

Course Unit	Biophysics		Field of study	Physical sciences	
Bachelor in	Biology and Biotechnology		School	School of Agriculture	
Academic Year	2022/2023	Year of study	1	Level	1-1
Type	Semestral	Semester	1	ECTS credits	6.0
Code	9029-510-1101-00-22				
Workload (hours)	162	Contact hours	T 30	TP -	PL 30
			TC -	S -	E -
			OT 4	O -	

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s) Amílcar Manuel Lopes António

### Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:

1. Recognize the importance of some fundamental laws of physics to explain some biological phenomena. Make the connection between these laws to explain some simple technological applications.
2. Recognizing the importance of different systems of units, measurements, accuracy and precision. Distinguish and quantify vector and scalar quantities.
3. Understand different properties of some fluids. Calculate densities and pressures. Determine pressure values at different points. Calculate flux values, speed and pressure fluids flow.
4. Determine electrostatic force values and electric fields. Quantify electric current and its effects. Determine field values and magnetic force. Quantify induced voltages and current.
5. Characterize different radioisotopes. Identify different types of ionizing radiation. Determine half-lives of radioisotopes.
6. Estimate the dose, equivalent dose and effective absorbed dose. Recognize the values of maximum dose and its biological effects.

### Prerequisites

Before the course unit the learner is expected to be able to:  
Mathematics, Physics or Chemistry at the level of Secondary Education.

### Course contents

FLUIDS: Properties. Laws of Hydrostatic. Laws of Hydrodynamics. BIOELECTROMAGNETISM: Charge. Force. Field. Energy. Potential. Resistance. Current. Ohm's Law. Kirchhoff's Laws. Simple Models. Magnetic Field. Magnetic Force. Faraday's Law. Induced Currents. RADIOISOTOPES and RADIOACTIVITY: Isotopes and applications. Ionizing Radiations. Half-life. Dose. Effective Dose. Equivalent Dose. Dose Limit. Biological Effects.

### Course contents (extended version)

1. FLUIDS
  - Density. Viscosity. Surface Tension. Capillarity. Pressure.
  - Fundamental law of hydrostatics. Pascal's Principle. Archimedes' Principle.
  - Flow and continuity equation, Bernoulli's equation. Poiseuille's equation and Reynolds number.
2. BIOELECTROMAGNETISMO
  - Electric charge. Electrical force. Electric field. Potential. Potential energy.
  - Voltage, Current and Electric Resistance. Electric models: Kirchhoff laws.
  - Magnetic field and electric current: Biot-Savart's law. Magnetic force: Lorentz's equation.
  - Magnetic flux and magnetic induction: Faraday's law.
3. RADIOISOTOPES and RADIOACTIVITY
  - Types of Radiation. Radioisotopes.
  - Half-life. Law of radioactive decay. Radiotracers.
  - Dose. Equivalent Dose. Effective Dose. Dose Limit. Biological Effects.

### Recommended reading

1. ANTÓNIO, A. L. (2016). "Biofísica - textos e problemas" ( www. esa. ipb. pt/grupofis )
2. DURAN, J. E. R. (2013). "Biofísica : Conceitos e Aplicações". Brasil: Pearson
3. PEDROSO LIMA, J. J. (2014). "Biofísica Médica". Coimbra: Imprensa da Universidade
4. HALLIDAY D. , RESNICK R. , & WALKER J. (2014). "Fundamentals of Physics (10th ed. )". USA: Wiley
5. URONE, P. P. (2016). "Physics with health science applications". USA: Wiley

### Teaching and learning methods

Presentation of fundamental concepts in the proposed content. Resolution of some numerical problems and conducting some experiments, by the teacher and others by the students.

### Assessment methods

- Alternative 1 - (Regular, Student Worker) (Final, Supplementary, Special)
  - Final Written Exam - 90%
  - Practical Work - 10%

### Language of instruction

1. Portuguese
2. English

### Electronic validation

Amílcar Manuel Lopes António	Tomás de Aquino Freitas Rosa Figueiredo	Altino Branco Choupina	Maria Sameiro Ferreira Patrício
05-12-2022	05-12-2022	05-12-2022	19-12-2022