Biophysics

Study programme: MIMV Curricular Year: 1st Semester: 1st Compulsory ECTS: 4,5

Lecturers: António Freitas Duarte (CCP, R)

1. Contact Hours: Lectures - 28; Practical – 28

2. Objectives:
The aim of this course is to provide foundational knowledge of the physical principles underlying biological functions. It will also foster critical thinking skills essential for analyzing and interpreting these principles. Additionally, the course will explain the physical basis of key diagnostic tools and clinical support techniques, particularly those 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:

- Klein B.G. (2020). *Cunningham´s Textbook of Veterinary Physiology*. 6th Ed. W. B. Saunders
- Martin M. (2015). Small Animal ECGs: An Introductory Guide. 3rd Ed., Wiley Blackwell
- Zao P., Stabler T.N., Smith L.A., Lokuta A. & Griff E. (2020) *PhysioEx 10.0: Laboratory Simulations in Physiology*, 1st Ed., Pearson.
- Handouts prepared by the teaching staff.

5. Assessment
The final assessment consists of a written exam that includes both theoretical questions, requiring short responses, and a practical section with problem-solving exercises. The exam covers all course material.