THE REPUBLIC OF UZBEKISTAN
MINISTRY OF HIGHER AND SECONDARY SPECIAL EDUCATION
CHIRCHIK STATE UNIVERSITY OF PEDAGOGICS

"I APPROVE"
Vice-Rector for Academic Affairs
I.O.Khaydarov
"__" _____ 2022

GENERAL PHYSICS (MOLECULAR PHYSICS)

CURRICULUM (SYLLABUS)

Field of knowledge:	100000 – Education
The field of education:	110000 - Education
Course of Study:	60110700 – Physics and Astronomy education

Chirchik-2022

The working curriculum (syllabus) of the board of Chirchik State Pedagogical University, approved by report, no___ ,on "___" _____in 2022

Developers:	
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The working curriculum (syllabus) was considered and recommended for approval at the meeting department of "Physics'', faculty of Physics and Chemistry, Chirchik State Pedagogical University,no ___, on "___" _____ in 2022.

The head of the department: **A.M.Tillaboyev**

This working curriculum (syllabus) of the subject was approved by the meeting council of department "Physics'', facuty of Physics and Chemistry, Chirchik State Pedagogical University on " ___ " of _____in 2022.

Dean of the faculty: **I.G.Tursunov**

Curriculum (SYLLABUS)

Faculty of Physics and Chemistry
60110700 – Physics and Astronomy education

General information		
Subject name: General Physics (molecular physics)		
Science code: Phys 1136	**Loan amount: 6**	**Semester: 2**
Department name: Physics		
Science teacher:		
Email: habibabdullayev04@gmail.com		
Subject type: Compulsory		
Form of education:	Day time	
Evaluation form:	Exam	
The language of science:	Uzbek	

Summary of science

The content of general physics (molecular physics) provides students with phenomenological knowledge, skills and competences necessary for a future physics teacher to understand the properties of matter and the physical properties of macroscopic systems in various states of aggregate (for individual bodies and fields). they form.

Educational results:

Students who completed the course:

- Demonstrates a thorough understanding of general physics (molecular physics) concepts and principles;
- Deeply analyzes the essence of general physics (molecular physics) methods;
- •He knows how to use the tools of general physics (molecular physics) suitable for solving problems in professional activity;

Competencies to be acquired as a result of the course (KK-1)

- Will acquire knowledge, skills and abilities in the fields of general physics in the future professional activities.

Content of science	
Form of classes: Lecture	
M1	Introduction to general physics (molecular physics). Fundamentals of molecular-kinetic theory. The fundamental equation of molecular kinetic theory. Two methods of studying the structure of matter. Interaction of molecules. Velocities of molecules
M2	An ideal gas. Gas pressure. Temperature. Measurement of state parameters. Ideal gas equation of state. Ideal gas laws. Brownian motion. Barometric formula. The Perren Experience. Bolsman's law. The concept of probability.
M3	Understanding distribution. Distribution function. Speed distribution of molecules. Maxwell distribution. Average speed of molecules. Probably the greatest speed. Maxwell's formula for relative velocities. Experimental verification of the law of distribution. Internal energy of an ideal gas. Amount of heat.
M4	Mechanical equivalent of heat. The first law of thermodynamics. Heat capacity. Heat capacity of monoatomic gases. Heat capacity of gases and degrees of freedom of molecules. Heat capacity of diatomic and polyatomic gases. Measurement of heat quantity and heat capacity.
M5	Work done in an isothermal process. Adiabatic process. Work done in an adiabatic process. Polytropic process. Gas expansion in space. Equilibrium states. Reversible and irreversible processes. Quasi-static processes. Irreversibility and probability. The conversion of heat into mechanical work. Carnot cycle. Refrigeration machines. Molecular movement and displacement events. Average number of collisions. Average free running path. Effective particle cross section and probability. Determining the path of free running in the experiment. Diffusion phenomenon. Nonstationary diffusion. Stationary diffusion. Calculation of the diffusion coefficient. Mutual diffusion. Thermal diffusion
M6	Phenomenon of heat conduction in gases. Non-stationary heat conduction. Stationary thermal conductivity. Calculation of heat transfer coefficient. Viscosity of gases (internal friction). Viscosity coefficient and its measurement. The relationship between displacement coefficients.
	Intermediate control
M7	The concept of entropy. Entropy in reversible processes. Entropy in irreversible processes. The second law of thermodynamics. Entropy and probability. Entropy and chaos. Maxwell demon. The third law of thermodynamics. Deviation of gas properties from ideality. Van der Waals equation. Van der Waals isotherm. Critical temperature and critical state. The given van der Waals equation.
M8	Volumetric properties of liquids. Heat capacity of liquids. Migration phenomena in liquids. Surface tension force. Dependence of surface tension

