MINISTRY OF EDUCATION AND SCIENCE
REPUBLIC OF KAZAKHSTAN

SATBAYEV UNIVERSITY

I affirm
Head of Department
"Engineering Physics"

_____

Beisenov R.E.
August 12, 2019

SILLABUS

CODE PHY00120 "Physics"
(Introduction to Physics)
3 credits (1/1/1)

Semester: fall, 2019 -2020 academic year year

Almaty, 2019

Satpayev University
Institute of Metallurgy and Industrial Engineering
Department of Engineering Physics

1. Information about the teachers:

Lecturer Lesbayev A.
Office hours, cabinet
Email – i_dos_90@mail.ru

Teacher (practical lessons) Office hours, cabinet Email -	Teacher (laboratory classes) Office hours, cabinet Email -

1. **Course objective:**

The main purpose of teaching the discipline "Introduction to Physics" is:

- in the formation of students' ideas about the modern physical picture of the world and the scientific worldview;

- in the formation of students' knowledge and skills to use fundamental laws, theories of classical and modern physics;

- in the formation of students' skills and abilities to solve typical tasks of the discipline (theoretical and practical training problems) from various fields of physics as the basis of the ability to solve professional problems.

2. Course Description:

1. The discipline "Introduction to Physics" forms the basis of the general theoretical preparation of students and plays an important role for the further successful mastering of the courses: Physics I and Physics II to create the fundamental base of engineering and technical activity of graduates of higher technical schools.

2. The course "Introduction to Physics" includes sections: physical foundations of mechanics, fundamentals of molecular physics and thermodynamics, electricity and magnetism, mechanical and electromagnetic vibrations, optics, the quantum nature of radiation, atomic theory.

✓ **Prerequisites:** Physics, Mathematics - School Course

3. **Post requisites:**
   PHY 1112 Physics I

4. **References:**

Basic literature	Further literature
[1] Трофимова Т.И. Курс физики: Учеб. пособие для вузов. М.: Академия, 2004.- 560с.	[7] Сулеева Л.Б. Электронный учебник. Физика, часть 1" Механика. Молекулярная физика и термодинамика" Изд. КазНТУ, 2006.
[2] Трофимова Т.И., Павлова З.Г. Сборник задач по курсу физики с решениями: Учебное пособие для вузов. Изд. 2– е, испр./ 3– е – 591с. М: Высшая Школа, 2002.	[8] Трофимова Т.И. Физика: 500 основных законов и формул: Справочник для студентов вузов. Изд. 3– е – 63 с. М: Высшая Школа, 1999.
[3] Савельев И.В. Курс общей физики: Учеб. пособие для втузов: В 5 кн.: Кн.1:	[9] Волькенштейн В.С. Сборник задач по общему курсу физики для студентов технических вузов Изд. доп., перераб. -

Механика. Молекулярная физика. М.: Астрель, 2005. – 312 с.	327 с. {Специалист} СПб: СпецЛит, 2002.
[4] Грабовский Р.И. Курс физики: Учебник для вузов. Изд. 6-е - 608 с. {Учебники для вузов: Специальная литература}, СПб: Лань, 2002.	[10] Чертов А., Воробьев А. Задачник по физике. – М.: Высшая школа, 1981.
[5] Детлаф А.А., Яворский Б.М. Курс физики: Учебное пособие для втузов. Изд. 6-е, испр. - 607 с. М: Высшая Школа, 2003.	
[6] Савельев И.В. Курс общей физики: Учеб. пособие для втузов: В 5 кн.: Кн. 2: Электричество и магнетизм. М.: АСТ: Астрель, 2005. – 336 с.	

5. Calendar - thematic plan:

A week	Lecture topic	Theme of practical work	Topic laboratory work	Link To literature	The task	Deadline
1 -2	Mechanics. Kinematics. Mechanical motion as the simplest form of motion of matter. Reference system. Kinematic description of the motion of a material point. Trajectory, path length, displacement vector. Speed. Acceleration and its components. Kinematics of rotational motion.	Kinematics of translational and rotational motion.	Exercise 1: Mathematical processing of measurement results of physical quantities. Atwood Machine.	[1], [2], [9]	Kinematics.	
3	The dynamics of the material point. Force. Weight. Newton's laws. Types of forces in mechanics. Elastic forces, friction forces. The law of gravity.	Dynamics of translational motion.	Task 2: Kinematics of translational and rotational motion.	[1], [2], [9]	The dynamics of the material point	Surrender of Task 1.
4	Laws of conservation. The law of conservation of momentum. Energy, work, power. The law of	Laws of conservation.	Task 3: The dynamics of the material point.	[1], [2], [9]	SIW-1	Completion of Task 2.

