena in semiconductors. Reflection and diffraction of electromagnetic radiation in semiconductors. Topic 8. Excitons and polaritons in semiconductors. Exciton and polariton states and their manifestation in the optical properties of semiconductors. Topic 9. Spontaneous and stimulated emission in semiconductors. Semiconductor light-emitting diodes and lasers. Topic 10. Photoelectric phenomena in semiconductors. Conversion of light into electrical energy. Photoelectrodes: photoresistors, photodiodes, and solar cells. Topic 11. Contact phenomena in semiconductors. Metal–semiconductor electrical contacts. Schottky barrier. p–n junction. Topic 12. Semiconductor transistors. Semiconductor bipolar and field-effect transistors. Thin-film transistors. Topic 13. Features of charge transport processes in dielectrics. Types of charge carriers. Electrical conductivity and polarization mechanisms. Topic 14. Dielectric permittivity and surface charge density in dielectrics. Topic 15. Application of semiconductors and dielectrics in modern

Study and examination requirements and forms of examination	Written Examination: In this exam, the student is given 80 minutes to write answers to the questions. The answers to the questions are graded as follows: 1. If detailed and complete answers are written for all questions – 5 (Excellent) 2. If answers are provided to all questions (some of them partially) or complete answers are given for 2/3 of the questions – 4 (Good) 3. If answers are given to some of the questions or partial answers are provided for 2/3 of the questions – 3 (Satisfactory) 4. If no answers are provided or the answers do not match the questions – 2 (Unsatisfactory)
Media employed	Presentations, videos, simulations, electronic resources and others
Reading list	1. Zaynobiddinov S., Teshaboev A.T. Physics of Semiconductors. Tashkent: O‘qituvchi Publishing House, 1999. 2. Teshaboev A., Zaynobiddinov S., Ermatov Sh. Solid State Physics. Tashkent: Moliya Publishing House, 2001. 3. Bonch-Bruevich V.L., Kalashnikov V.L. Semiconductor Physics. Moscow: Nauka, 1990. 4. Oreshkin P.T. Physics of Semiconductors and Dielectrics. Moscow: Vysshaya Shkola, 1977. 5. Shalimova K.V. Semiconductor Physics. Moscow: Energiya, 1976. 6. Zaynobiddinov S., Akramov X. Methods for Determining Semiconductor Parameters. uchebnoe posobie (Textbook), Tashkent, 2001. 7. Normurodov M.T., Umirzakov B.E., Tashatov A.K. Fundamentals of Nanotechnology. Textbook, Tashkent: NIF-MSH Publishing House, 2021.
Reviewers	M.Normuradov-Associate Professor, Department of Theoritical and experimental phsics, doctor in physics and mathematics Scienses. Normuradov D- Professor, Qarshi State University, PhD in physics and mathematics Scienses.
Confirmed place and time	Developed and approved by Karshi State University (Report №1 30.08.2024)

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PHYSICS AND TECHNOLOGY OF SEMICONDUCTOR SOLAR CELLS
MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODULE REFERENCES

Module name:	Physics and technology of semiconductor solar cells
Code, if applicable:	YQE2606
Semesters in which the module is taught:	6
Lecturer:	Professor of the Department of Theoretical and Experimental Physics, Karshi State University, Tashatov Allanazar Qarshiyevich
Language	Uzbek
Relation to curriculum:	Compulsory
Type of teaching, contact hours:	Lecture, practical
Workload:	6 ECTS (180 hours): For the course load Classroom sessions lecture 30 hours practical training 20 hours laboratory exercises 10 hours Independent study: 90 hours
Credit points:	6
Recommended prerequisites:	Condensed matter physics
Module objectives Intended learning outcome	As a result of mastering the subject, the student will: and the purpose of teaching this Science is to introduce the necessary set of knowledge in the science of semiconductor solar cell physics technology, to form knowledge, skills and abilities in methods of using solar energy in the study of the physical processes occurring in these materials, which are the main components of solar cells operating on the basis of modern semiconductor devices.
Contents	Lectures Topic 1. Energy bands and band gap of semiconductors determine the width. Topic 2. Fundamentals of semiconductor physics for solar cells. Energy band structure, intrinsic and compound semiconductors. Topic 3. Theory of p-n junctions, formation, equilibrium state, and movement of charge carriers. Topic 4. The principle of operation of solar cells. Photogeneration of charge carriers and mechanisms of their separation.

	Topic 5. Current-voltage characteristics. Equations of ideal and real solar cells. Topic 6. Efficiency of solar cells. Fill factor, open circuit voltage and short circuit current. Topic 7. Optical properties of solar cells. Absorption and antireflection Coatings. Topic 8. Recombination mechanisms. Bulk and surface recombination. Topic 9. Types of solar cells. Silicon-based, thin-film, organic, and perovskite solar cells. Topic 10. Thin film technologies. Deposition methods and material properties Topic 11. Technology of manufacturing solar cells. Alloying, diffusion, etching, metallization. Topic 12. Energy dissipation mechanisms in solar cells. Electrical and optical losses. Topic 13. Measurement methods. Current-voltage characteristics and quantum efficiency. Topic 14. Photovoltaic systems. Modules, panels and system integration. Topic 15. Applications of solar cells. Renewable energy systems and modern technologies. The following topics are recommended for practical exercises: 1. Energy bands and band gap width of semiconductors to determine 2. Electrical conductivity of intrinsic and compound semiconductors 3. Analysis of the volt-ampere characteristic of a p-n

	junction 4. The processes of drift and diffusion of charge carriers in the p-n junction learning 5. Study of photogeneration and photocurrent generation in a solar cell 6. Obtain and analyze the characteristics of the solar cell 7. Determination of the main parameters of the solar cell 8. Calculation and analysis of solar cell efficiency 9. Study of optical energy dissipation in solar cells 10. Methods and properties of thin film solar cells learning Laboratory exercises. 1. Four-probe method for measuring the resistivity of semiconductor materials measure with 2.Determining the parameters of semiconductors using the Hall effect 3. Study of the operating modes of solar panels 4. Semiconductor-based solar cells and batteries determining the useful work coefficient 5. Studying the effects of blocking diodes on solar cells
Media employed	**Presentations, videos, simulations, electronic resources and others**
Study and examination requirements and forms of examination	Oral Examination: For this exam, the student is given 20 minutes for preparation to answer the questions. The answers to the questions are graded as follows: 1. If detailed and complete answers are provided for all questions – 5 (Excellent) 2. If answers are provided for all questions (some of them partially) or complete answers are given for 2/3 of the questions – 4 (Good) 3. If answers are given to some of the questions or partial answers are provided for 2/3 of the questions – 3 (Satisfactory) 4. If no answers are provided or the answers do not correspond to the questions – 2 (Unsatisfactory)
Reading list	Referens

	1.Zainobiddinov C. Teshaboev A.T. Physics of semiconductors. T."Teacher" 1999. 2. Teshaboev A.T. Zainobiddinov C. Yermatov Sh. Solid State Physics, T. "Finance" 2001. 3.Fistul V.I. Vvediniya v fiziku poluprovodnikov. M. Vicshaya School. 1984 4. Bonch - Bruevich V.L., Kalashnikov C.G. Physics semiconductors. M. 4. Science, 1990. 5.Normurodov M.T., Umirzakov B.E., Tashatov A.K. Textbook, Nif-msh Publishing House Tashkent 3031 Fundamentals of Nanotechnology
Reviewers	Reviewers: A.Tashatov - Professor of the Department of Theoretical and Experimental Physics, Karshi State University f-m,f,d. M.Normurodov - Karshi State University, Theoretical and Experimental Physics Professor of the Department, F-M, F, D.
Confirmed place and time	Developed and approved by Karshi State University (Report №1 30.08.2024)

MINISTRY OF HIGHER EDUCATION, SCIENCE AND INNOVATIONS OF THE REPUBLIC OF UZBEKISTAN

KARSHI STATE UNIVERSITY

ECOLOGY AND ENVIRONMENTAL PROTECTION
MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODULE REFERENCES

Module name:	Ecology and Environmental Protection
Code, if applicable:	EAMM2604
Semesters in which the module is taught:	6
Lecturer:	Hilola Meyliyeva
Language	Uzbek
Relation to curriculum:	Elective
Type of teaching, contact hours:	Lecture, practical, Laboratory
Workload:	120 hours Contact hours: 60 hours; lecture – 30 hours; practical – 30 hours; Self-study: 60 hours
Credit points:	4
Recommended prerequisites:	Biology Geography Technology

Module objectives Intended learning outcome	It consists of teaching the students issues related to the theoretical foundations of ecology, the consequences of disrupting the balance of interactions between nature and society, improving the environmental management system, and increasing the efficiency of natural resource use. As a result of mastering the subject, the student, in the process of studying the course 'Ecology,' should acquire scientific knowledge, practical skills, and competencies regarding the assessment of environmental quality, the role of ecological tourism in global tourism, national parks, ecological trails, recreational landscapes, the use of recreational zones, degradation of natural ecosystems, ecological management, and the interconnection of ecological problems with the system of knowledge about nature.
Content	1. Lesson 1. Lecture ● Introduction. Contemporary environmental problems. Population growth and environmental problems. Environmental problems in Central Asia and measures to prevent them. 2. Lesson 2. Lecture Ecology and its goals and objectives, history of development. The object of study of ecology. Goals and tasks of science. Scientists and scholars who contributed to the development of ecology. Population growth and environmental problems, environmental problems in Central Asia and measures to prevent them.

