KAZAKH KBTU BRITISH
TECHNICAL
UNIVERSITY

Kazakh-British Tecnical University
General Education Faculty

GEF Physics Sector

APPROVED
Dean of General Education Faculty
Beissenov R.E.
«06» 04 2022

SYLLABUS

Discipline: Physics-1
Number of Credits: 3
Semester: Spring 2022
Syllabus compiler: Voronkov V.V., Candidate of Phys.– Math. Sciences

Information on the Instructor	Time and Place		Contact Information	
	Class Room & Hours	Office Room & Hours (TSIS)	Tel:	E-mail:
Yevgeniya Kedruk				y.kedruk@kbtu.kz

1. Introduction and Course Description

Prerequisites: Calculus 1-2.

Brief Description: Physics-1 is the first part of the 2-semester course including the basic topics of General Physics. During this semester the main focus will be on laws and the main principles of Mechanics, Molecular Physics, Thermodynamics, Electricity and Magnetism. The course reflects current state of modern physics and combines both macroscopic and microscopic approaches.

2. Course Objectives and Intended Learning Outcomes

The objective of the course for the student is to achieve good understanding of basic concepts and to be able to apply these concepts to a variety of physical situations. Students will acquire skills in

scientific methods, critical reasoning and problem solving. It is important for students to develop skills for experimental research and computer simulations of physical phenomena.

3. Learning Support Materials

Compulsory

1. P. Fishbane, S. Gasiorowicz, S. Thornton. Physics for Scientists and Engineers (extended version) Publisher: Prentice Hall, Inc.,2005
2. Lectures on Physics. Summary. Compiled by F.F. Umarov/Almaty:KBTU, 2008.
3. Савельев И.В. Курс общей физики. Т.1 М.:Наука. 2000.
4. Савельев И.В. Курс общей физики. Т.2 М.:Наука. 2000.
5. Трофимова Т.И. Курс физики. М.:Высшая школа. 2001.
6. A. Serway, J. Jewett. Physics for Scientists and Engineers, 6th Edition Thomson Brooks/Cole 2004.
7. Young Hugh D. Sears and Zemansky's University Physics with modern physics technology update / Young Hugh D., Freedman Roger A. - 13th ed. - England : Pearson, 2014. - 1681 p.

Recommended

8. Детлаф А.А., Яворский Б.М. Курс физики.- М.: Высшая школа. 2001.
9. Волькенштейн В.С. Сб. задач по общему курсу физики. – М.: Наука. 2003.
10. Огурцов А.Н. Лекции по физике (1 - 4 части), 2002.
11. Умаров Ф.Ф., Кошкимбаева А.Ш. «Методические указания к выполнению лабораторных работ по механике, молекулярной физике, электричеству и магнетизму» Алматы: КБТУ, 2005.
12. Механика, молекулярная физики и термодинамика, электричество и магнетизм. Задания к практическим занятиям. Под общей редакцией Лагутиной Ж.П.

(Additional resources are available in the course web site on the Intranet.)

4. Week by Week Course Outline

Table 1. Course Outline

week	Topic	Details	Text Book	Expected Learning Hours		
				Lecture	Tutorial	Self-Study
Module 1. Mechanics						
1	Kinematics	Definition of mechanics and kinematics, rectilinear motion, projectile motion, uniform circular motion, dimensions and units Lab-1: Safety regulations	1. Ch.2,3 2. Lecture 1 3. Ch. 1 5. Ch. 1	1	1	2
2	Dynamics	Forces in mechanics. Newton's laws of motion and their application. Weight and mass. Lab-2: Journal	1. Ch.4,5 2. Lecture 2 3. Ch. 2 5. Ch. 2	1	1	2
3	Work	Work, energy and power. Conservation of energy. Impulse and momentum. Collisions. Lab-3: Caliper	1. Ch.6-8 2. Lecture 3 3. Ch. 3,4 5. Ch. 3	1	1	2

