Identification	**Subject (Code, title, credits)**	PHSC 112, Physics II - 6 ECTS credits
	Department	Physics and Electronics
	Program (undergraduate, graduate)	Undergraduate
	Term	Spring 2026
	Instructor	Hajar Hajiyeva
	E-mail:	hajar.hajiyeva@khazar.org
	Phone:	
	Classroom/hours	11 Mehseti str. (Neftchilar campus), Bakikhanov campus
	Office hours	Monday: 10:10-13:20 | Thursday: 10:10-13:20
Prerequisites	PHSC 111Physics 1	
Language	English	
Compulsory/ Elective	Compulsory	
Required textbooks and course materials	1. Fundamentals of Physics Extended 8th Edition by Halliday, Resnick, and Serway, Walker John Wiley, 2021. Fundamentals of Physics, Volume 2 9781119801269, 1119801265 - DOKUMEN.PUB Go to this page to download the textbook 2. Physics for Scientists and Engineers with Modern Physics (10th ed.), Cengage Learning - Serway, R. A., and Jewett, J. W. Jr. - 2018 3. University Physics with Modern Physics (15th ed.), Pearson - Young, H. D., Freedman, R. A. - 2018 4. University Physics Volume 1. OpenStax - Ling, S. J., Sanny, J., and Moebs, W. - 2016	
Course description	Physics II provides a continuation of the fundamental concepts introduced in Physics I, with a focus on electromagnetism, optics, and wave phenomena. The course covers electric fields, electric potential, capacitance, and current-carrying circuits, emphasizing analytical problem-solving and practical applications. Students will explore magnetic fields, electromagnetic induction, and the behavior of alternating currents in circuits. Additionally, the course introduces the principles of light, including reflection, refraction, interference, and diffraction, as well as the basic concepts of electromagnetic waves. Through lessons, problem-solving sessions, and laboratory experiments, students develop a deeper understanding of physical principles and acquire the skills to apply them to real-world scenarios in engineering and science.	
Course objectives	• To develop a solid understanding of electromagnetism, including electric and magnetic fields, potential, and circuit behavior. • To introduce the fundamental principles of optics and light phenomena, such as reflection, refraction, interference, and diffraction. • To enhance students' ability to analyze and solve complex physics problems using theoretical and mathematical tools. • To provide practical experience through laboratory experiments, connecting theoretical knowledge with real-world applications. • To prepare students for advanced studies in physics, engineering, and related scientific disciplines.	

<table>
<tr><td>Learning outcomes</td><td colspan="3">By the end of the course, students will be able to:
1. Calculate electric fields and potentials for various charge distributions.
2. Analyze DC and AC circuits, including R, L, C, and RLC combinations.
3. Explain the principles of magnetic fields, electromagnetic induction, and Faraday’s Law.
4. Solve problems involving wave phenomena, interference, diffraction, and polarization.
5. Describe the propagation and characteristics of electromagnetic waves.
6. Perform laboratory experiments to measure electrical and optical phenomena and interpret results.
7. Apply theoretical knowledge to engineering and real-world scenarios.</td></tr>
<tr><td rowspan="4">Teaching methods</td><td colspan="2">Case analysis</td><td>x</td></tr>
<tr><td colspan="2">Group discussion</td><td>x</td></tr>
<tr><td colspan="2">Lecture</td><td>x</td></tr>
<tr><td colspan="2">Simulation</td><td>x</td></tr>
<tr><td rowspan="6">Evaluation Criteria</td><td>Methods</td><td>Date/deadlines</td><td>Percentage (%)</td></tr>
<tr><td>Midterm Exam</td><td></td><td>30</td></tr>
<tr><td>Attendance</td><td>At each lesson</td><td>5</td></tr>
<tr><td>Quizzes</td><td>4 quizzes during the semester</td><td>20</td></tr>
<tr><td>Activity</td><td>During the semester</td><td>10</td></tr>
<tr><td>Final Exam</td><td></td><td>35</td></tr>
<tr><td>Total</td><td></td><td>100</td></tr>
<tr><td>Class Policy</td><td colspan="3">▪ Preparation for class
The pedagogical structure of this course necessitates diligent individual study and external preparation. Course sessions are designed to emphasize the primary theoretical frameworks introduced in the text. Pre-class engagement with assigned chapters is essential to facilitate a comprehensive understanding of the material. Subsequent to each session, students should synthesize their notes and resolve pertinent problems, case studies, and sample examination questions located at the conclusion of each chapter.
▪ Withdrawal (pass/fail)
This course strictly adheres to the grading ordinances of the School of Science and Engineering. Consequently, students are required to achieve a minimum threshold of 60% to secure a passing grade. In the event of an unsatisfactory result, the student will be mandated to repeat the course in the following academic term or year.
▪ Cheating/plagiarism
Any instance of academic dishonesty or plagiarism during Quizzes, Midterms, or Final Examinations will result in the immediate nullification of the assessment. In such cases, the student will automatically be assigned a score of zero (0) without further consideration.
▪ Professional behavior guidelines
Students are expected to conduct themselves in a manner that fosters a constructive academic and professional environment during instructional hours. Unauthorized discourse and unethical behavior are strictly prohibited.
▪ Attendance
Students who attend the whole class will get 5 marks. After three absences the student loses 1 mark.</td></tr>
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	▪ **Activity** Students who will be active during the discussion of past lessons and who will solve homework problems in a seminar will be awarded one activity mark. ▪ **Quizzes** There will be 4 quizzes and examinations during the semester. The quizzes will be announced in the classroom two weeks before. The quiz is based on homework problems. The homework problems will be selected from questions and problems at the end of each chapter. The number of homework problems will be announced after finishing each chapter. The students who can pass the midterm and first two quizzes with max points automatically get a maximum of 10 points for the overall quiz score.