	3. Lesson 3. Lecture Ecological factors and laws. Ecological factors and their types. Anthropogenic changes. Ecological laws and laws. 4. Lesson 4. Lecture Biosphere. Ecology of ecosystems. The concept of the biosphere, the composition and functions of the biosphere, the biosphere and the universe. The concepts of ecotism, population and biogeocenosis. The circulation of substances in nature. Ecology of populations. Vernadsky's doctrine. Boundaries and components of the biosphere 5. Lesson 5. Lecture Natural resources and their types. Natural resources, their classification. Energy and mineral raw materials resources. Real and potential resources. Problems of rational use of underground minerals. Use of mineral resources in Uzbekistan. Economic mechanisms of nature use. 6. Lesson 6. Lecture Atmosphere and its protection. The composition of atmospheric air. Atmospheric pollution and sources of pollution. Negative consequences of atmospheric pollution. (Greenhouse effect, acid rain, ozone layer depletion); distribution of pollutants in the atmosphere. Pollution of the atmosphere with toxic gases, ways to reduce and neutralize them. 7. Lesson 7. Lecture Hydrosphere. The role and importance of water in nature. Water in nature and its importance. General water resources of the Republic of Uzbekistan. Pollution of the hydrosphere, shortage and problems of fresh water. The main problems in the use of water resources. The concept of wastewater. Classification of wastewater according to various properties. Water supply and closed water circulation system in industry. Methods of wastewater treatment. Mechanical, physicochemical, chemical and biological methods of wastewater treatment generated in industry. Methods and facilities for wastewater treatment. 8. Lesson 8. Lecture Lithosphere. Soil degradation. Soil, its importance and role in the life of living organisms. Soil erosion and its types. Natural and artificial erosion, water and wind erosion and ways to combat it. Degradation of terrestrial ecosystems. 9. Lesson 9. Lecture Protected areas. Reserves. Specially protected areas. National parks and sanctuaries. The role of the sustainable development program in solving global environmental problems

	10. Lesson 10. Lecture Waste problem. Development of waste science. Waste problem in Uzbekistan. Waste-free and low-waste technology. Classification of environmental waste, classification of waste, basic principles of organizing waste-free technological processes. Solid waste generated in industry and ways of its processing and utilization. Lesson 11. Lecture Methods and types of monitoring concept. Methods and types of monitoring concept. State ecological expertise. Economic importance of environmental protection. 12. Lesson 12. Lecture Problems and prospects of sustainable development. Ecology and international cooperation. International organizations in the field of ecology. Ensuring environmental safety. The concept and definition of sustainable development. The role of the sustainable development program in solving global environmental problems. Problems and prospects of sustainable development. Ecology and international cooperation. International organizations in the field of ecology. Ensuring environmental safety. The concept and definition of sustainable development. The role of the sustainable development program in solving global environmental problems. 13. Lesson 13. Lecture International legal protection of the environment. The concept and history of development of international legal protection of the environment. Principles and sources of international legal protection of the environment. 14. Lesson 14. Lecture Educational and educational features of nature protection. Educational and educational features of nature protection. Ensuring ecological safety.
Study and examination requirements and forms of examination	Oral Examination: For this exam, the student is given 20 minutes for preparation to answer the questions. The answers to the questions are graded as follows: 1. If detailed and complete answers are provided for all questions – 5 (Excellent) 2. If answers are provided for all questions (some of them partially) or complete answers are given for 2/3 of the questions – 4 (Good) 3. If answers are given to some of the questions or partial answers are provided for 2/3 of the questions – 3 (Satisfactory) 4. If no answers are provided or the answers do not correspond to the questions – 2 (Unsatisfactory)
Media employed	Lectures; • interactive case studies;

	• practical exercises (logical reasoning, quick questions and answers); • group work; • making presentations; • individual projects; • projects for teamwork and defense.
Reading list	1. A. Tokhtayev, A. Hamidov. Fundamentals of Ecology and Nature Protection. Tashkent Teacher Publishing House. 1994 (in Uzbek) 2. Ergashev A., Ergashev T. Ecology, biosphere and nature protection. T., "Generation of the New Age". 2005.- 430 p. (in Uzbek) 3. A. Ergashev General Ecology. Tashkent. Publishing House of Uzbekistan. 2003 (in Uzbek) 4. P.S.Sultonov. Fundamentals of Ecology and Environmental Protection. Tashkent. Musiqa Publishing House, 2007 (in Uzbek) 5. A.A.RAFIKOV, Q.N. AMIRQULOV, A. HOJIMATOV., Ecology Publishing House of the Literary Fund of the Writers' Union of Uzbekistan. Tashkent 2004 (in Uzbek)
Reviewers	T.U. Rakhimov – Karshi State University, Associate Professor of the Department of Agrochemistry and Ecology, D.Sc.
Confirmed place and time	Developed and approved by Karshi State University (Report № 1 30.08.2024)

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KARSHI STATE UNIVERSITY

ENVIRONMENTAL PROTECTION AND GREEN DEVELOPMENT
MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODULE REFERENCES

Module name:	Environmental Protection and Green Development
Code, if applicable:	AMMQ2604
Semesters in which the module is taught:	6
Lecturer:	N.Sh. Bazarova - QSU, Associate Professor of the Department of "Agrochemistry and Ecology", Candidate of Pedagogical Sciences G'.D. Kudratov, Lecturer of the Department of "Agrochemistry and Ecology"
Language	Uzbek
Relation to curriculum:	Elective
Type of teaching, contact hours:	Lecture, practical
Workload:	4 ECTS (120 hours): For the course load Classroom sessions Lecture :30 hours Practical training**:**: 30 hours Independent study: 60 hours
Credit points:	4
Recommended prerequisites:	Philosophy Life safety
Module objectives Intended learning outcome	• Have an idea of the basics of environmental protection and green development, the impact of scientific and technological progress on nature, changes in the biosphere, the negative and positive impact of human economic activity on nature; • Know and use the pressure on ecosystems, metabolism in the biosphere, mechanisms that ensure ecosystem stability, the possibilities of managing processes in the ecosystem, as well as ecological laws and regulations, the role of alternative energy in human life; • Be able to analyze environmental problems at different levels, find solutions to ecological principles of nature use, protect plants and animals, and rational use and protection of natural resources, and have the skills to plan and implement activities.
Contents	**Lectures** Topic 1. Introduction. Goals and objectives of the science of environmental protection and green development, history of development. Goals and objectives, object, methods, history of development of the science of environmental protection and green development. Scientific foundations of the use of natural resources in environmental protection and green development. Topic 2. Scientific and technical progress and the emergence of environmental problems Evolution of relations between nature, society and man. Increased human pressure on the environment and its

	ecological consequences. Development of science and technology and the problems facing them. Population growth, demographic explosion, modern scientific and technical process. Renewable natural resources and environmental problems. Negative consequences of industry on the natural environment. Combating desertification, drought and deforestation. Urbanization and its impact on the biosphere. Ways to solve the problems of urbanization and migration. Topic 3. Biosphere - a global ecosystem The concept of the biosphere, its structure. The role of V.I. Vernadsky in the formation of modern scientific views on the biosphere. The importance of water in the biosphere. Global pollution of the biosphere, its consequences and ways to combat them. The impact of industry and transport on the environment. Pollution of the biosphere with toxic and radioactive substances. Topic 4. Global climate change. The concept of the environment, types of environmental factors. The main factors of climate formation. Anthropogenic factors in climate formation. Atmospheric pollution and its negative consequences. Gases and aerosols that create the greenhouse effect. Scenarios of climate change on a global scale. Consequences of climate change on a global scale. our future climatic or geographical changes. Topic 5. Atmospheric protection The structure and main properties of the atmosphere. Gas composition and layers. Atmospheric pollution and its prevention. Problems arising from air pollution and its negative consequences. Problems of atmospheric pollution in Uzbekistan and measures to prevent it. Topic 6. Hydrosphere protection Concept of the hydrosphere. The importance of water in nature and in the life of living organisms. Sources and compounds polluting water resources. Waterborne diseases. Water use issues. Water use in Central Asia and Uzbekistan. Problems of the Aral Sea and the Aral Sea. Topic 7. Lithosphere protection Concept of the lithosphere. Land resources. Environmental problems of the soil. Use of land resources in Uzbekistan. Problems of rational use of underground minerals. Measures to protect soils. Use of mineral resources in Uzbekistan. Topic 8. Biodiversity protection Biological diversity, the importance of ecosystems in maintaining the ecological balance in the biosphere. The role and significance of plants and animals in nature. Causes of biodiversity decline. Protection of plants and animals. Protection and rational use of plants and animals in Uzbekistan. Topic 9. Economic and ecological aspects of natural

	resources and their effective use Classification of natural resources. Natural resources, the problem of their conservation. The real threat of depletion of natural resources. Natural resources, the problem of their conservation and their effective use. Urbanization and its impact on the biosphere. Ways to solve the problems of urbanization. Reclamation of lands that have become unsuitable as a result of economic activity. Foreign experience. The importance of using alternative energy. Topic 10. The problem of waste. General concept of waste. Types of waste. Separation of waste into types. Negative impact of waste on the environment. Diseases. Foreign experience. Waste recycling. Laws and resolutions. Topic 11. Environmental protection from noise The concept of noise. Sources and types of noise. Reasons for increasing noise. Noise-induced diseases. Noise protection measures. Topic 12. The role of alternative energy in society. General concept of alternative energy. Alternative energy sources and types. Ecological significance of using alternative energy. Use of solar, wind, water and biogas energy. Ecologically clean technology. Fuel bases of world energy. Topic 13. Opportunities for using alternative energy sources in Uzbekistan. Alternative energy reserves and their use in Uzbekistan. Opportunities for using solar energy. The role of water energy. Wind energy. Ecological aspects of using bioenergy. The current role and prospects of using alternative energy in our country. Topic 14. The problem of green development in the world and the strategy of sustainable development. The concept of nature and society protection, ecological safety and sustainable development. International cooperation in nature protection. International organizations operating in the field of nature protection. The “Man and the Biosphere” program. International activities towards greening. Implementation and future prospects of the “Green Space” national program. Topic 15. Issues of environmental education in environmental protection. The importance of environmental education in environmental protection. The educational and educational significance of nature protection. Ecological culture and nature protection. A model of a highly spiritual and ecologically cultured person. Ecological policy and environmental safety **The following topics are recommended for practical training:** 1. Impact on the biosphere. 2. Pollution and prevention of the atmosphere.

	3. Pollution and prevention of the hydrosphere. 4. Pollution and prevention of the lithosphere. 5. Natural resources, the problem of their conservation. 6. Environmental problems of the present time. 7. Agriculture and the environment. 8. The Aral Sea disaster and ways to prevent it. Social and environmental problems of the Aral Sea. 9. Preservation of biological diversity. 10. Use of renewable energy sources in the national economy. 11. Environmental aspects of the use of bioenergy. 12. Environmental aspects of sustainable development. 13. Environmental policy and environmental safety 14. The problem of waste. 15. The green space program and the model of a highly spiritual person.
Media employed	**Presentations, videos, simulations, electronic resources and others**
Study and examination requirements and forms of examination	Oral Exam: In this exam, the student is given 20 minutes to answer the questions. The answers to the questions are evaluated as follows: 1. If all questions are answered in detail and completely – 5 (Excellent) 2. If all questions are answered (some of them partially) or 2/3 of the questions are answered completely – 4 (Good) 3. If some questions are answered or 2/3 of the questions are answered partially – 3 (Satisfactory) 4. If no answers are given or the answers do not correspond to the questions – 2 (Unsatisfactory)
Reading list	1. Ergashev A., va boshqalar. Barqaror taraqqiyot va tabiatshunoslik asoslari. T. Baktria press, 2016. 2. Ergashev A., Ergashev T. “Ekologiya, Biosfera, va tabiatni muhofaza qilish” darslik. – Toshkent, 2005. 3. Nigmatov A., va boshqalar. Barqaror rivojlanishning ekologik jihatlari. T. 2006 4. Nigmatov A., Pardayev G‘. Ekologik xavfsizlik va barqaror rivojlanish. Qo‘shimcha ta’lim uchun qo‘llanma 5. Ekologik ta’limdan barqaror rivojlanish ta’limi sari. A.N.Nigmatovning umumiy taxriri ostida// qo’llanma: - T., Talgin, 2007. 6. Tursunov X.T. Ekologiya va barqaror rivojlanish.-T., 2009.
Reviewers	R.Eshonkulov - Karshi State Technical University, Associate Professor of the Department of Ecology and Environmental Protection, Doctor of Philosophy in Biological Sciences M.Bo’ronova - Associate Professor of the Department of Botany, Karshi State Technical University, Doctor of Philosophy in Biological Sciences (PhD)
Confirmed place and time	Developed and approved by Karshi State University (Report №1 30.08.2024)