4	Rotational dynamics	Rotation of rigid bodies. Angular momentum and torque. Properties of fluids. Lab-4: Micrometer	1. Ch.9,10,16 2. Lecture 4 3. Ch. 5,9 5. Ch. 4,6 6. Ch. 16	1	1	2
Module 2. Molecular Physics and Thermodynamics						
5	Ideal gas	Molecular-kinetic Theory of ideal gases. Molecular bases of thermal physics. Collisions and transport phenomena. Lab-5: Uncertainties of measurements and error propagation.	1. Ch. 17 2. Lecture 5 3. Ch. 10,11 5. Ch. 8	1	1	2
6	Heat and work	Heat flow and the first law of thermodynamics. Kind of thermodynamic process. Adiabatic processes. Lab-6: Determination of the acceleration of gravity using the Atwood machine.	1. Ch.18 2. Lecture 6 3. Ch. 11,12 5. Ch.9	1	1	2
7	Entropy	The second law of thermodynamics. Entropy.The Carnot cycle. The engines. Real gases. Fluids and solids.	1. Ch.19, 20 2. Lecture 7 3. Ch.12 5. Ch.9,10	1	1	2
Module 3. Electricity						
8	Electric charge.	Electric charge. Electric field. Gauss' law. Electric potential. Applications of Gauss' law. Lab-7: Determination the speed of a bullet shot from a gun using ballistic method.	1. Ch. 21-24 2. Lecture 8 4. Ch.1 5. Ch.11	1	1	2
9	Capacitors	Insulators and conductors in electric field. Capacitance and dielectrics. Current, resistance and electromotive Force. Lab-8: Viscousity and Stokes' Law	1. Ch.25 2. Lecture 9 4. Ch. 2-5 5. Ch. 11	1	1	2
10	Kirchhoff rules	Currents in materials. Direct current circuits. Lab-9: Investigation of electrostatic fields.	1. Ch. 26,27 2. Lect. 10 4. Ch. 5 5. Ch. 12	1	1	2
Module 4. Magnetism						
11	Magnetic force	Magnets. Magnetic force. The Lorentz force. The Hall effect. Lab-10: Determination of resistance and resistivity.	1. Ch.27 2. Lect. 11 4. Ch. 11,12 5. Ch. 13	1	1	2
12	Sources of the Magnetic Field	The effects of magnetic fields. The production and properties of magnetic fields. Lab-11: Study of Hall effect in semiconductors.	1. Ch.28, 29 2. Lect. 12 4. Ch. 7 5. Ch. 14	1	1	2
13	Electromagnetic Induction	Faraday's law of induction. Lenz' law Eddy currents. Maxwell's equations. Lab-12: Study of magnetic field on the axis of a cylindrical coil.	1. Ch. 28 2. Lect. 13 4. Ch. 7,10,11 5. Ch. 14	1	1	2

14	Inductance of a conductor	Inductance. Self-inductance. RL Circuits. Energy in a Magnetic Field. Mutual Inductance. LC circuit – harmonic oscillations. RLC circuit – damped harmonic oscillations.	1. Ch. 30,32 2. Lect. 14 4. Ch.8 5. Ch.15	1	1	2
15	Special Theory of Relativity	Postulates os STR. The Lorentz transformations. Length constriction. Time dilation. Momentum and energy in STR.	1. Ch 31, 34 2. Lect. 15 4. Ch. 7,9 5. Ch. 16, 17	1	1	2

Table 2. Course Structure by Modules

Module	Lectures	Practice	Laboratory works
1	1-4	Problems-1	1-3
2	5-7	Problems-2	4-6
3	8-10	Problems-3	7-9
4	11-15	Problems-4	10-12

5. Teaching Methodology

A variety of teaching methods are used in this course. These are lectures, seminars and laboratory classes. All kinds of activities are carried out in an interactive mode. Presentation equipment is actively used.

Distance learning: lessons can be conducted in conditions of distant learning. In this case, they can be given in synchronous or asynchronous modes. In distance learning, all quizzes, tests and exams are conducted under online proctoring of such systems like Teams or ProctorEdu.

6. Course requirements and assessment

Homework is assigned regularly. It is important to work over the homework to obtain a good understanding of the material covered. Homework material is included in quizzes, tests and exams, so there are no separate points for homework as they are earned on quizzes, tests, and exams.