	conservation of mechanical energy.					
5	Mechanical vibrations. Mechanical harmonic vibrations and their characteristics. Harmonic Oscillator Mathematical, spring and physical pendulums.	Examination number 1	Task 4: Laws of conservation.	[1], [2], [9]	Mechanical harmonic vibrations	To hand over SIW-1
6	Molecular physics. Molecular-kinetic theory of an ideal gas. The basic equation of MKT. Gas laws. The equation of state of an ideal gas. Isoprocesses.	Mechanical harmonic vibrations.	Task 5: Mechanical harmonic vibrations.	[1], [2], [9]	Molecular physics.	To hand over Quests - 4
7	The first law of thermodynamics. The internal energy of the system. Work and warmth. Application of the first law of thermodynamics to isoprocesses in an ideal gas.	The basic equation of MKT. Gas laws. The equation of state of an ideal gas. Isoprocesses.	Task 6: Molecular physics.	[1], [2], [9]	The first law of thermodyna mics.	To hand over SIW-2
8	Electrostatic field. Coulomb's Law. Electrostatic field strength. The work done when moving a charge in an electrostatic field. The potential of the field.	Milestone control №1	Milestone occupation.	[1], [2], [9]	Electrostat field.	Summa rizing.
		First Interim Certification			Midterm	
9	The electric field in the conductors. Power consumption. Capacitors The energy of a charged capacitor. Capacitor Connections.	Coulomb's Law. Electrostatic field strength. The work done when moving a charge in an electrostatic field.	Task 7: Study of electrostatic fields	[1], [2], [9]	The electric field in the conductors.	
10	D.C. Strength and current density. The laws of Ohm and	D.C. Strength and current density. The laws	Task 8: Coulomb's Law. Electrostatic field strength. The	[1], [2], [9]	D.C. Preparation for	To hand over SIW-3, Task 7

	Joule - Lenz. Conductor Connections.	of Ohm and Joule - Lenz. Conductor Connections.	work done when moving a charge in an electrostatic field.		control work number 2.	
11	The power of Lorentz. Ampere Force. Magnetic flux.	Examination number 2	Task 9: The potential of the field. Power consumption. Capacitors The energy of a charged capacitor. Capacitor Connections	[1], [2], [9]	Magnetic field in a vacuum.	Сдача Задани я 8
12	Elements of geometric optics. The laws of geometric optics. The phenomenon of full reflection.	Strength and current density. The laws of Ohm and Joule - Lenz. Conductor Connections.	Task 10: Strength and current density. The laws of Ohm and Joule - Lenz. Conductor Connections.	[1], [2], [9]	The laws of geometric optics.	Сдача Задани я 9
13	Light interference.	The power of Lorentz. Ampere Force. Magnetic flux.	Task 11: The power of Lorentz. Ampere Force. Magnetic flux.	[1], [2], [9]	Preparation for the midterm control No. 2.	Сдача CPC 4
14	Diffraction of light.	Milestone control number 2.	Task12: The laws of geometric optics	[1], [2], [9]	Endterm	Сдача CPC 4
15	The quantum nature of radiation. The laws of radiation of an absolutely black body. Quantum hypothesis. Planck formula. Photo effect.	Discussion of midterm control results.	Milestone occupation.	[1], [2], [9]		Подвед ение итогов
		Second final certification				
		Exam				

В календарно – тематическом календаре возможны изменения с учетом праздничных дней

Types of control		Score	
		I cert	I I cert
Lecture activity		2	2
Accomplishment of control tasks (I att.: KR 1 II att .: KR 2)		6	6
Laboratory tasks:			
I cert.	Exercise 1	4	

II cert.	Exercise - 2, 4	6	
	Exercise - 7.		4
	Exercise – 8, 9		6
Midterm		8	-
Student's independent work		4	4
Endterm		-	8
Total		30	30
Final exam		40	
Total		**100**	

6. Tasks and brief guidelines for their implementation:

☐ Independent student work (CDS):

Student's independent work 1. Kinematics of translational and rotational motion. The dynamics of the material point.

Student's independent work 2. Mechanical harmonic vibrations. Laws of conservation.

Student's independent work 3. Electrostatic field.

Student's independent work 4. Magnetic field in a vacuum. The laws of geometric optics.

The student's independent work (semester assignments) provides for the implementation of 4 assignments per semester covering the completed material of the discipline. Assignments must be completed in writing and delivered as completed according to deadlines. Based on your written work will

the average score is displayed. Timeliness of completion and delivery of work will be taken into account.

☐ Collaboration with the teacher (SRSP):

Practical assignments (SRSP) are an independent solution to problems on the topic under the guidance of a teacher. Assignments will be presented during practical exercises. They are mandatory for all students to do as an ongoing independent work. When preparing your homework, you should use the knowledge gained from textbooks and classes. Based on your work, an average rating will be displayed. Timeliness of completion and delivery of tasks will be taken into account.

