Biophysics

Study Programme: MIMV **Curricular Year: 1st** **Semester: 1st** **Compulsory** **Credits: 4,5 ECTS**

Lecturer(s): António Duarte (CCP), **Maria de S. José Centeno** (R)

1. Contact hours:
Lectures - 28; Theoretical-practical – 88; Laboratory teaching - 24 Total - 140

2. Objectives:
The objectives of Biophysics are: to provide basic knowledge on the physical principles of biological functions; to develop critical thinking necessary for its analysis and interpretation and explain the physical basis of ancillary diagnostic clinical support, most relevant to the practice of veterinary medicine.

3. Programme:
Theoretical: Electrophysiology: physical basis of action potential; pacemaker potentials and cardiac automatism; principles of electrocardiography. Radiations: electromagnetic radiations. Radiometry and radiometric parameters. Stimulated emission-**LASER;** magnetic resonance imaging. X-rays and radiological techniques; computed axial tomography. Detection/quantification of ionizing radiation; biological effects and quantification of radiation biological damage. Radioactive isotopes: radionuclide used in nuclear medicine; radiopharmaceuticals used in scintigrams and positron emission tomography. Mechanics of fluids: measurement of flow in blood vessels; hemodynamic in arteries; vascular resistance; pressure-flow curves; hemodynamic in veins. Liquid properties: viscosity and superficial tension. Transfer processes: diffusion and osmosis. Heat transfer. Sounds: the ultrasonography. Practical:Lenses and optical instruments. Special techniques used in optical microscopy. Physical methods for particles separation. Determination of heart electrical axis. Decay equations and their application in quantitative analysis.

4. Bibliography:

Centeno, M.S.J. (2020). *Manual de Aulas Teóricas e Práticas de Biofísica do MIMV*. Moodle FMV-ULisboa.
Duncan, G. (1990). *Physics In The Life Sciences*. 2th ed, Blackwell S.C, London.
David Randall, Warren Burggren.(2001). *Eckert Animal Physiology: Mechanisms of Adaptation*. Feeman & Cª. U.S.A.
Kane,J.W. & Sternheim, M.M. (1988). *Physics*. John Wiley & Sons, New York.
Klein J. G. (2020). *Cunningham´s Textbook of Veterinary Physiology*. 6th ed. W.B.Saunders Company. Philadelphia.
Levick, J.R. (2000). *Hemodynamic: Pressure, Flow And Resistance*. Arnold, UK.
Lodish, H., *et al.,* (2000). *Molecular Cell Biology*. 4th ed, Freeman & Cª. USA.
Marion, J.B. & Hornyak, W.F. (1985). *General Physics With Bioscience Essays*. John Wiley & Sons, New York. U.S.A.
Mike Martin (2015), 3th ed. Editions, Wiley BlackwellSmall Animal ECGs: An Introductory Guide
Salgueiro, L. & Ferreira, J.G. (1991). *Introdução à Biofísica.* Fundação C.G, Lisboa.
Segel, I.H. (1975). *Biochemical Calculations*. John Wiley & Sons, New York.

5. Assessment:
Final evaluation will be performed by a written examination with a theoretical component, including short answers and a practical component with exercises to solve, covering all matter.