Tentative Schedule

Week	Date/Day (tentative)	Topics	Textbook
1	16.02.2026 21.02.2026	**Electric Charge** The Origin of Electricity, Types of Electric Charge - Forces among two charges (Coulomb's law) - Charge quantization - Charge conservation Charged Objects and the Electric Force, Conductors and Insulators, Charging by Contact and Induction, Coulomb's Law.	1. Fundamentals of Physics by Halliday, Chapter 21.2. Handnotes given by teacher
2	23.02.2026 28.02.2026	**Electric Field** The Electric Field, Electric Field Lines, The ElectricField Inside a Conductor. Calculate the electric field generated by a pointcharge. - Using the principle of superposition determine the electric field created by a collection of point charges as well as continuous charge distributions. - Define the notion of an "electric dipole". Determine the net force, the net torque, exerted on an electric dipole by a uniform electric field, as well as the dipole potential energy	1. Fundamentals of Physics by Halliday, Chapter 22. 2. Handnotes given by teacher.
3.	02.03.2026 07.03.2026	**Electric Potential Energy and the ElectricPotential** Potential Energy, The Electric Potential Difference, The Electric Potential Difference Created by Point Charges, Equipotential Surfaces	1. Fundamentals of Physics by Halliday, Chapter 24. 2. Handnotes given by teacher.
4.	09.03.2026	**Quiz** Problem solving	
5.	10.03.2026 17.03.2026	**Capacitance** Capacitor; Capacitance, Capacitors in Parallel and in Series Potential Energy and Energy Density, Capacitance with a Gauss' Law with a Dielectric Equivalent capacitance. -Energy stored in a capacitor.	1. Fundamentals of Physics by Halliday, Chapter 25. 2. Handnotes given by teacher

6.	24.03.2026 31.03.2026	**Current and Resistance** Current, Current Density, Drift Speed, Resistance of a Conductor, Ohm's Law, Resistivity of a Metal, Power, Resistive Dissipation, Semiconductors, Superconductors	1. Fundamentals of Physics by Halliday, Chapter 26. 2. Handnotes given by teacher
7	04.04.2026	**Quiz** Problem solving	
8	06.04.2026	**MidtermExam** Problem solving	
9.	07.04.2026 18.04.2026	**Circuits** Electromotive force (emf), Ideal and real emf devices, Seri wiring, Parallel wiring, Circuits partially series and partials parallel, Internal resistance. **Circuits** RC circuits, charging and discharging of a capacitor, Measurement of current, Kirchhoff's Rules, Capacitors in series and parallel	1. Fundamentals of Physics by Halliday, Chapter 27. 2. Handnotes given by a teacher
10.	20.04.2026 28.04.2026	**Magnetic Forces and Magnetic Fields** Magnets and Magnetic Fields, Force on a Moving Charge, Motion of a Charged Particle in a Magnetic Field, Mass spectrometer. Hall effect, Force on a Current, Torque on Coil, Magnetic Fields by Currents, Magnetic Materials **Magnetic Forces and Magnetic Fields** Hall effect, Force on a Current, Torque on Coil, Magnetic Fields by Currents, Magnetic Materials	1. Fundamentals of Physics by Halliday, Chapter 28 2. Handnotes given by teacher
11.	02.05.2026	**Quiz** Problem solving	
12.	04.05.2026 09.05.2026	**Magnetic Fields Due to Currents** The Biot-Savart Law, Magnetic Field of a Long Straight Wire, Magnetic Field of a Circular Arc, Force Between Parallel Currents, Ampere's Law,Fields of a Solenoid, and a Toroid.	1. Fundamentals of Physics by Halliday, Chapter 29. 2. Handnotes given by teacher
13	11.05.2026 16.05.2026	**Induction and Inductance** Magnetic Flux, Faraday's Law, Lenz's Law, Emf andthe Induced Electric Field, Self-Induction, Mutual Inductance	1. Fundamentals of Physics by Halliday, Chapter 30. 2. Handnotes given by teacher
14	18.05.2026 26.05.2026	**Electromagnetic Oscillations and Alternating Current** *LC* oscillations, Damped Oscillations in an RLC Circuit, Forced Oscillations of Three Simple Circuits **Electromagnetic Oscillations and Alternating Current** The Series RLC Circuit, Power in Alternating-Current Circuits, Transformers	1. Fundamentals of Physics by Halliday, Chapter 31. 2. Handnotes given by teacher
15	30.05.2026	**Quiz** Problem solving	
		Final Exam	

This syllabus is a guide for the course and any modifications to it will be announced in advance.