Laboratory works: this course of physics accompanies a weekly laboratory. Experiments are based on the material covered in lectures. The handouts for the labs are available on the course website. Points for the laboratory works are earned at Tests 1-4 and lab lessons, 2 points for each laboratory work, as given in Table 3.

Quizzes, tests and exams are closed book and notes. Students are expected to know basic expressions and equations used in Physics. The quizzes, tests and exams may consist of conceptual questions, problems or multiple-choice questions similar to suggested those in homework, quizzes, tutorials and discussed in lectures.

Quizzes (Test-1 and Test-3) are closed book and notes. They assess respectively Module-1 and Module-3. Quizzes may consist of conceptual questions, problems or multiple-choice questions.

Exams: Midterm (Test-2), End-term (Test-4) and Final exams will be given. They assess respectively Modules 1-2, Modules 3-4 and Modules 1-4. There are no make-up exams. The Final Exam takes place on a date designated by the Office Registrar.

Bonus points can be assigned to any task of the course. If a student earns a total score for an attestation or Final Exam above the maximal value (30 and 40, respectively), then the student is given the maximal score for this attestation or Final Exam and the excess points are discounted.

Table 3. Grading Breakdown

Test	Status	Module	Lectures	Practice	Laboratory works	Points
Test-1	Quiz	1	1-4	Problems 1	1-3	10
Test-2	Midterm	1-2	1-7	Problems 1-2	1-6	20
Test-3	Quiz	3	8-10	Problems 3	7-9	10
Test-4	End-term	3-4	8-15	Problems 3-4	7-12	20
Final Exam		1-4	1-15	Problems 1-4	1-12	40

7. Timetable for Assessment Submission

Table 4. Timetable for Assessment Submission

		Week															Points
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	Quizzes				*							*					8
2	Laboratory works		*	*	*	*	*	*		*	*	*	*	*	*		24
3	Midterm							*									14
4	End-term														*		14
5	Final Exam																40
	Total																100

8. Grading policy

- If a student gets less than 30 points for both attestations then the student gets F (Fail) for the discipline.
- If a student gets less than 20 points for the Final Exam then the student gets FX for the discipline.
- If a student does not appear at the Final Exam, then the student gets FAIL for the discipline (even if the student's score for both attestations is above 50 points).
- If a student misses some lessons or the Final Exam in the case of illness then the student must give the doctor's certificate to the KBTU medical centre during three days after the last date of the certificate. And only if the medical centre approves the doctor's certificate then the student is considered to have reasonable excuse in missing the lesson or the Final Exam.

The grading scale is as follows:

95-100	A	75-79	B-	55-59	D+
90-94	A-	70-74	C+	50-54	D
85-89	B+	65-69	C	Below 50	F
80-84	B	60-64	C-		

9. Academic Integrity

Any time you put your name on a piece of work for this source you are asserting that it is your own work. If it is not the case, it is plagiarism. You must report, in proper citation format, the source of information used in a paper. Direct quotes must be denoted by quotation marks and page references. Plagiarism is classed as cheating and will be dealt with according to the policies and procedures of KBTU.

Cheating on exams and assignments will not be tolerated and will be dealt with according to the policies and procedures of KBTU.

10. Conduct

Students are required:

- to be respectful to the teacher and other students;

- to switch off mobile phones during classes;
- to meet the deadlines;
- to come to classes prepared and actively participate in classroom work;
- to enter the room before the teacher starts the lesson;
- to attend all classes. No make-up tests are allowed unless there is a valid reason for missing them;
- to follow KBTU academic policy regarding **W, AW, I, F** grades.

Students are encouraged to

- consult the teacher on any issues related to the course;
- make any proposals on improvement of the academic process;
- monitor their continuous assessment throughout the semester.

Students must abide by all course management issues according to KBTU policies and procedures

Should students wish to raise issues regarding their grades, they must follow KBS and KBTU procedures.

Should students wish to raise issues regarding the conduct of the instructor (s), they should contact the Office of the Dean, Room 332.

Course Instructor: Yevgeniya Kedruk

Approved by the meeting of the Sector

Meeting number: _____

Date: _____