REPUBLIKA E SHQIPËRISË

"ISMAIL QEMALI" UNIVERSITY
FACULTY OF TECHNICAL AND NATURAL SCIENCES
COMPUTER SCIENCE DEPARTMENT

SYLLABUS
PHYSICS 2

Curriculum Developer	DR. ASTRIT DENAJ

Credits and hours	Credits	Hour in the classroom						Individual study	Total
		Lectures	Seminars	Labs	Practice	Course project	Total		
	6 ECTS	45	30	0	0	0	75	75	150

Course Typology	A - Basic disciplines
Academic year /semester	2025-2026/ First year, Second semester
Nature and requirement of the course	Mandatory course
Study program	Bachelor in Computer Engineering
Course Code	FIZ 152E
Email of curriculum developer / lecturer	astrit.denaj@univlora.edu.al

SUMMARY AND LEARNING OUTCOMES

Course Description	The course "Physics 2" is a continuation of the previous course, "Physics 1," and covers fundamental concepts of electricity, magnetism, and optics. This course includes the study of the natural laws related to electric and magnetic forces, electromagnetic fields, and the behavior of electromagnetic waves. Furthermore, the course expands on the concepts of light refraction and reflection, the dual nature of light, and practical applications in optical systems. Throughout the course, students will develop problem-solving skills using mathematical methods and laboratory practices, helping them connect theory with practical applications.
Course Objectives	Understanding and applying fundamental concepts and laws of Electromagnetism, Optics, and Modern Physics. Developing students' skills in solving various problems related to the covered topics. Students will gain proficiency in using instruments for conducting electrical measurements and independently performing laboratory work.
Expected Outcomes	By the end of the course, students will be able to: • Apply the laws of electricity in various problem-solving situations. • Understand Maxwell's equations. • Recognize spherical mirrors and lenses. • Understand the phenomena of interference and diffraction of light.

REPUBLIKA E SHQIPËRISË

"ISMAIL QEMALI" UNIVERSITY

FACULTY OF TECHNICAL AND NATURAL SCIENCES

COMPUTER SCIENCE DEPARTMENT

FUNDAMENTAL CONCEPTS

- Electricity: Electric charge, Electric field, Electric potential and energy, Capacitance, and capacitors
- Magnetism: Magnetic field, Ampère's law, Electromagnetic induction, Maxwell's equations
- Optics: Electromagnetic waves, Refraction and reflection, Interference and diffraction, Geometrical and wave optics
- Electric Circuits: Circuits with resistors, capacitors, and inductors, Alternating currents (AC) and direct currents (DC)