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LASER PHYSICS
MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODUL REFERENCES

Module name:	Laser physics
Code, if applicable:	LF 2706
Semesters in which the module is taught:	7
Lecturer:	H.Z.Botirov - Assistant Professor of the Department of "General Physics"
Language	Uzbek
Relation to curriculum:	Elective
Type of teaching, contact hours:	Lecture, seminar
Workload:	6 ECTS (180 hours): For the course load Classroom sessions lecture 30 hours practical training 30 hours laboratory: 30 Independent study: 90 hours
Credit points:	6
Recommended prerequisites:	Electricity and magnetism Optics Molecular Spectroscopy
Module objectives Intended learning outcome	As a result of mastering the subject, the student should be able to: Know the basic physical laws related to the field of laser physics; their place in practice; apply them to the fields of science and technology; analyze formulas and graphs representing physical processes and draw appropriate conclusions. Describe physical experiments, demonstrations and phenomena based on physical laws and principles; Have the skills to apply the science of laser physics and its laws in the development of science and practice. Know the properties of laser light and their main characteristics. Know the essence of laser light and its practical application; Know the fundamental nature of optical quantum generators and their practical application; Know the fundamental nature of the theory of forced radiation and its practical application; Know the fundamental nature of coherent rays and their practical application; Know the fundamental nature of optical devices and their practical application; A clear understanding of the scattering of photons from matter, scattering theory and its practical application; Solve and analyze problems of general requirement level in the sections planned in the curriculum; correctly apply mathematical methods in solving problems; perform laboratory work related to the laws of laser physics, work with spectral devices, obtain high-precision results, correctly

	use measuring instruments, calculate experimental results, draw graphs, analyze and draw conclusions.
Contents	MAIN THEORETICAL PART (lectures) The subject includes the following topics: Topic 1. Introduction. History and stages of development of laser physics: Research works of Einstein, Fabricant, Basov, Prokhorov, Towns and Mayman. Topic 2. *Principle and types of lasers. Functional scheme of lasers. Properties of laser light. Einstein coefficients. Beer-Boeger's law and negative absorption. Absorption and amplification in an active medium. Conditions for self-excitation of lasers. Lasers with three and four energy states. Methods of excitation of an active medium and relaxation schemes. Topic 3: *Elementary theory of optical resonators. Optical resonator. Formation of modes in an optical resonator. Types of optical resonator oscillations (modes). Stability of an open optical resonator. Flat parallel resonator. Spherical resonator. Modes of an active open optical resonator and the effect of expansion on them. Mode selection method. Spectral properties of laser light. Topic 4: *Properties of laser light Spectral width of laser radiation. Monochromaticity. Coherence. Directivity of laser light. Duration of laser light. Topic 5: Types of lasers Solid-state lasers. Gas lasers. Semiconductor lasers. Fiber lasers. Topic 6: Physical foundations of changing the frequency of laser light. Medium polarization. Deformational (electronic) polarization. Orientational polarization. Polarization of anisotropic media Topic 7: Nonlinear optical processes Second harmonic generation in a quadratic medium. Optical processes in a cubic nonlinear medium. Self-interference of a light wave. Topic 8: *Nonlinear interaction of electromagnetic waves. Second harmonic generation Second harmonic generation and synchronism. Coherence length Topic 9: *Nonlinear interaction of electromagnetic waves. Maxwell's equations and second harmonic generation

	Nonlinear Maxwell's equations. Second harmonic generation. Topic 10: *Properties of single-axis crystals. Scalar and vector synchronisms Basic properties of single-axis crystals. Types of phase synchronisms of second harmonic generation in single-axis crystals Topic 11: *Parametric generation of light Parametric generation in a mechanical pendulum. Parametric oscillations in an electric oscillation circuit. Parametric generation of light. Topic 12: Scattering of light. Spontaneous and forced molecular scattering. Spontaneous and Stimulated Combinatorial Scattering. Topic 13:Multi-Photon Processes Probability of Two-Photon Transitions. Methods for Measuring Two-Photon Transitions The following topics are recommended for practical classes: 1. Determining the Beer-Bougeries law and determining the absorption coefficient. 2. Learning to solve the kinetic equation of a system with two energy states at the time of the particle. Theoretical determination and practical calculation of the third-order acceptability χ in optical fibers. Studying the process of self-focusing. 3. Determining the refractive index in monoaxial crystals. 4. Determining the synchronism angle for the second harmonic in a nonlinear monoaxial crystal. 5. Studying the helium-neon laser. Studying the CO2 laser. Studying the neodymium laser. 6. Researching the practical application of multi-photon processes. 7. The use of lasers in technology. The following topics are recommended for laboratory exercises: 1. Diffraction of light at a secondary slit. Recording and analysis of the results using VideoCom. 2. Study of the interference phenomenon in a Fresnel mirror using a helium-neon laser. 3. Determination of the wavelength of helium-neon laser radiation using a Michelson interferometer. 4. Determination of the refractive index of air using a Max-Zendr interferometer.

	5. Study of Fresnel's law of refraction.
Study and examination requirements and forms of examination	Oral Examination: For this exam, the student is given 20 minutes for preparation to answer the questions. The answers to the questions are graded as follows: 1. If detailed and complete answers are provided for all questions – 5 (Excellent) 2. If answers are provided for all questions (some of them partially) or complete answers are given for 2/3 of the questions – 4 (Good) 3. If answers are given to some of the questions or partial answers are provided for 2/3 of the questions – 3 (Satisfactory) 4. If no answers are provided or the answers do not correspond to the questions – 2 (Unsatisfactory)
Media employed	Presentations, videos, simulations, electronic resources and others
Reading list	1. Meytlend A.. Dann M.. Vvedenie v fiziku lazerov.M. Nauka. 1978 g. 2. Mirinoyatov M.M. “Lazerlar fizikasi va texnikasi. T. O‘ZMU nashriyoti. 2009 y. 3. Dmitriev V.G. Tarasov L.V. Prikladnaya nelineynaya optika. M.FizmatLit.2004 4. Tarasov L.V. Fizicheskie osnovi kvantovoy elektroniki. M. 1976 g. 5. Karlov N.V. Leksii po kvantovoy elektronike, M. Nauka. 1988 g. 6. Zvelto O. Prinsipы lazerov, M. Mir-1990 g. 7. Shen M.R. Prinsipы nelineynoy optiki: Per.s angl. / Podredaksii S.A.Axmonova.-M: Nauka 1989.-560 s 8. Wolfgang Demtroder/ Laser Spectroscopy. Springer - 2008.
Reviewers	G.S.Uzokova - Professor of the Department of "General Physics"
Confirmed place and time	Developed and approved by Karshi State University (Report №1 30.08.2024)

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PHYSICS OF ACCELERATERS
MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODULE REFERENCES

Module name:	Physics of Acceleraters
Code, if applicable:	TF2706
Semesters in which the module is taught:	7
Lecturer:	B. Koyliyev - Ph.D., Professor, Lecturer of the Department of "General Physics" of Karshi State University H. Batirov - Lecturer of the Department of "General Physics" of Karshi State University
Language	Uzbek
Relation to curriculum:	Elective
Type of teaching, contact hours:	Lecture, practical and laborotory
Workload:	6 ECTS (180 hours): For the course load Classroom sessions Lecture :30 hours Practical training**:**: 30 hours Laborotory: 30 hours Independent study: 90 hours
Credit points:	6
Recommended prerequisites:	General Physics course
Module objectives Intended learning outcome	It is necessary to analyze the systems of application of the laws of physics and their formulas, content, laws of motion and their graphs, draw appropriate conclusions, know the meaning of physical quantities, units and their comparison. The conditions that determine the quality of education related to the educational process are: teaching at a high scientific and pedagogical level, organizing lessons in an interesting question-and-answer format, using advanced pedagogical technologies and multimedia tools, setting motivating and thought-provoking problems for students, demandingness, individual work with students, engaging in free communication, and scientific research. Ability to apply basic physical laws and principles to natural phenomena, describe molecular physics experiments, demonstrations, processes, their application limits, laws of thermodynamics, cycle work, heat capacities and their quantities, temperature, processes occurring on the surface of liquids, and capillarity phenomena based on physical laws and principles; This education, by its very nature, provides for the full development of all participants in the educational process. Students will gain the skills to understand the science of accelerator physics and its laws in the development of science, to apply formulas characterizing physical processes in practice, to compare existing theories with experimental results, to analyze and draw appropriate

	conclusions, and to use experimental devices operating on the basis of the laws of accelerator physics.
Contents	**Lectures** **Introduction** Subject, tasks and sources of the science of accelerator physics. The task of accelerators. A brief history of the development of accelerators. Units and dimensions in accelerator physics. Selection of accelerator energy. Particles used in accelerators and their sources. Types and classification of accelerators. **Vacuum system and ion sources in accelerators** Vacuum. Pumps used in vacuum production. Forevac and diffusion pumps. Pumps used in high vacuum production. Gas pressure measurement and measuring devices. Ion sources and their operating principles. Structure of an ion source. The process of formation of a proton particle. **Motion of charged particles in electric and magnetic fields.** Motion of charged particles in an electric field. Motion of electrons in longitudinal and transverse electric fields. Electronic lenses. Motion of charged particles in magnetic fields. Magnetic lenses. Transmission of accelerated particle flux over long distances. **Direct-action accelerators. Accelerator tubes.** Electrostatic generator. Van de Graaff generators. Cascade generators. **Linear accelerators.** Videro accelerators. Alvarez accelerator. Traveling wave linear accelerators. **Linear accelerators used in medicine** Linear electron and ion accelerators used in medicine. **Neutron generators.** The principle of operation of a neutron generator. Neutron generators and their characteristics. Neutron generators and their application in medicine. **Betatron and synchrotron.** Structure and principle of operation of betatron.

