UNIVERSITY "ISMAIL QEMALI" VLORE
FACULTY OF TECHNICAL AND NAURAL SCIENCES
DEPARTMENT OF PHYSICS

FIZ 161 PHYSICS COURSE SYLLABUS

Head/Teacher of the subject:	Dr. Astrit Denaj
Charge:	Lectures 3 hours / Seminars 2 hours / Lab 1 hour
Subject typology:	Disciplines of the characteristic formation of the program
Academic year/semester when it takes place:	2022 - 2023/ Spring 2023
Subject type:	Forced
Study program:	Bachelor in Biology
CREDIT	8 credits
Subject code:	FIZ 161
E-mail address of the holder/pedagogue:	astrit.denaj@univlora.edu.al, astrit.denaj@yahoo.com

SUMMARY AND LEARNING OUTCOMES:

It is a course that has been prepared for biology students and presents in a complete and concise manner general physics on the one hand and on the other hand biophysics which is an intermediate science between physics and biology, which studies the occurrence of the main physical phenomena in the living world. The course mainly deals with basic knowledge of kinematics, dynamics and statics of material point and solid body, statics and dynamics of fluids, capillary phenomena and mechanical properties of solutions; molecular physics, ideal gases and the basics of thermodynamics; vibrations, wave motion and sound; optics and electromagnetic phenomena; the structure of the atom, the molecule, the nucleus of the atom and the interactions at the atomic, molecular and nuclear level. Merged organically with the content of general physics, the main phenomena of biophysics are treated such as biomechanics, fluid mechanics in biological systems, elements of hemodynamics, membranes and transport of matter, heat and life, bioacoustics, the process of seeing, photosynthesis, electrophysiology, ionizing and non-ionizing radiations and their interaction with matter and physical methods of analysis in biology such as: spectrophotometry, spectrofluorimetry, X-ray, chromatography, resonance magnetic, nuclear and mass spectrometry.

BASIC CONCEPTS:

1. Movement of the material point
2. The laws of dynamics
3. Laws of conservation of energy and momentum
4. Principles of thermodynamics.
5. Fluid dynamics.
6. Electricity and Magnetism.
7. Electromagnetic waves
8. Geometric optics and wave optics. Reflection, refraction of light. Interference and diffraction of light.
9. The atom. Bohr's theory of the hydrogen atom. The core. Isotopes and Isobars. Radioactivity.

COURSE TOPICS:

Topics to be covered in the lectures:

Topic 1 Physics and its object of study. Biophysics as a science. Physical dimensions. Operations with vectors

Topic 2 Movement of a material point: rectilinear, circular, plane movement (two-dimensional).

Topic 3 The laws of dynamics. Some simple types of forces. Static and dynamic friction force. Centripetal force. Forces acting at a distance (Universal Gravitational Force, Coulomb Force).

Topic 4 The work of a force. Power. Kinetic energy. Kinetic energy theorem. Conservative forces and potential energy. Potential energy of elastic force and gravitational force. Law of conservation of mechanical energy.

Topic 5	Momentum of a material point and a system of material points. Law of conservation of momentum. Moment of force and conditions of equilibrium of a rigid body. Partial exam I
Topic 6	Fluid statics. Pascal's principle. Stevin's Law. Fluid dynamics. The flow. Continuity equation. Bernoulli's equation and its applications.
Topic 7	Real fluid movement. Pausel's law. Viscosity measurement. Surface tension. Laplace's formula. Contact forces. Capillarity.
Topic 8	Thermodynamic state and thermodynamic variables. Equation of state. Ideal and real gases. Reversible and irreversible thermodynamic transformations. Work in thermodynamics. I and II principle of thermodynamics. Thermal machines. Enthalpy. Entropy.
Topic 9	Electric charge and the law of conservation of electric charge. Coulomb's law. Electric field. Electric potential. Electrical capacity. Capacitors in series and in parallel.
Topic 10	Electricity. Electrical resistance. Ohm's Law. The Joule effect. Kirkoff's Laws. Resistances in series and in parallel. RC circuits.
Topic 11	Magnetic effects. Magnetic induction vector. Lawrence's force. The strength of the magnetic field in a current-carrying conductor. Magnetic field strength on a point charge. Faraday's - Lenz's law.
Topic 12	Electromagnetic waves. General properties of electromagnetic waves. Polarization. The polarizing power of a substance. Polarimeter. Light as part of the electromagnetic spectrum. Speed of light in vacuum and in a medium.
Topic 13	Geometric optics. Laws of reflection and refraction of light. Full internal review. Plane mirrors and spherical mirrors. Convergent and divergent lenses. Thin lenses. The human eye as an optical system. Optical devices.
Topic 14	Wave optics. Interference (coherent sources, Jung's experiment). The concept of diffraction, in particular diffraction by circular propagation (Airy disk) and the resolving power of an optical system (human eye, lens, microscope.
Topic 15	The atom. Planetary model. Bohr's theory for the hydrogen atom. Optical spectra of atoms. Nucleus: Nucleus of the atom. Isotopes and isobars. Nuclear magnetic resonance. Natural radioactivity. Ionizing radiations and their biological effects