☐ Milestone control:

Midterm control (1st intermediate certification) and Endterm (2nd final certification) is carried out in writing and covers the practical solution of at least 5 specific tasks of varying difficulty, summarizes the course material for the passed period.

☐ Exam:

The final exam covers and summarizes the entire course material. The exam is conducted in writing and covers the practical solution of 7 specific tasks of varying difficulty. Exam duration 2 academic hours. There will be no additional assignments for the exam to increase the grade if it is low. There will also be no retake.

7. Criteria for assessing practical, control, milestones, CDS and examination papers:

Оценка по буквенной системе	Цифровой эквивалент оценки	Критерий
A	**95 – 100**	A complete correct solution is given, including the following points:

		1) Correctly written formulas expressing physical laws, the application of which is necessary to solve the problem in the selected way; 2) Drawings and graphs are given (if necessary); 1) 3) The necessary mathematical transformations and calculations are carried out, leading to the correct numerical answer, and the answer is presented (indicating the units of measurement). In this case, a solution "in parts" (with intermediate calculations) is allowed.
A -	90 – 94	The solution contains all of the above paragraphs 1,2,3, but the answer is presented with Incorrect units or units are indicated partially or not at all.
B +	85 – 89	The decision contains all of the above paragraphs 1.2. The necessary mathematical transformations and calculations were carried out, but a mistake was made in the mathematical calculation.
B	80 – 84	The decision contains all of the above paragraphs 1.2. The necessary mathematical transformations and calculations were carried out, but not completed.
B -	75 – 79	The decision contains all of the above paragraphs 1.2. But the transformations leading to the answer are not presented, but the correct numerical answer or the answer in general is written down. Or the solution contains an error in the necessary mathematical transformations and is not brought to a numerical answer.
C +	70 – 74	Only the provisions and formulas expressing the physical laws are presented, the application of which is necessary for solving the problem, without any transformations with their use aimed at solving the problem and the answer.
C	65 – 69	Arguments are given indicating physical phenomena and laws, but an incorrect or incomplete answer is given.
C -	60 – 64	Arguments are given indicating physical phenomena and laws, but no answer is given.
D +	55 – 59	Some correct necessary formulas or theoretical calculations, or laws are given. A partial solution is given.
D -	50 – 54	Some correct necessary formulas or theoretical calculations, or laws are given. A partial solution is given.
FX	25 – 49	The task is not completed. Or done wrong.
F	0 - 24	The task is not completed. Or done wrong.

Students who have received an "F" mark ("unsatisfactory") in a particular discipline are required to register and retrain for such a discipline on a paid basis in the following academic periods.

If the final control (exam) is assessed as "unsatisfactory" corresponding to "FX" points, the student has the opportunity to retake the final control (exam) once during the Incomplete exams without re-passing the discipline.

7. Late submission policy:

The student must come prepared for lecture, practical classes. Timely, complete implementation of all types of work (practical and independent) is required. The student should not be late and miss classes, be punctual and compulsory. It is planned to reduce the maximum score by 10% for untimely completed work. If you are forced to skip the midterm exam for good reason, you must notify the instructor before class. After writing an intermediate exam by all students and analyzing it in the lesson, the exam cannot be passed. Skipping an exam for a disrespectful reason deprives you of the right to pass it.

8. Class attendance policy:

Activity at lectures and practical classes is mandatory and is one of the components of your final score / mark. Many theoretical questions supporting the lecture material will be presented only in lectures. Therefore, skipping classes can affect your performance and grades. Every two delays and / or departures before the end of the lesson for any reason will be considered as one missed lesson. However, attending classes in itself does not mean an increase in points. Your constant active participation in the classes is necessary. A mandatory requirement of the course is preparation for each lesson. It is necessary to look through the indicated sections of the textbook and additional material not only in preparation for practical exercises, but also before attending the corresponding lecture. Such preparation will facilitate your perception of new material and will contribute to your active acquisition of knowledge within the walls of the university.

9. The policy of academic conduct and ethics:

As part of the discipline training, any corruption in any form is unacceptable. The organizer of such actions (teacher, students or third parties on their behalf) are fully responsible for violation of the laws of the Republic of Kazakhstan.

Be tolerant, respect the opinions of others. Formulate objections in the correct form. Plagiarism and other forms of dishonest work are unacceptable. It is unacceptable prompting and cheating during exams, passing the exam for another student. A student found to falsify any course information will receive a final grade of "F".

Considered at a meeting of the Department of Engineering Physics, protocol No. 1 dated August 12, 2019.

Compiled by: Lesbayev A.