REPUBLIKA E SHQIPËRISË

"ISMAIL QEMALI" UNIVERSITY

FACULTY OF TECHNICAL AND NATURAL SCIENCES

COMPUTER SCIENCE DEPARTMENT

Week	COURSE TOPICS	Reference Literature	Teaching Methodology
I	***Topic 1***. *Electric Charge. Conductors and Insulators. Electrification by Induction. Coulomb's Law. Electric Field* ***Topic 2***. *Electric Field Lines. Motion of Point Charges in an Electric Field.* ***Topic 3***. *Electric Dipole in an Electric Field. Problems* ***Seminar 1***. *Exercises related to Coulomb's Law.* ***Seminar 2***. *Exercises related to the motion of point charges in an electric field.*	[1] page 7-17	Lecture 1 hour Lecture 1 hour Lecture 1 hour *Seminar 1 hour* *Seminar 1 hour*
II	***Topic 4***. *Calculation of Electric Field Intensity using Coulomb's Law. Electric Field Intensity along the axis of a linearly distributed electric charge. Electric Field Intensity along the symmetry axis of a linearly distributed electric charge. Electric Field Intensity near an infinitely long linear charge.* ***Topic 5***. *Electric Field Intensity along the axis of a uniformly charged full ring. Electric Field Intensity along the axis of a uniformly charged disk. Electric Field Intensity near an infinite surface charge. Gauss's Theorem.* ***Topic 6***. *Calculation of Electric Field Intensity using Gauss's Theorem. Electric Field Intensity near a point charge. Electric Field Intensity near an infinite uniformly charged plane. Electric Field Intensity inside and outside a uniformly charged sphere.* ***Seminar 3***. *Calculation of Electric Field Intensity using Coulomb's Law.* ***Seminar 4***. *Calculation of Electric Field Intensity using Gauss's Theorem.*	[1] page 22-42	Lecture 1 hour Lecture 1 hour Lecture 1 hour *Seminar 1 hour* *Seminar 1 hour*
III	***Topic 7***. *Electric Field Intensity inside and outside a uniformly charged cylinder. Discontinuity of En. Electric Charge and Electric Field Intensity on the surface of a conductor. Mathematical treatment of Gauss's Theorem. Problems.* ***Topic 8***. *Electric Potential and Potential Difference. Potential created by a system of electric charges. Electrostatic Potential Energy.* ***Topic 9***. *Calculation of Electric Potential for point charges. Potential along the axis of a uniformly charged ring. Potential along the axis of a charged disk. Potential near an infinitely large uniformly charged plane; continuity of potential.* ***Seminar 5***. *Calculation of Electric Potential for point charges.* ***Seminar 6***. *Calculation of Electric Potential for point charges.*	[1] page 53-74	Lecture 1 hour Lecture 1 hour Lecture 1 hour *Seminar 1 hour* *Seminar 1 hour*

IV	***Topic 10**. Potential inside and outside a uniformly charged spherical surface. Potential near an infinitely long charged rod. Electric Field and Electric Potential. Equipotential surfaces, charge, and spark discharge. Problems.* ***Topic 11**. Flat Capacitor. Cylindrical Capacitor. Dielectrics.* ***Topic 12**. Accumulation of Electric Energy. Series and Parallel Connections of Capacitors. Problems.* ***Seminar 7**. Calculation of potential inside and outside a uniformly charged spherical surface.* ***Seminar 8**. Exercises with electric circuits consisting of capacitors.*	[1] page 84-107	Lecture 1 hour Lecture 1 hour Lecture 1 hour *Seminar 1 hour* *Seminar 1 hour*
V	***Topic 13.** Electric Current and the motion of electric charges. Electric Resistance and Ohm's Law. Superconductivity.* ***Topic 14**. Kirchhoff's Laws. Circuits with multiple loops. Circuit analysis using symmetry.* ***Topic 15**. RC Circuits. Capacitor discharging process. Capacitor charging process.* ***Seminar 9**. Exercises with electric circuits consisting of resistors.* ***Seminar 10**. Exercises with electric circuits. Applications of Kirchhoff's Laws.*	[1] page 115-158	Lecture 1 hour Lecture 1 hour Lecture 1 hour *Seminar 1 hour* *Seminar 1 hour*
VI	***Topic 16**. Ammeters, Voltmeters, and Ohmmeters. Problems.* ***Topic 17.** Force exerted by the magnetic field. Motion of a point charge in the magnetic field. Speed Selector.* ***Topic 18**. Measurement of (q/m) for the electron in Thomson's experiment. Mass Spectrometer. Cyclotron.* ***Seminar 11**. Exercises with the force of the magnetic field.* ***Seminar 12**. Exercises related to the motion of a point charge in the magnetic field.*	[1] page 163-214	Lecture 1 hour Lecture 1 hour Lecture 1 hour *Seminar 1 hour* *Seminar 1 hour*
VII	***Topic 19**. Moment of forces exerted by the magnetic field on coils and currents and on magnets. The Hall Effect. Quantum Hall Effect. Problems.* ***Topic 20**. Magnetic field of moving point charges. Magnetic force and conservation of momentum. Magnetic field of an electric current: Laplace's First Law.* ***Topic 21**. Magnetic Flux. Induced Electromotive Force and Faraday's Law. Lenz's Law.* ***Seminar 13**. Applications of Laplace's Law.* ***Seminar 14**. Applications of Faraday-Lenz's Law.*	[1] page 216-253	Lecture 1 hour Lecture 1 hour Lecture 1 hour *Seminar 1 hour* *Seminar 1 hour*