	Application in medicine. Structure and principle of operation of synchrotron. Synchrotron radiation and its application in medicine. **Stability of particle motion** Free (betatron) oscillations. Forced oscillations. Resonance phenomena during particle motion. Principle of autophasing. **Application of accelerators in industry and medicine** Production of radionuclides and their application in medicine. Modification of chemical properties of substances by accelerators. Application of accelerators in industry. **Application of accelerators in medicine** Application of accelerators in medicine. Sterilization. Radiation therapy and radiosurgery. **The following topics are recommended for practical training:** 1. Application of cyclotrons in the production of radionuclides used in medicine 2. Microtron and their applications 3. A new generation of microtrons. 4. Betatron and their applications in medicine. 5. Laser-plasma accelerators. 6. Stability of particle motion. 7. Free (betatron) oscillations. 8. Forced oscillations. 9. The principle of autophasing 10. Linear colliders. 11. Sterilization. 12. Radiation therapy. **Laborotory topics** 1. Study of the interference phenomenon in a Fresnel mirror using a helium-neon laser. 2. Determination of the wavelength of helium-neon laser radiation using a Michelson interferometer. 3. Determination of the refractive index of air using a Max-Zehnder interferometer. 4. Study of Fresnel's law of refraction.
Media employed	**Presentations, videos, simulations, electronic resources and others**
Study and examination requirements and forms of examination	Oral Exam: In this exam, the student is given 20 minutes to answer the questions. The answers to the questions are evaluated as follows: 1. If all questions are answered in detail and completely – 5 (Excellent) 2. If all questions are answered (some of them partially) or 2/3 of the questions are answered completely – 4 (Good) 3. If some questions are answered or 2/3 of the questions are answered partially – 3 (Satisfactory) 4. If no answers are given or the answers do not correspond to the questions – 2 (Unsatisfactory)

Reading list	1. S. Y. Lee. Accelerator Physic. Second edition. 575 pg 2. Klause Welli. The Physics of Particle Acceleators. 315 pg 3. Helmut Wiedemann. Particle Accelerator Physics Fourth Edition. 1021 pg.
Reviewers	L.O. Meyliyev – Associate Professor of the Department of General Physics B.E. Khayriddinov – Professor of the Department of General Physics
Confirmed place and time	Developed and approved by Karshi State University (Report №1 30.08.2024)

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MINISTRY OF HIGHER EDUCATION,

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KARSHI STATE UNIVERSITY

"FUNDAMENTALS OF NANOPHYSICS"
MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODULE REFERENCES

Module name:	Fundamentals of nanophysics
Code, if applicable:	NFA2704
Semesters in which the module is taught:	7
Lecturer:	Professor, Normurodov Murodulla
Language	Uzbek
Relation to curriculum:	Elective subject
Type of teaching, contact hours:	Lecture
Workload:	4 ECTS (120hours): For the course load Classroom sessions lecture 30 hours practical training :30 hours Independent study: 60 hours
Credit points:	4
Recommended prerequisites:	Molecular physics
Module objectives Intended learning outcome	The goal of science education is to study new physical processes occurring in low-dimensional materials with nanostructures. The fundamentals of nanophysics are to understand the physical properties of nanomaterials and their physical mechanisms, and to determine in which nanodevices these properties can be used. Considering that educational programs are based on the progression from simple to complex, the content of this program was also formed based on this requirement. This recommended curriculum covers the propagation of electromagnetic radiation in various media, including nonlinear polarization, light dispersion, forced scattering of all forms of light, propagation in optical fibers, physical There is also ample room for parameter calculations and other phenomena.
Contents	Lectures Topic 1. The subject includes the following topics: Introduction to the subject "Fundamentals of Nanophysics". Basic concepts of nanophysics and nanotechnologies, the history of the origin and future role of nanotechnologies. Topic 2. Nanomaterials and their types. Nanomaterials. Fullerenes, carbon nanotubes and Graphene. Their physical properties and practical applications. Topic 3. Size effects. Quantum size effects. Quantum confinement. Nanomaterials and their quantum dimensions: quantum coils, quantum wires, quantum dots. Zero, one and two-dimensional nanostructures (2D, 1D and 0D). Topic 4. Fundamental electronic phenomena in nanostructures. Fundamental electronic phenomena in nanostructures.

	Topic 5. Ballistic motion. Quantum tunneling effects. Quantum size effects. Topic 6. Quantum confinement. Synthesis of nanomaterials Methods for synthesizing monomaterials "from sugar" Topic 7. Synthesis of nanomaterials/Methods of synthesis of nanomaterials: "top-down" and "bottom-up" technologies Topic 8. . Methods of synthesis of nanomaterials. Chemical and hybrid methods. Topic 9. Familiarity with equipment for the formation and synthesis of nanostructures. Topic 10. Their advantages and disadvantages. Physical, applied Topic 11. Methods for observing nanomaterials. Topic 12. Tools for observing and analyzing the properties of nanomaterials. Topic 13. Introduction to the equipment used in observing nanomaterials. Topic 14. Their advantages and disadvantages. Topic 15. Scanning probe microscopy, electron spectroscopic methods. microscopy and The following topics are recommended for practical exercises: Topic 1. Areas of application of nanotechnology. Topic 2. Energy and environmental aspects of nanotechnology its role in preserving the environment. Topic 3. Solar energy conversion methods. I, II, III generation solar elements. Topic 4 Photocatalyst nanomaterials. Topic 5. Nanogenerators. Topic 6. Scanning probe microscope. Topic 7. Atomic force microscope. Topic 8. Their devices, principles of operation Topic 9. Methods for studying nanofilms using electron optics and modern microscopes Topic 10. Basic technologies for obtaining nanofilms. Topic 11. Photocatalysts. Topic 12. photocatalytically purify water break up and damage. Topic 13. Triboelectric and piezoelectric nanogenerators. Topic 14. Electron beam microscope. Topic 15. Nanogenerators and their applications
Media employed	**Presentations, videos, simulations, electronic resources and others**
Study and examination requirements and forms of examination	Oral Examination: For this exam, the student is given 20 minutes for preparation to answer the questions. The answers to the questions are graded as follows: 1. If detailed and complete answers are provided for all questions – 5 (Excellent)

	2. If answers are provided for all questions (some of them partially) or complete answers are given for 2/3 of the questions – 4 (Good) 3. If answers are given to some of the questions or partial answers are provided for 2/3 of the questions – 3 (Satisfactory) 4. If no answers are provided or the answers do not correspond to the questions – 2 (Unsatisfactory)
Reading list	Referens 1.M.T.Normuradov, B.E.Umirzakov, A.Q.Tashatov. "Fundamentals of Nanotechnology". Tashkent. NIF ShM.2021. 2.St. Petersburg, 2013 2. T.A. Vartanyan. Basic physical metallic nanostructure Uchebnoe posobie, 3.S.M. Lindsay. Introduction to nanoscience, Oxford University Press, 2010 3. 4.Parfenov V.V. Quantum-dimensional structures and electronics: optoelectronics.Kazan, 2007 5.N.G. Huseynzade, K.A. Zvezdin, M.Yu. Romanovsky, Course lecture on physical nanostructure, Uchebnoe posobie. Izd. "Moscow state technical university of radio engineering, electronics and automation" MGTU MIREA, Moscow,
Reviewers	1. Maria Rybapkina Nanotechnologii dlya vsex, Moscow, 2005. 440 p. 2. Yu. Altman. Military nanotechnology. Moscow: Technosphere, 2006, 424 s 3. Money - ML. F. Owens Nanotechnology (2nd edition). Moscow: Technosphere, 2006 4. Foster Nanotechnology, science, innovation and opportunities Moscow: Technosphere, 2008-352 c 5. L. Novotnyi, B. Hext. Basic nanooptics. Perevod s angliyskogo Moscow,Physiology, 2009 6. Mamykin A. I., Rassadina A. A. Introduction to physical nanoscale structure. Moscow, 2016. 7.I.P. Suzdalev Nanotechnology. Physico-chemistry of nano clusters, nanostructures and nanomaterials.-Moscow, KomKniga, 2006. -592 p. 8. A. G. Gurevich Fizika tverdogo tela, Uchebnoe posobie dlya vuzov/FTI im. A.F. Ioffe RAN). S. Petersburg. 2004.-320 p.
Confirmed place and time	Developed and approved by Karshi State University (Report №1 30.08.2024)

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FUNDAMENTALS OF NANOTECHNOLOGY
MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODULE REFERENCES

Module Name	Fundamentals of Nanotechnology
Code (if applicable)	NTA2704
Semesters Taught	8
Lecturer	Normuradov \muradullar Togayevich – Professor of the Department of Theoretical and Experimental Physics Dovranov Kuvondik Turakulovich – Associate Professor of the Department of Theoretical and Experimental Physics
Language of Instruction	Uzbek
Relation to Curriculum	Mandatory subject
Type of Teaching, Contact Hours	Lecture, Practical Sessions
Total Workload	120 hours
Contact Hours	60 hours (Lecture – 30 hours, seminars – 30 hours)
Independent Study	60 hours
Credit Points	4
Recommended Prerequisites	Electricity and Magnetism Computer Modeling of Physical Processes Physics of Semiconductors and Dielectrics

Module objectives / intended learning outcome	CONTENT OF THE SUBJECT Course Description The course is aimed at studying novel physical phenomena occurring in low-dimensional materials with nanostructures. It covers the formation and fabrication of nanostructures and nanomaterials within the field of nanotechnology, as well as the investigation of physical processes taking place in nanoscale materials. The course also provides knowledge on the properties and characteristics of nanomaterials and focuses on the application of nanodevices based on the physical processes occurring within them. Learning Outcomes In terms of Knowledge: Ability to analyze nanomaterials, nanostructures, their formation mechanisms, and the physical processes occurring within them; Understanding the nature, dimensions, and units of physical quantities describing processes and properties, and determining them through mathematical analysis;

	Ability to independently process laboratory results and describe and analyze experimental and theoretical laws. In terms of Skills: Ability to develop mathematical models and technological solutions for theoretical and practical problems related to controlling the physical properties of materials in condensed matter systems within defined objectives; Ability to use relevant mathematical software packages and information technologies in the field; Ability to select appropriate methods for solving subject-related problems and tasks; Ability to study research equipment, conduct experiments, perform measurements, and correctly use measuring instruments; Ability to clearly and logically present well-founded conclusions and ideas.
Content	Topics Topic 1: Introduction to Nanotechnology. History, scope, and interdisciplinary nature of nanotechnology Topic 2: Development and Future Prospects of Nanotechnology. Relation to other advanced technologies Topic 3: Fundamentals of Solid State Physics. Free electron theory, band theory, electrical conductivity Topic 4: Types of Nanomaterials and Nanostructures. Fullerenes, carbon nanotubes, graphene Topic 5: Quantum Size Effects in Nanostructures. Quantum wells, wires, and dots Topic 6: Low-Dimensional Systems (0D, 1D, 2D). Physical properties and confinement effects Topic 7: Electronic Processes in Nanostructures. Quantum transport and tunneling phenomena Topic 8: Synthesis Methods of Nanostructures. Bottom-up and top-down approaches Topic 9: Semiconductor–Dielectric Nanostructures. Multilayer and heterostructure systems Topic 10: Characterization Techniques for Nanomaterials. Overview of analytical methods Topic 11: Electron Microscopy and Scanning Probe Techniques. SEM, AFM, STM principles Topic 12: Spectroscopic Methods in Nanotechnology. Electron spectroscopy and optical methods Topic 13: Nanofilm Deposition Technologies. Physical and chemical deposition methods Topic 14: Applications of Nanotechnology. Energy, electronics, environment Topic 15: (NEW) Nanodevices and Nanoelectronics. Nanosensors, nanoelectronics, MEMS/NEMS systems