Topics to be covered in the seminars:

Topic 1	Vectors and vector operations. Base units in SI.
Topic 2	Kinematics. Equations of motion with acceleration. The movement of the body thrown at an angle to the horizon. Free fall.
Topic 3	The laws of dynamics. Applications of Newton's laws.
Topic 4	Work done by a constant and variable force. Kinetic energy theorem. Potential energy of elastic force and gravitational force. Law of conservation of mechanical energy
Topic 5	Impulse and the law of conservation of momentum. Moment of force. Conditions of equilibrium of the
Topic 6	Archimedes' force. Applications of Bernoulli's equation.
Topic 7	Surface tension. Fluid mechanics in biological systems.
Topic 8	Temperature scales. Kinetic theory of gases. Specific heats of ideal gas. General gas equation of state. Work in thermodynamics. I and II principle of thermodynamics. Thermal machines. Carnot engine. Entropy.
Topic 9	Coulomb's law. Electric potential and electric field intensity. Electrical capacity. Capacitors connected in the circuit.
Topic 10	Ohm's Law. Kirkoff's Laws. Electrical resistances connected in the circuit.
Topic 11	Lawrence's force. Magnetic field strength on a straight current-carrying conductor. Magnetic field strength on a point charge. Faraday's - Lenz's law
Topic 12	Electromagnetic waves. Speed of light in vacuum and in a medium. Polarization
Topic 13	Laws of reflection and refraction. Imagery in plane and spherical mirrors. The example of lenses
Topic 14	Interference of light. Diffraction of light
Topic 15	Atomic models. Quantum numbers. Spectral lines. Mass defect. Bond energy. Law of radioactive decay

Topics to be covered in the laboratories:

Topic 1 Error theory.
Topic 2 Study of the laws of free fall
Topic 3 Study of Newton's second law
Topic 4 Determination of surface tension of liquids.
Topic 5 Study of ideal gas laws
Topic 6 Study of the simple pendulum (mathematics)
Topic 7 Determining the speed of a transverse wave in a chord
Topic 8 Calculation of the unknown resistance on the side of the Winston Bridge
Topic 9 RLC circuit
Topic 10 Study of spherical mirrors and lenses
Topic 11 The study of the prism.
Topic 12 Determination of the wavelength of the laser by means of the phenomenon of Diffraction
Topic 13 Determination of Planck's constant
Topic 14 Protection of laboratory work
Topic 15 Protection of laboratory work

FORM OF KNOWLEDGE CONTROL

control	Percentage rating
Control I	20%
Annual assessment: Seminars and	20%
Final check	60%

Grading is based on the conversion of the total grade to %, grade 5-10 progressively 41-100%.

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

ATTENDANCE:

The student, who results in less than 75% attendance for the period that belongs to each partial exam, the period for which he will be tested, will not be included in the relevant exam, will be evaluated with M.

If the student has attended the course, but does not appear in the next exam, he is assessed NP (Did Not Appear).

COURSE FORMAT:

The subject will be evaluated on the basis of two partial exams, assignments and the final exam. Points earned will be cumulative. The exams will not be repeated, for any reason. If you miss an exam without any major reason, then you will lose points for that exam that you did not appear for.

COMMUNICATION:

Homework exercises, course assignments and any other announcements will be given in class or at the official address of the "Ismail Qemali" University of Vlora on the Internet: www.univlora.edu.al or at the lecturer's email address astrit.denaj@univlora. edu.al

Email: It is the duty of every student to check e-mail regularly. There will be tasks and announcements will be given only via e-mail astrit.denaj@univlora.edu.al.

HONESTY CODE:

Students are encouraged to work in groups for the exercises and tasks that are given to them. Copying from one another in exams, course assignments, homework, etc. is not allowed. Violation of this rule will be accompanied by punitive measures up to the expulsion of the student from the university.

LITERATURE

a)**Mandatory basic literature:**

1. Written lectures 2."Introduction to Physics I": Jorgo Mandili, Silvana Mico. 3."Introduction to Physics II": Jorgo Mandili, Silvana Mico. 4. Practicum of General Physics, Prof. Dr. 5. Mersin Shena, Prof. Nor. Veledin Cako

b) Recommended literature:

1."Physics for Scienze Biologiche" Maria Teresa Tuccio

FINAL REMARKS FROM THE SUBJECT TEACHER

Homework exercises, coursework and any other notices will be given in class. Students are also encouraged to work in groups for the homework exercises. Copying from one another in exams, coursework, homework, etc. is not allowed. Violation of this rule will be accompanied by punitive measures up to expulsion from the university. The use of mobile phones and smoking in the auditorium is not allowed.

SUBJECT TEACHER

Dr. Astrit Denaj

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