VIII	***Topic 22***. *Dynamic EMF. Eddy Currents. Electric Generators and Motors. Inductance.* ***Topic 23***. *Self-Inductance (Autoinduction). Mutual Inductance.* ***Topic 24***. *RL Circuits. Magnetic Energy. Problems.* ***Seminar 15***. *Exercises with autoinductance.* ***Seminar 16***. *Exercises with RL circuits.*	[1] page 255-307	Lecture 1 hour Lecture 1 hour Lecture 1 hour *Seminar 1 hour* *Seminar 1 hour*
IX	***Topic 25***. *Magnetization and Magnetic Susceptibility. Magnetic Moment of the Atom. Paramagnetism.* ***Topic 26***. *Ferromagnetism. Diamagnetism. Calculation of Induced Magnetic Moments. Problems.* ***Topic 27***. *AC Circuits. Rotational Vectors. LC and LCR Circuits without a Generator - Page 356.* ***Seminar 17***. *Exercises with RL, RC, and RLC Circuits without a Generator.* ***Seminar 18***. *Exercises with RL, RC, and RLC Circuits without a Generator.*	[1] page 312-352	Lecture 1 hour Lecture 1 hour Lecture 1 hour *Seminar 1 hour* *Seminar 1 hour*
X	***Topic 28***. *LCR Circuits connected to a generator. Series LCR Circuits. Resonance.* ***Topic 29***. *Parallel LCR Circuits. Transformer. Direction and Amplification. Problems.* ***Topic 30***. *Displacement Current. Maxwell's Equations. Electromagnetic Wave Equation.* ***Seminar 19***. *Exercises with RLC Circuit with a Generator.* ***Seminar 20***. *Exercises with Series and Parallel RLC Circuits.*	[1] page 361-416	Lecture 1 hour Lecture 1 hour Lecture 1 hour *Seminar 1 hour* *Seminar 1 hour*
XI	***Topic 31***. *Energy and Momentum of an Electromagnetic Wave. Electromagnetic Spectrum. Problems. Speed of Light. Light Propagation. Huygens' Principle. Reflection. Refraction.* ***Topic 32***. *Dispersion. Rainbow. Fermat's Principle. Reflection. Refraction.* ***Topic 33***. *Polarization. Polarization by Absorption. Polarization by Diffusion. Polarization by Reflection. Polarization by Double Refraction. Problems.* ***Seminar 21***. *Exercises with Light Reflection and Refraction.* ***Seminar 22***. *Exercises with Light Polarization.*	[1] page 418-459	Lecture 1 hour Lecture 1 hour Lecture 1 hour *Seminar 1 hour* *Seminar 1 hour*

XII	***Topic 34***. *Plane Mirrors. Spherical Mirrors. Graphical construction of the image formed by mirrors. Concave Mirrors.* ***Topic 35***. *Convex Mirrors. Formation of images by Refraction. Focal Ray. Ray in a Refraction Medium.* ***Topic 36***. *Optical Instruments. Human Eye. Magnifying Lenses.* ***Seminar 23***. *Exercises related to spherical mirrors.* ***Seminar 24***. *Exercises related to spherical mirrors.*	[1] page 460-506	Lecture 1 hour Lecture 1 hour Lecture 1 hour *Seminar 1 hour* *Seminar 1 hour*
XIII	***Topic 37***. *Camera. Microscope. Telescope.* ***Topic 38***. *Phase Shift and Coherence. Interference in Thin Films. Michelson Interferometer.* ***Topic 39***. *Interference Pattern from Two Slits. Determination of Harmonic Wave Set by the Rotational Vector Method.* ***Seminar 25***. *Exercises related to lenses.* ***Seminar 26***. *Exercises related to lenses.*	[1] page 510-558	Lecture 1 hour Lecture 1 hour Lecture 1 hour *Seminar 1 hour* *Seminar 1 hour*
XIV	***Topic 40***. *Diffraction Pattern from a Single Slit. Qualitative Treatment. Quantitative Treatment. Interference-Diffraction Pattern from Two Slits.* ***Topic 41***. *Fraunhofer and Fresnel Diffraction. Diffraction Rules.* ***Topic 42***. *Electrons and Holes in Pure Semiconductors. P-N Junction.* ***Seminar 27***. *Exercises related to interference and diffraction of light.* ***Seminar 28.*** *Exercises related to semiconductors.*	[1] page 565-603	Lecture 1 hour Lecture 1 hour Lecture 1 hour *Seminar 1 hour* *Seminar 1 hour*
XV	***Topic 43***. *Semiconductor Diodes. Voltage-Ampere Characteristics. Diodes as Circuit Elements. Zener Diodes.* ***Topic 44***. *Transistors. Construction and Operation of a Transistor. Graphical Representation of Transistor Characteristics.* ***Topic 45.*** *Annual Review. Exercises.* ***Seminar 29***. *Review Exercises.* ***Seminar 30***. *Review Exercises.*	[1] page 613-632	Lecture 1 hour Lecture 1 hour Lecture 1 hour *Seminar 1 hour* *Seminar 1 hour*