	Recommendations for Seminar Classes 1. Vacuum technology and measurement methods 2. Substrate preparation techniques for nanofilm deposition 3. Thin film and nanofilm fabrication methods 4. Magnetron sputtering system: structure and working principles 5. Technological parameters in magnetron deposition 6. Electrical properties of nanomaterials (conductivity, resistivity) 7. Hall effect and carrier concentration analysis 8. Optical properties of nanomaterials (absorption, reflection) 9. UV-Vis spectroscopy analysis of nanofilms 10. FTIR spectroscopy and interpretation of spectra 11. SEM analysis of surface morphology 12. Introduction to AFM and surface topology analysis 13. Experimental data processing and error analysis 14. Modeling physical processes in nanostructures 15. Case studies of nanotechnology applications in energy and electronics
Study and examination requirements and forms of examination	Written Examination: In this exam, the student is given 80 minutes to write answers to the questions. The answers to the questions are graded as follows: 1. If detailed and complete answers are written for all questions – 5 (Excellent) 2. If answers are provided to all questions (some of them partially) or complete answers are given for 2/3 of the questions – 4 (Good) 3. If answers are given to some of the questions or partial answers are provided for 2/3 of the questions – 3 (Satisfactory) 4. If no answers are provided or the answers do not match the questions – 2 (Unsatisfactory)
Media employed	Presentations, videos, simulations, electronic resources Presentations, videos, simulations, electronic resources and others
Reading list	1. Guseynzade N.G., Zvezdin K.A., Romanskiy M.Yu. Course of Lectures on Physics of Nanostructures. Moscow, MIREA, 2012. 2. Teshaboev A., Zaynobidinov S., Ermatov Sh. Solid State Physics. Tashkent: Moliya, 2001. 3. Normuradov M.T., Umirzaqov B.E., Tashatov A.Q. Fundamentals of Nanotechnology. Tashkent, 2021. 4. Vartanian T.A. Fundamentals of Physics of Metallic Nanostructures. Saint Petersburg, 2013. 5. Suzdalyev I.P. Nanotechnology: Physical Chemistry of Nanoclusters, Nanostructures and Nanomaterials. Moscow, 2006. 6. Lindsay S.M. Introduction to Nanoscience. Oxford University Press, 2010. 7. Novotny L., Hecht B. Principles of Nano-Optics. Cambridge University Press, 2012. 8. Sze S.M., Ng K.K. Physics of Semiconductor Devices. Wiley, 2007.

	9. Kittel C. Introduction to Solid State Physics. Wiley, 8th Edition, 2005. 10. Poole C.P., Owens F.J. Introduction to Nanotechnology. Wiley, 2003 (latest editions recommended).
Reviewers	A. Tashatov –Professor, Professor of the Department of Theoretical and Experimental Physics, D. Normurodov – Associate Professor of the Department of Theoretical and Experimental Physics
Confirmed place and time	Developed and approved by Karshi State University (Report №1 30.08.2024)

MINISTRY OF HIGHER EDUCATION, SCIENCE AND INNOVATIONS OF THE REPUBLIC OF UZBEKISTAN

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LIFE SAFETY

MODULE HANDBOOK

Field of knowledge:	500,000-Natural sciences, mathematics and statistics
Field of education:	530,000 - Physics and natural sciences
Field of education:	60530500-physics

MODULE REFERENCES

Module name:	Life safety
Code, if applicable:	HFX2704
Semesters in which the module is taught:	7
Lecturer:	Zulpikar Tuymuradov, associate professor
Language	Uzbek
Relation to curriculum:	Elective
Type of teaching, contact hours:	Lecture, practical
Workload:	120 hours Contact hours: 30 hours; practical – 30 hours Self-study: 60 hours
Credit points:	4
Recommended prerequisites:	Mechanics Electricity and magnetism Fundamentals of radio electronics

Module objectives Intended learning outcome	The purpose of teaching this subject is to teach future specialists the causes, characteristics, consequences of hazards that arise in their daily lives, the rules for their elimination, the creation of safe working conditions, the protection of the population from natural, man-made, environmental and other emergencies, their theoretical and practical protection, and the rules for providing primary medical care to injured people. To achieve this goal, the subject performs the tasks of forming students' theoretical knowledge, practical skills, a methodological approach to phenomena and processes, and a scientific worldview, as well as methods for analyzing the types of emergencies that may occur during their activities, their causes, and consequences, and the skills of using means of preserving and rescuing people and material assets in emergencies that may occur during their activities.
Content	Module 1: Theoretical foundations of life safety 1. Lesson 1 (Lecture) Introduction to the subject of "Life safety". Legal foundations of life safety. Analysis of activity safety. Ergonomic and psychological foundations of ensuring activity safety. Module 2: Occupational Safety Management System in Production 2. Lesson 2 (Lecture) Checking and training employees' knowledge in organizing safe activities. Accidents and occupational diseases in production.

	Occupational safety management system in production. Standards of industrial sanitation and hygiene, content 3. Lesson 3 (Lecture) The negative effects of industrial dust and toxic substances on the human body, measures to combat them 4. Lesson 4 (Lecture) Ventilation and lighting systems of industrial enterprises. Noise and vibration in production. Harmful radiation in production, their properties and effects on the human body. 5. Lesson 5 (Lecture) Ishlab chiqarishda elektr havfsizlik asoslari. Module 3: Emergencies and Civil Protection 6. Lesson 6 (Lecture) Emergency situations, their types and characteristics. Earthquake and its warning, protective measures Module 4: Fire Safety Basics 7. Lesson 7 (Lecture) Fundamentals of fire safety Module 5: Basics of Primary Care 8. Lesson 8 (Lecture) Basics of primary health care 9. Lesson 9 (Practical) 1 - practical exercise: The essence of the basic concepts of science. Types of hazards, their grouping and identification 10. Lesson 10 (Practical) 2 - practical exercise: Studying the comfort conditions of life safety, ergonomics of the workplace 11. Lesson 11 (Practical) 3 - practical exercise: Structure and functions of the labor protection and industrial safety management system in Uzbekistan. Hazardous objects in labor protection and industrial safety management in organizations. Territorial level of labor protection and operational safety management. 12. Lesson 12 (Practical) 4 - practical training: Methods of examination, recording and identification of occupational diseases and injuries at work. Protection against mechanical injuries and protective equipment. 13. Lesson 13 (Practical) 5 - practical exercise: The impact of harmful and toxic factors in the work process on the human body. Methods for calculating natural and artificial lighting in buildings. 14. Lesson 14 (Practical) 6 - practical exercise. Calculation of noise and vibration in work areas. Physiological effects of electric current on the human body 15. Lesson 15 (Practical)

	7 - practical exercise: Basic fire extinguishing equipment and calculation methods
Study and examination requirements and forms of examination	Oral Examination: The student is given time to prepare for the exam questions. His answers to the questions are evaluated as follows: 1. If all questions are answered in detail and completely – 5 (Excellent) 2. If all questions are answered (some partially) or 2/3 of the questions are answered in full – 4 (good) 3. If some questions are answered or 2/3 of the questions are answered in part – 3 (satisfactory) 4. If no answers are given or the answers do not correspond to the questions – 2 (unsatisfactory)
Media employed	In the lessons lecturer uses modern pedagogical technologies that combine text, sound, graphics, animation and video, and multimedia tools such as computers and laptops, interactive whiteboards that allow visual and tactile control of the lesson, and projectors to display information on a large screen.
Reading list	1. A. Mark, P. Friend James Fundamentals of Occupational Safety and Health. Bernan Press. Germany, 2007 2. Yuldashev O.R. Special course on occupational safety./ Textbook. -T.: “Wing of thought”, 2015. - 336 p. 3. Ibragimov E.I., Gazinazarova S., Yuldashev O.R. Special course on occupational safety. Textbook.-T.: TIMI, 2014. - 536 p. 4. Yuldashev O.R., Dzhabborova Sh.G., Xasanova O.T. Safety of life activities. Textbook-T.:“Tashkent-Economy”, 2014. - 268 p. 5. Yormatov G‘.Yo. and others. Safety of life activities. -T.: “Alokachi”, 2009. - 348 p. 6. Narziyev Sh.M., Kurbonov Sh.Kh. Safety of life activities. Textbook-T.: "New edition", 2019.- 234 p.
Reviewers	Y.S.Tilavov - Associate Professor of the Department of Technological Education, Candidate of Tekhnical Sciences.
Confirmed place and time	Developed and approved by Karshi State University (Report № 1 30.08.2024)

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EMERGENCY SITUATIONS AND CIVIL PROTECTION
MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODULE REFERENCES

Module name:	Emergency situations and civil protection
Code, if applicable:	FVFM2704
Semesters in which the module is taught:	7
Lecturer:	Elmurodov N.S. - Karshi State University, senior lecturer of the Department of "Technological Education", PhD.
Language	Uzbek
Relation to curriculum:	1. elective subject
Type of teaching, contact hours:	Lecture
Workload:	4 ECTS (120hours): For the course load Classroom sessions lecture 60 hours Independent study: 60 hours
Credit points:	4
Recommended prerequisites:	Natural Sciences
Module objectives Intended learning outcome	The purpose of teaching the subject is to form knowledge and skills in the causes, characteristics, consequences and rules for eliminating hazards in emergency situations, creating safe working conditions, protecting the population from natural, man-made, ecological and other emergencies, and providing primary medical care to the injured. The task of the subject is to form the necessary theoretical knowledge of students in the field of civil protection in emergency situations, and to teach them how to carry out labor protection activities.
Contents	Lectures Topic-1. Introduction to the subject "Protection of citizens in emergency situations" Topic 2. The content and essence of laws and by-laws on the protection of the population and territories from emergency situations. Legal foundations and content of life safety. The system of basic laws, standards, regulations, rules and regulatory documents adopted to ensure the safety of activities in production. Topic 3. Understanding the powers and means of the FVDT. Forces and means of civil defense, procedures for its organization in economic sectors. Drawing up civil defense plans. Organization and conduct of civil defense training exercises.