	coefficient on temperature. Methods of measuring the surface tension coefficient. Evaporation and boiling of liquids. Crystal lattice. Crystal defects. Mechanical properties of solids. Elastic deformation and thermal expansion. Dislocation in crystals.
M9	Go to hard state. Triple point. First and second order phase transitions. Thermal properties of solids. Diffusion in solids. Heat transfer in low pressure gases. Molecular flow. Diffusion in vacuum. Measuring low pressures. Liquefaction of gases. Joule-Thomson effect. Methods of liquefaction of gases. Properties of liquefied gases. Liquid helium.
Form of training: practical training (A)	
A1	The fundamental equation of molecular kinetic theory. Velocities of molecules
A2	An ideal gas. Gas pressure.
A3	Temperature. Measurement of state parameters.
A4	Ideal gas laws. Brownian motion.
A5	Barometric formula. The Perren Experience. Bolsman's law.
A6	Internal energy. Heat capacity of gases
A7	Maxwell distribution.
A8	Path of free movement of gas molecules. The average number of collisions of gas molecules
A9	Ideal gas equation of state.
A10	Diffusion in gases. Migration phenomena in gases
A11	Thermal conductivity. The first law of thermodynamics
A12	The work done by the gas. Work done in an isothermal process
A13	Work done in an adiabatic process
	Current control – 1
A14	Polytropic processes. Heat machine
A15	Entropy. Van der Waals equation. Critical situation
A16	The given Van der Vaals equation. saturated steam
A17	Surface tension force
A18	Melting and solidification Osmotic pressure. Thermal conductivity of solid bodies. Thermal expansion of solids.

Teaching and learning methods.

The module is organized through lectures and practical classroom training, as well as independent educational activities of students. Lectures provide theoretical information necessary for analyzing the topics of the general physics (molecular physics) course. In practical classroom sessions, general physics (molecular physics) course problems (examples and problems) are presented and students are given the opportunity to practice applying the necessary physical methods and techniques to solve them. In independent educational activities, students should study the topics in depth and analyze the topics using literature and scientific journals and sources.

Type of training	A dedicated hour
Lecture	18
Practical training	36
Independent education	90
Total hours of study and teaching of students	180

Criteria for evaluation and control of student knowledge in science

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

- Midterm control is an important stage of assessment by the professor-teacher of the student's knowledge and practical skills acquired in the first part of the module, and is an indicator of future mastery of this subject. Assessment of students' knowledge in mid-term control is carried out through oral question-and-answer and written work. If the student does not pass the mid-term examination, he will be given the opportunity to retake it 2 more times. 20 percent of the total evaluation.
- Assessment of independent education - it is carried out by the students' performance of practical projects in a collective order and individually. Each student is given one team project and two individual projects. The student studies and conducts research on the given issue, understanding the goals and objectives of the assigned project. Analyzes the obtained results, prepares presentations with conclusions and defends them. The number, subject, content of the projects, methods of implementation and deadlines are fully disclosed in the working science program. 50 percent of the total evaluation.
- Final control is a summative stage of evaluation of knowledge and practical skills of the student by the professor-teacher. Final control is conducted in the form of a written work. 30 percent of the total evaluation.

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

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

A student must not engage in any activity that may lead to academic misconduct. For example, plagiarism, collusion, falsification of results, violations during the examination process, i.e. use of notes and handouts, telephone and other

means of communication, communication with others inside or outside the examination room are prohibited. Students who are guilty of this will be removed from the control or examination process, and their grade will be zero.

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

	Basic literature
1.	Jurayev U.B. "MOLEKULAR FIZIKA". Voris-Nashriyoti. 2015
2.	B.F.Izbosarov, I.R.Kamolov. "Molekulyar fizika va termodinamika asoslari". Toshkent – 2007.
3.	M.O'lmasova. "Mexanika, molekulyar fizika va issiqlik". T., «ЎҚИТУВЧИ» 1997.
4.	Абдурахманов Қ., Эгамов Ў. "ФИЗИКА КУРСИ". Тошкент-2010 й.
5.	Karabayev M. A."Molekulyar fizika"Toshkent"Universitet"- 2014
6.	N. A. Sultanov. "Fizika kursi". Farg'ona – 2011
	Recommended additional reading
1.	J.A.Toshxonova va b. Fizikadan praktikum. Mexanika va molekulyar fizika. Toshkent, "O'qituvchi", 2006.
2.	М.Исмоилов, П.Хабибуллаев, М.Халиулин "Физика курси" Тошкент, "Ўзбекистон", 2000.
3.	В.С.Волкенштейн. Сборник задач по общему курсу физика. Москва, "Наука", 1992.
4.	Детлаф А.А., Яворский Б.М.. Курс физики. I-III том. Москва, "Высшая школа", 1994.

Internet addresses

1. www.cspi.uz
2. www.edu.uz
3. http://ziyonet.uz
4. www.pedagog.uz
5. http://qr.natlib.uz/
6. https://www.kitob.uz/