REPUBLIKA E SHQIPËRISË

"ISMAIL QEMALI" UNIVERSITY
FACULTY OF TECHNICAL AND NATURAL SCIENCES
COMPUTER SCIENCE DEPARTMENT

KNOWLEDGE ASSESSMENT

ATTENDANCE	Attendance for lectures and seminars is mandatory at 75%. Otherwise, the student loses the right to take the exam. Absences are the personal responsibility of the student, as are any missed assignments or tests. A student who has less than 75% attendance for the period relevant to any partial exam, during which they will be tested, will not be allowed to take the corresponding exam and will be graded with an M (Missing). If the student has attended the course but does not show up for the next exam, they will be graded NP (Not Present).

	Assessment Method	*Assessment Time*	*Learning Topics to be Assessed*	*Maximum Points*	*Knowledge Testing Method*	*Test Content*
CONTINUOUS ASSESSMENT	Partial Exam	Week 7-8	1-15	25 points	Written exam	Concepts and exercises
	Final Exam	End of the semester	16-45	60 points	Written exam	Concepts and exercises
	Continuous Assessment* (Course Assignment*)	During the semester	-	15 points	Written raport and oral presentation	Exercises

* Continuous Assessment – *The student will realize a project, that will start at the beginning of the semester.*

The conversion of points to the final grade is as follows:

0 - 40 points	41 - 50 points	51 - 60 points	61 - 70 points	71 - 80 points	81 - 90 points	91 - 100 points
4	5	6	7	8	9	10

LITERATURE

Primary literature	[1] "Kursi i Fizikës II"; Për studentet e Inxhinerise. Grup Autoresh. [2] "Ushtrime të zgjidhura, Kursi i Fizikës II": Partizan Malkaj. ISBN:978-9928-175-88-5.
Recommended literature	[1] University Physics with Modern Physics 15th Edition by Hugh Young (Author), Roger Freedman (Author), 2019, ISBN-10 0135159555.

REPUBLIKA E SHQIPËRISË

"ISMAIL QEMALI" UNIVERSITY
FACULTY OF TECHNICAL AND NATURAL SCIENCES
COMPUTER SCIENCE DEPARTMENT

FINAL REMARKS FROM THE COURSE INSTRUCTOR	
Provisions	Students are expected to develop values and an ethics that reflect their interests and behavior from a professional perspective. Students must respect individual differences, be cooperative, and in accordance with ethical rules, they should respect ethnic differences and assist individuals with disabilities with inclusive and supportive attitudes.
Delays	Delays in lectures and seminars will not be tolerated.
Academic integrity and copyright	Each test or written work must be completely individual and original. Plagiarism (mixed combinations) or theft of information through various means will not be allowed.

HEAD OF DEPARTMENT OF COMPUTER SCIENCES
Dr. Alketa HYSO