	Topic 4. Modes of operation of the FVDT and the interaction of management personnel in these modes. Ergonomics basics, basic principles and methods of ensuring occupational safety. Psychology of occupational safety. Psychological aspects of organizing human activity. Aesthetic equipment of workplaces. Topic 5: The essence of Resolution No. 455 "On the classification of emergencies of a natural, man-made and ecological nature." General information about emergencies of natural, man-made and ecological nature. Types of emergencies. Causes of emergencies and their classification. "Ensuring the protection of the population in emergencies of natural, man-made and ecological nature. Topic 6. Geological hazards (earthquakes, landslides, mountain blinks) .There are many types of natural disasters: earthquakes, floods, strong winds, fires, droughts, landslides, etc. These types of natural disasters can occur independently or in conjunction with each other, that is, one natural event occurs as a result of another. Topic 7. Hydrometeorological hazards (floods, waterlogging and mudslides, avalanches, strong winds (hurricanes), hail). It is known that ensuring the interests of man, his dignity, health and safety occupy a relevant, priority and important place in all aspects of our daily lives. The history of human development is associated with natural disasters and man-made disasters. Topic 8. Epidemics, quarantine diseases, highly dangerous infectious diseases, their prevention. Infectious disease is actually derived from the Latin word "infecio", which means "contamination". The infectious process is the changes that occur as a result of the interaction between the human organism (macroorganism) and a disease-causing microbe (microorganism) under certain conditions. Topic 9.. Transport accidents and disasters. Transport is one of the most important sectors of the economy, contributing significantly to the socio-economic development of a country by transporting goods and passengers from one place to another.

	Topic 10. Chemically hazardous facilities, classification and accidents at them. A chemical situation is a situation resulting from the release of highly toxic substances (CTS) into the environment when chemical weapons are used by the enemy or when a chemical facility is destroyed. Topic 11. Accidents at radiation hazardous facilities. Accidents involving radioactive substances and biological (bacteriological) agents. The Law of the Republic of Uzbekistan "On Radiation Safety" was adopted on August 31, 2000 on radiation situations and their safety. The purpose of this law is to regulate issues related to ensuring the protection of human life, health and property, as well as the environment from the harmful effects of ionizing radiation and radioactive pollution. Topic 12. Accidents in hydraulic structures. Accidents in the energy and utility systems. The failure of hydraulic structures leads to certain consequences, including: failure of the hydraulic structure to fulfill its functions; water waves causing harm to people and destruction of various structures; flooding of areas, causing serious material damage to property, land, material resources and other objects. Topic 13. Causes, characteristics of technogenic emergencies and the actions of the population in the areas of damage. Technogenic emergencies. Causes, characteristics of technogenic emergencies and population movements in the foci of damage. Accidents at facilities that use or store explosive, flammable and other fire-hazardous substances and materials in the technological process. Topic 14. Fire safety measures Fire disaster, its causes, factors, types, combustion phases and their characteristics. Fire resistance levels of buildings, structures and building materials of economic sectors. Categories of enterprises according to fire and explosion hazard. Industry

	Topic 15. Regulatory and legal frameworks and methods for preparing the population of the republic for action in emergency situations. All citizens are required to actively participate in resolving civil protection issues. Therefore, it is essential for citizens to know their rights and obligations in the field of civil protection. The normative and legal framework and methods for preparing the population of the republic for action in emergency situations are introduced. The following topics are recommended for practical exercises: 1. Introduction. Goals and objectives of the discipline "Safety in Emergency Situations". 2. The content and essence of laws and by-laws on the protection of the population and territories from emergency situations. 3. Understanding the powers and means of the FVDT. 4. FVDT operating modes and the interaction of management personnel in these modes. 5. The essence of Resolution No. 455 "On the classification of emergencies of a natural, man-made and ecological nature." 6. Geological hazards (earthquakes, landslides, landslides). 7. Epidemics, quarantine diseases, highly dangerous infectious diseases, and their prevention. 8. Chemically hazardous facilities, classification and accidents at them. 9. Accidents at facilities with a risk of fire and explosion. 10. Accidents at radiation hazardous facilities. 11. Accidents in hydraulic structures. Accidents in the energy and utility systems. 12. Causes, characteristics of man-made emergencies and the actions of the population in the areas of damage. 13. Causes, characteristics of man-made emergencies and the actions of the population in the areas of damage.
Media employed	**Presentations, videos, simulations, electronic resources and others**
Study and examination requirements and forms of examination	Oral Examination: For this exam, the student is given 20 minutes for preparation to answer the questions. The answers to the questions are graded as follows: 1. If detailed and complete answers are provided for all questions – 5 (Excellent)

	2. If answers are provided for all questions (some of them partially) or complete answers are given for 2/3 of the questions – 4 (Good) 3. If answers are given to some of the questions or partial answers are provided for 2/3 of the questions – 3 (Satisfactory) 4. If no answers are provided or the answers do not correspond to the questions – 2 (Unsatisfactory)
Reading list	1. I. Nigmatov, M. Tojiyev. Favqulodda vaziyatlar va fuqaro muhofazasi. Darslik. «Iqtisod-Moliya» nashriyoti. Toshkent, 2017-yil. 2. M. Tojiyev, I. Nigmatov, M. Ilhomov. Favqulodda vaziyatlardan muhofaza qilish. Darslik. Toshkent, 2002-yil. 3. H.E. Rustamova, M.D. Maqsudov, U.A. Yuymachev. Hayot faoliyati xavfsizligi va fuqaro muhofazasi. Darslik. Toshkent, 2019-yil.
Reviewers	Reviewer: Elmurodov N.S. - Karshi State University, senior lecturer of the Department of "Technological Education", PhD.
Confirmed place and time	Developed and approved by Karshi State University (Report №1 30.08.2024)

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QUANTUM MECHANICS

MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODULE REFERENCES

Module Name	Quantum Mechanics
Code (if applicable)	KM2704
Semesters Taught	7
Lecturer	Suyunov Laziz – Assistant Teacher of the Department of Theoretical and Experimental Physics Odilova Nilufar – Senior Teacher of the Department of Theoretical and Experimental Physics
Language of Instruction	Uzbek
Relation to Curriculum	elective
Type of Teaching, Contact Hours	Lecture, Practical Sessions
Total Workload	120 hours
Contact Hours	60 hours (Lecture – 30 hours, Practical – 30 hours)
Independent Study	60 hours
Credit Points	4
Recommended Prerequisites	Theoretical mechanics, Electrodynamics, Chemistry, Physics

Module objectives / intended learning outcome	Purpose of teaching the subject: The goal of the course is to provide students with a deep understanding of the laws of the microworld. The student must master the mathematical tools of non-relativistic quantum mechanics and many-particle quantum mechanics and be able to apply them in practice. Tasks of the subject: to know the difficulties of classical physics and the emergence of quantum mechanics; to master the mathematical apparatus of quantum mechanics, to ensure its practical application and, on this basis, to reveal the physical essence of phenomena subject to quantum laws, to have quantitative and qualitative ideas; to pay attention to the main fundamental concepts in non-relativistic quantum mechanics, including the wave function and uncertainty relations; to pay attention to important topics of non-relativistic quantum mechanics, such as the harmonic oscillator, the tunnel effect, the hydrogen atom, and the spin of the electron; to pay special attention to the specific laws arising from systems of identical particles in systems consisting of many particles; to know the Klein-Gordon and Dirac equations and the elements of relativistic quantum mechanics in relativistic quantum theory; to solve and analyze problems on quantum mechanics of a general level; It is necessary to be able to use mathematical methods to calculate quantum mechanical problems in different coordinate systems.

Content	Topics Topic 1: The subject, task and sources of quantum mechanics. Difficulties in classical physics. The emergence of quantum theory. Rayleigh-Jeans formula. Topic 2: Planck's idea. The phenomenon of the photoelectric effect. Compton effect. Topic 3: The ideas of Louis de Broglie. Group velocity. Diffraction of particles. Wave packet. Topic 4: The probabilistic nature of the de Broglie wave. The influence of experience on the state of a microparticle. The superposition principle. The uncertainty relation and its interpretation. Topic 5: Linear and self-adjoint operators. Eigenvalues and eigenfunctions of Hermitian operators, their physical meaning. Topic 6: The main properties of eigenfunctions. Average value of operators. Coordinate, momentum and angular momentum, operators, their eigenvalues and eigenfunctions. Topic 7: Hamiltonian operator and energy operator. Hamiltonian. Commutating operators. Topic 8: Schrödinger equation. Law of conservation of number of particles. Probability flow and probability density. Stationary states. Topic 9: Differentiation of operators with respect to time. Integrals of motion in quantum mechanics. Topic 10: One-dimensional motion. Motion of a particle in a rectangular potential field. Eigenvalues of energy. Topic 11: Motion of a particle in an infinitely deep potential field. Passage and return through a finite potential barrier. Coefficients of passage and return. Tunneling Effect Topic 12: Linear Harmonic Oscillator, Its Eigenvalues and Eigenfunctions. Energy of Harmonic Oscillator. Principal Quantum Number. Quasiclassical Approximation. Turning Points. Topic 13: General Theory of Motion in a Central Field, Separation of Variables. Schrödinger's Radial Equation Topic 14: Continuous and Discrete Energy Spectra. Motion in a Spherical Enclosure. Motion in a Coulomb Field. Hydrogen and Hydrogen-Like Atoms Topic 15: Energy Levels. Principal Quantum Number, Orbital Quantum Number and Magnetic Quantum Number Generalized Lager Polynomials Topic 16: Matrix Definition of Quantum Mechanics Topic 17: Various Representations of the State of Quantum Systems. Operators and Matrices. Continuous matrices. Unitary permutations. Oscillator representation in the energy concept Topic 18: Spin of electrons and other elementary particles. Stern-Gerlach experiment. Spin operators, their eigenvalues and eigenfunctions. Topic 19: Pauli matrices. Spin functions. Pauli equation. A simple form of the Zeeman effect.

	Topic 20: Total mechanical and magnetic moments of the electron. Symmetric and antisymmetric states. Bose particles and Fermi particles. Pauli principle. Topic 21: Total momentum. The principle of exact similarity of particles. Bosons and fermions Topic 22: Time-independent perturbation theory. Perturbations in the presence of spin. Separation of levels in the presence of double spin. Topic 23: Anharmonic oscillator. Separation of spectral lines in an electric field - Stark effect. Topic 24: Helium atom. Orthohelium and parahelium. Classification of atomic states. Quantum mechanics of the atom and the periodic system of elements. Topic 25: Zeeman effect in a complex state. Hydrogen molecule. Absorption and emission of light. Topic 26: Scattering amplitude and cross section. Born termination Topic 27: Scattering in different fields. Elastic scattering of charged particles with high speed from atoms. Topic 28: Atomic form factor. Rutherford formula. Partial wave method. Scattering phase. Topic 29: Klein-Gordon equation. Dirac equation. Diagonalization of matrices. Topic 30: Solution of Dirac equation for a freely moving particle. Origin of particle spin in Dirac theory. Practical Tasks 2. Difficulties of classical physics. Rayleigh-Jeans formula. Planck's idea. Light quanta. Quantum nature of photons and particle motion. Complex series 3. Bohr theory of the hydrogen atom. Louis de Broglie's ideas. Wave packet. Phase and group velocity. Special points. Laurent series. 4. Louis de Broglie Probabilistic nature of the wave. Superposition principle. Uncertainty relation. 5. Linear and self-adjoint operators. Eigenvalues and eigenfunctions of operators. Hermitian operators. 6. Propagation by eigenfunctions. Average values of operators. Coordinate, momentum, angular momentum operators, their eigenvalues and eigenfunctions. 7. Schrödinger's equation. Law of conservation of particle number. Probability flow and probability density. Stationary states. 8. Free motion of a particle. Motion of a particle in a one-dimensional infinitely deep rectangular potential field. Determination of eigenvalues of energy. 9. Linear harmonic oscillator, its eigenvalues and eigenfunctions. Energy of a harmonic oscillator. 10. Motion in a Coulomb field. Energy levels. Principal quantum number, orbital quantum number and magnetic quantum number. Generalized Lager polynomials.

	11. Operators and matrices. Schrödinger, Heisenberg and the concept of interactions. Oscillator representation in the energy concept. 12. The spin of electrons and other elementary particles. 13. Time-independent theory of evolution. 14. Helium atom. Quantum mechanics of the atom. Hydrogen molecule. 15. Scattering amplitude and cross section. Born approximation. 16. Partial wave method. Scattering phase 17. Klein-Gordon equation. Dirac equation.
Study and examination requirements and forms of examination	Written Examination: In this exam, the student is given 80 minutes to write answers to the questions. The answers to the questions are graded as follows: 1. If detailed and complete answers are written for all questions – 5 (Excellent) 2. If answers are provided to all questions (some of them partially) or complete answers are given for 2/3 of the questions – 4 (Good) 3. If answers are given to some of the questions or partial answers are provided for 2/3 of the questions – 3 (Satisfactory) 4. If no answers are provided or the answers do not match the questions – 2 (Unsatisfactory)
Media employed	Presentations, videos, electronic resources, and others
Reading list	1. Musaxanov M.M., Rahmatov A.S. Quantum mechanics, Tafakkur bo‘stoni, 2011. 2. Blokhinsev D.I. "Fundamentals of Quantum Mechanics", Moscow, 1983. 3. Landau L.D., Lifshits E.M. "Quantum mechanics". v. 3, M., 1974 4. Musaxanov M.M., Pazdzersky V.A., Faizullaev B.A. Relativistic quantum mechanics, 2003, University. 5. Grechko L.G. et al. Collection of problems in theoretical physics. Textbook. M., 1984. 6. A.S. Davydov, “Quantum mechanics”, M. “Nauka”, 1973 and later editions. 7. Messiah, “Quantum mechanics”, v.1 M. “Nauka”, 1978; v.2 M. “Nauka”, 1979 and later editions. 8. Z. Flugge, “Problems in quantum mechanics”, in 2-x t. M. “Mir”, 1974 and later editions.
Reviewers	A.Tashatov - Professor of the Department of "Theoretical and Experimental Physics" of KarSU
Confirmed place and time	Developed and approved by Karshi State University (Report №1 30.08.2024)

KARSHI
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KARSHI STATE UNIVERSITY

SOLID STATE PHYSICS
MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODULE REFERENCES

Module name:	Solid state physics
Code, if applicable:	QJF2704
Semesters in which the module is taught:	7
Lecturer:	PhD. G. Allayorova Karshi State University, Department of "Theoretical and Experimental Physics"
Language	Uzbek
Relation to curriculum:	1. elective subject
Type of teaching, contact hours:	Lecture
Workload:	4 ECTS (120hours): For the course load Classroom sessions lecture 30 hours practical training 30 hours Independent study: 60 hours
Credit points:	4
Recommended prerequisites:	Molecular Physics, Atomic Physics
Module objectives Intended learning outcome	The main goals and objectives of the science of solid-state physics. The subject of solid-state physics studies the composition of solids, their atomic electronic structure, and various physical properties. Solid-state physics is an independent branch of physics. Solid-state physics studies issues related to the formation of bodies with mechanical strength, heat resistance, electrical, magnetic, and optical properties. Matter in nature exists in the form of gases, liquids, solids, and plasma. These states are called states of matter and differ from each other in their physical properties. Solids differ from liquids and gases in that they retain their shape and do not flow. Unlike liquids and gases, a solid body has an elastic shape. This means that when the shape of a solid body changes under the influence of an external force, internal elastic forces appear in this body. These internal elastic forces tend to return the solid body to its original state. In other words, a solid body retains its shape and form. Solids are metals and dielectrics, without which electrical engineering is unthinkable. These are semiconductors, magnets, superconductors, and structural materials that form the basis of modern electrical engineering. Thus, the development of scientific and technical technology is largely based on the use of solids.
Contents	Lectures Topic 1: Chapter I. Introduction. Distribution of solids in nature. Purpose and objectives of the science of solid-state physics. General characteristics of solids.

	Topic 2. Chapter II. Structure of solids Crystal structure of matter. Types of symmetries in crystals. Spatial lattice of crystals. Types of chemical bonds in crystals. Defects in crystals. Amorphous state of matter. Topic 3: Chapter III. Thermodynamic properties of solids. Thermal behavior in solids. Concept of phonons. Thermal expansion of solids. Heat capacity of solids. Heat transfer phenomenon in solids. Phase transitions in solids. Melting and evaporation of solids Topic 4: Chapter IV. Electrical properties of solids. Classification of solids according to their electrical properties. Zone structure of solids. Electrical properties of solids according to zone theory. Electrical conductivity. Mobile charge carriers. Charge transport mechanisms of different crystal lattice types in solids. Topic 5: Chapter V. Magnetic properties of solids. The nature of magnetic phenomena in solids. Diamagnetism. Para and ferromagnetism. Magnetic domains. Magnetic susceptibility and magnetization of solids. Hysteresis phenomena. Topic 6: Chapter VI. Optical properties of solids. Propagation of electromagnetic waves in solids. Absorption and refraction of light. Optical constants. Recombination radiation. Stimulated emission. Lasers. "Solid State Physics". Suggested topics for practical sessions. 1. Syngoniums. Brave fences. 2. The nature of elastic forces in solids. 3. Crystal lattice vibrations. 4. Thermodynamics of defects in solids. 5. Energy zones in solids. Brillouin zones. 6. The distribution of charge carriers in bodies with different electrical conductivity mechanisms migration processes. 7. Polarization mechanisms of dielectrics. 8. Superconductivity. 9. Phase transitions in magnetics. 10. Solid-state lasers. Their operating principle and applications.
Media employed	**Presentations, videos, simulations, electronic resources and others**
Study and examination requirements and forms of examination	Oral Examination: For this exam, the student is given 20 minutes for preparation to answer the questions. The answers to the questions are graded as follows: 1. If detailed and complete answers are provided for all questions – 5 (Excellent)

	2. If answers are provided for all questions (some of them partially) or complete answers are given for 2/3 of the questions – 4 (Good) 3. If answers are given to some of the questions or partial answers are provided for 2/3 of the questions – 3 (Satisfactory) 4. If no answers are provided or the answers do not correspond to the questions – 2 (Unsatisfactory)
Reading list	1. Teshaboyev A., Zaynobiddinov S., Ermatov Sh. Solid state physics.-T., Moliya, 2001. 2. Aggiecroft N, Merlin N. Physics tverdogo tela, M, 1979. 3. Zayman Dj. Principa teorii tverdogo tela, M, 1974 4. Epifonov G.I. Physics tverdogo tela, M, 1977 5. Kitel Ch. Velenie v fiziku tverdogo tela, M, 1978 6. Flute Dj. Fizicheskiy svoystva kristallov iik opisanie s pomoshchyu tensorov i matrits, M, 1974 7. Chert Ch, Thomson R. Physics tverdogo tela, M, 1966 8. Frankel Ya.I. Vvedenie v teoriyu metallov, M, 1960 9. Zadachi po fizike tverdogo tela Pod. Red G.Dj. Goldsmid, M, Science, 1976
Reviewers	PhD. G. Allayorova Karshi State University, Department of "Theoretical and Experimental Physics" Sh. Jumanov - Karshi State University, Department of "Theoretical and Experimental Physics" Assoc. Prof.
Confirmed place and time	Developed and approved by Karshi State University (Report №1 30.08.2024)

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THERMODYNAMICS AND STATISTICAL PHYSICS
MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODULE REFERENCES

Module Name	Thermodynamics and statistical physics
Code (if applicable)	TSF 2704
Semesters Taught	7
Lecturer	Mallayev Amin – Teacher of the Department of Theoretical and Experimental Physics Nurmatova Dildora – Teacher of the Department of Theoretical and Experimental Physics
Language of Instruction	Uzbek
Relation to Curriculum	Elective
Type of Teaching, Contact Hours	Lecture, Practical Sessions
Total Workload	120 hours
Contact Hours	60 hours (Lecture – 30 hours, Practical – 30 hours)
Independent Study	60 hours
Credit Points	4
Recommended Prerequisites	Theoretical Mechanics, Electrodynamics, Chemistry, Physics
Module objectives / intended learning outcome	Purpose of teaching the subject: The main goal of thermodynamics and statistical physics is to ensure that students master the fundamentals, laws, and distribution functions of this science. Tasks of the subject: The main task of thermodynamics and statistical physics is to present it clearly, fluently, and simply, at the level of requirements for students' knowledge, training, and skills, and to introduce them to modern scientific work in this field.
Content	Topics Topic 1: Introduction. Basic concepts of statistical physics, thermodynamic quantities, general methods of statistical mechanics, ideal gas, Fermi and Bose distributions, non-ideal gases, phases and phase transitions, fluctuations, thermodynamics of non-equilibrium processes, kinetic theory. Topic 2: Basic concepts of statistical physics. The concept of a macroscopic system. Phase space. Image points. Statistical distribution. Statistical averaging. Liouville's theorem. The role of energy. Microcanonical distribution. Density matrix. Entropy. The law of increase of entropy. Topic 3: Thermodynamic quantities. Temperature. Adiabatic process. Pressure. Amount of work and heat. Thermodynamic potentials: heat function, free energy, etc. Relations connecting thermodynamic potentials and thermodynamic quantities. Dependence of thermodynamic quantities on the number of

	particles. Heat capacities. Joule-Thomson process. Maximum work. Le Châtelet principle. Nernst theorem. General laws of thermodynamics zeroth, first, second and third. Thermodynamics of dielectrics and magnets. Piezoelectric and piezomagnetic phenomena. Topic 4: General methods of statistical mechanics. Gibbs distribution (canonical distribution). Maxwell distribution. Free energy and statistical sum. Gibbs distribution for a rotating system. Gibbs distribution with a variable number of particles. Gibbs distribution and thermodynamics. Topic 5: Ideal gas. Bolsmann distribution. Free energy of an ideal gas. Equation of state of an ideal gas. Number of collisions. Ideal gas not in equilibrium. Gas with constant heat capacity. Law of equal distribution. Monatomic ideal gas. Diatomic ideal gas. Magnetism of gas. Topic 6: Fermi and Bose distributions. Fermi distribution. Bose distribution. Non-equilibrium Fermi and Bose gases. Fermi and Bose gases composed of elementary particles. Condensed electron gas. Magnetic properties of electron gas Landau diamagnetism and Pauli paramagnetism. Relativistic condensed electron gas. Condensed Bose gas. Bose-Einstein condensation. Black radiation. Heat capacity of a solid at low and high temperatures (Deby theory). Negative temperatures. Topic 7: Non-ideal gases. Van der Waals equation. Virial diffusion. Thermodynamics of classical plasma. Topic 8: Phases and phase transitions. Phase equilibrium condition. Phase rule in multicomponent systems. Phase transitions of the first kind. Clapeyron-Clausius equation. Critical point. Triple point. Phase transitions of the second kind Ehrenfest equations. Phase transitions of the second kind Landau theory. Fundamentals of the Ginzburg-Landau theory of superconductivity. Osmotic pressure. Chemical reactions. Topic 9: Fluctuations. Gaussian distribution. Fluctuations of basic thermodynamic quantities. Fluctuation in a photon gas. Molecular scattering of light. Topic 10: Thermodynamics of non-equilibrium processes. Local equilibrium. Conservation laws. Currents and thermodynamic forces. Linear laws. Onsager's reciprocity. Topic 11: Kinetic theory. Bolsmann kinetic equation. H-theorem. Free path. Number of collisions. Hydrodynamic equations. Kinetic equation for a weakly inhomogeneous gas. Thermal conductivity of a gas. Electrical conductivity of a metal. Fokker-Planck equation. Practical Tasks 1. Liouville's theorem. Number of quantum states and volume of phase space. Elementary volume Binomial distribution. Poisson distribution. Gaussian distribution. 2. Method of determinants. Relationships between thermodynamic quantities. 3. Clausius inequality. Thermodynamic quantities and Gibbs distribution.

	4. Statistical sum and statistical integral (for various physical systems). 5. Bolsmann distribution. Maxwell distribution. 6. Work done in thermodynamic processes. 7. Heat capacities of diatomic and triatomic gases 8. Blackbody radiation 9. Degenerate electron gas. Fermi gas 10. Heat capacity of a solid 11. Van der Waals gas 12. Phase transitions 13. Thermodynamic fluctuations 14. Kinetic equation
Study and examination requirements and forms of examination	Written Examination: In this exam, the student is given 80 minutes to write answers to the questions. The answers to the questions are graded as follows: 1. If detailed and complete answers are written for all questions – 5 (Excellent) 2. If answers are provided to all questions (some of them partially) or complete answers are given for 2/3 of the questions – 4 (Good) 3. If answers are given to some of the questions or partial answers are provided for 2/3 of the questions – 3 (Satisfactory) 4. If no answers are provided or the answers do not match the questions – 2 (Unsatisfactory).
Media employed	Presentations, videos, simulations, electronic resources, and others Presentations, videos, simulations, electronic resources, and others
Reading list	1. Levich V.G. et al. Course of Theoretical Physics. Vol. 1, 2. Moscow, Nauka, 1967-1971. 2. Landau L.D., Lifshitz E.M. Statistical Physics. Moscow, Nauka, 1976. 3. Abdumalikov AA, R. Mamatkulov, B. Mamatkulov Statistical physics, thermodynamics and kinetics. Textbook. National University of Uzbekistan named after Mirzo Ulugbek. 2003. 4. Rumer Yu.B., Ryvkin M.S. Thermodynamics, statistical physics and kinetics. Moscow, 1976.
Reviewers	A.Tashatov - Professor of the Department of Theoretical and Experimental Physics, KarSU D.Normurodov - Head of the Department of Theoretical and Experimental Physics, KarSU
Confirmed place and time	Developed and approved by Karshi State University (Report №1 30.08.2024)

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SELECTED CHAPTERS OF THEORETICAL PHYSICS
MODULE HANDBOOK

Field of knowledge:	500000 - Natural sciences, mathematics and statistics
Field of education:	530000 - Physical sciences
Field of education:	60530500 - Physics

MODULE REFERENCES

Module name:	Selected chapters of theoretical physics
Code, if applicable:	NFTB2704
Semesters in which the module is taught:	7
Lecturer:	D.Normurodov,. Karshi State University, Head of the Department of Theoretical and Experimental Physics, Suyunov L.A ,. Karshi State University, of Theoretical and Experimental Physics, Teacher
Language	Uzbek
Relation to curriculum:	1. elective subject
Type of teaching, contact hours:	Lecture
Workload:	4 ECTS (120hours): For the course load Classroom sessions lecture 30 hours practical training 30 hours Independent study: 60 hours
Credit points:	4
Recommended prerequisites:	General physics course
Module objectives Intended learning outcome	The purpose of teaching science - In today's globalization and integration process, further improving science is of great importance. The teaching of the course "Selected Chapters of Theoretical Physics" is of great importance in preparing physicists-masters as qualified specialists at the Faculty of Physics. The main purpose of this course is to help master students master the topics of the courses "Theoretical Mechanics", "Electrodynamics", "Quantum Mechanics" and "Thermodynamics and Statistical Physics" that are not included in the undergraduate course of the theoretical physics course, and to provide students entering the master's program at the Faculty of Physics with a deeper understanding of the topics that form the foundations of theoretical physics. The task of the subject is that as a result of mastering the course, undergraduates should master the mathematical apparatus of theoretical physics, become familiar with the basic methods used in theoretical physics, and be able to apply them in practice. Graduates of the course will be able to find eigenvectors and eigenvalues of matrices and diagonalize matrices, find analytical properties of the solution of a differential equation depending on its special points, apply the methods of increasing and stationary phase, and gain skills and experience in using group theory methods to elucidate the symmetric properties of quantum systems.
Contents	Lectures

	1. Introduction to the science of selected chapters of theoretical physics 2. Equations of motion. Lagrange function. Euler Lagrange equation. 3. Integrating equations of motion. One-dimensional equation of motion. Two bodies Problem. Central field scattering theory 4. Small oscillations. One-dimensional systems. External force constant and periodic the case 5. Vibrations in multidimensional systems. Vibrations of molecules. Boundary problems in combined cases 7. A moving pendulum 6. Nonlinear oscillations. Anharmonic oscillator 8. Rigid body motion. Center of inertia and tensor. Euler angles 9. Mathematical methods of theoretical physics and their application in theoretical physics. 4- 10. Differential equations, symmetries in physical systems Definition of dimensional vectors and tensors, operations on them. Principle of relativity. 11. Lagrangian function of a free material point. 12. Principle of relativity. Interval in the theory of relativity. 13. Time in the theory of relativity. Lorentz displacements. 14. Decay and elastic collision of relativistic particles. Polarization of the medium in an electric field movement of charges. 15. Charge and particles in the theory of relativity. In electric and magnetic fields 16. Law of conservation of charge. 17. Electrostatic field. Coulomb's law. 18. Magnetic field of currents.

	19. Electromagnetic wave scale. The main means of generating electromagnetic waves styles. 20. Dipole radiation. Radiation reaction. 21. Dispersion of light. Cherenkov-Vavilov radiation. 22. Fields. Fundamentals of theoretical mechanics. 23. Mechanics of Particle Systems 24. Basic concepts of statistical physics. Statistical distribution 25. Canonical Parmalism. Rauz function and cyclic coordinates. Canonical permutations and Poisson brackets 26. Integral invariants. Integral invariant in spatial space. Liouville theorem. Hamilton Jacobi equation 27. Fluid mechanics. Hydrostatics. Inclined flow 28. Statistical and phenomenological thermodynamics. Change in internal energy in a quasi-statistical process 29. Space transitions of systems with a variable number of particles 30. One-dimensional nonlinear Schrödinger equations Practical training 1. Basic formulas of vector and tensor calculus 2. Special time, Lorentz permutations 3. Substitution of velocities and angles in the theory of relativity 4. Logarithmic function of a free material point 5. Decay of relativistic particles 6. Momentum and energy of particles in the theory of relativity 7. Lorentz transformations for electromagnetic field magnitudes

	8. Motion of charge in electric and magnetic fields 9. Law of conservation of charge 10. Equations for field potentials 11. The first and second pairs of Maxwell-Lawrence equations 12. Electrostatic field 13. Coulomb's law 14. Dipole moment 15. Magnetic moment 16. Wave equation. Polarization of a wave 17. Monochromatic electromagnetic wave 18. Dipole radiation. Radiation reaction 19. Natural width of the radiation line 20. Scattering of electromagnetic waves by charges 21. Radiation of relativistic particles 22. Maxwell and the coupling equations 23. Boundary conditions 24. Methods for solving electrostatic problems 25. DC linear conductors 26. Magnetic field of stationary currents 27. Energy of quasi-stationary currents 28. Electromagnetic waves in homogeneous and isotropic media 29. Dielectric absorption dispersion 30. Generation of the second harmonic
Media employed	Presentations, videos, simulations, electronic resources

Study and examination requirements and forms of examination	Oral Examination: For this exam, the student is given 20 minutes for preparation to answer the questions. The answers to the questions are graded as follows: 1. If detailed and complete answers are provided for all questions – 5 (Excellent) 2. If answers are provided for all questions (some of them partially) or complete answers are given for 2/3 of the questions – 4 (Good) 3. If answers are given to some of the questions or partial answers are provided for 2/3 of the questions – 3 (Satisfactory) 4. If no answers are provided or the answers do not correspond to the questions – 2 (Unsatisfactory)
Reading list	1. A.A. Abdumalikov. Theoretical Physics Course. Volume II. Tashkent-2011. 343 p. 2. Faizullaev B. Theoretical mechanics. Tashkent, 2011. 3. A.A. Abdumalikov, Electrodynamics, "Cholpon", 2011, 343p. 4. Landau L.D., Lifshitz E.M. Mechanics. M., Nauka, 1988, 208 p. 5. Karimkhojaev A., Latipov A. Sh. In the problems of theoretical mechanics. Study Manual. Tashkent: University. 1992. 84 pages. 6. Tom W. B. Kibble, Frank H. Berkshire, Classical mechanics, Imperial College Press, 2004. 7. Khoshimov G.K. et al. Fundamentals of Quantum Mechanics. Tashkent, 1995. 8. Abdumalikov A.A., Mamatkulov R., Mamatkulov B. Statistical physics, thermodynamics and kinetics. Do not use. National University of Uzbekistan named after Mirzo Ulugbek. 2003. 9. Mamatkulov R. And others. Thermodynamics, statistical physics and kinetics a set of issues on this. 1-2 parts. Tashkent, 1993. 10. A.V. Umarov, U. Abdurakhmanov. Mechanics. Methodological manual. Tashkent. 2011. 45 pages.
Reviewers	Reviewers: D.Normurodov,. Karshi State University, Head of the Department of Theoretical and Experimental Physics, Suyunov L.A ,. Karshi State University, of Theoretical and Experimental Physics, Teacher
Confirmed place and time	Developed and approved by Karshi State University (Report №1 30.08.2024)