****

Department of Biology

College of Education

Salahaddin University-Erbil

Subject: **Practical Animal physiology**

Course Book – (Year: 3)

Lecturer's name: **Sarwar N. Jafar -Ph.D.**

Academic Year: **2023/2024**

**Course Book**

|  |  |
| --- | --- |
| **1. Course name** | Practical Animal Physiology |
| **2. Lecturer in charge** | Sarwar N. Jafar |
| **3. Department/ College** | Biology/College of Education |
| **4. Contact** | **E-mail**: Sarwarnawzad@gmail.com  **Tel**: 0750 4654287 |
| **5. Time (in hours) per week** | **(6 hrs.)** |
| **6. Office hours** |  |
| **7. Course code** | **EdB0303** |
| **8. Teacher's academic profile** | I was born in Erbil in 1984, I finished High school in 2001 and attended to College of Education, Biology Department/Salahaddin University /Erbil during 2001-2005, and I was among the top 10 students in Biology class and college level with a grade of 80.396.  In April 2007 started working as an official employee in the biology department as an assistant biologist which my role was to assist the head of the biology department and help lecturers in biology laboratories and teach students the practical parts. I got my master’s degree and animal physiology in 2012 with a grade of 83. Then I got my Ph.D. in animal physiology as well in June 2020.  My academic title is Lecturer now, and I have taught various courses during my career as a lecturer, including Animal Physiology, Anatomy and Physiology, Histology, and Eco statistics. |
| **9. Keywords** | **Hematology, physiological experiments** |
| 10. Course overview:  Physiology is the study of the normal functions of living systems.  This course will introduce students to the basics of invertebrate and vertebrate physiology.  Lectures guide the student through the various body systems and their interactions that maintain homeostasis in animals.  Associated practical’s allow the student to explore systems in further detail and to develop relevant lab skills. Several topics are covered throughout the year, including main physiological processes including gas exchange, blood and circulation, osmoregulation, digestion, nervous and muscle systems, and endocrinology, and an understanding of the physiological problems animals face and how they solve those problems. As a branch of biology, Animal physiology is closely related to Histology and Cytology. Animal Physiology makes extensive use of the principles and methods of physics, chemistry, and mathematics. The chemical and physical processes occurring in the organism are studied in conjunction with biochemistry, biophysics, and evolutionary laws studied in conjunction with embryology. Animal Physiology is most closely associated with medicine, which utilizes physiological achievements to diagnose, treat, and prevent a variety of diseases. Clinical medicine, in turn, provides physiology with new areas of investigation.  The comparative approach can help us to develop a general evolutionary framework in which to address physiological problems. By comparing how different animals solve related problems in various environments, we can begin to gain insight into physiological principles that apply across levels of organisms and environments. | |
| **11. Course objective:**  **The course has two primary objectives:**   * The first is for every student to obtain a working knowledge and understanding of basic Animal physiology, including describing the systems and processes involved in and explaining the physiological processes and the major organ systems of the body, including the cardiovascular, circulatory system, gastrointestinal, muscular and nerve, endocrine systems. * The second is to apply these physiological principles to problem-solving situations, as observed in medical situations, including cardiac problems, hypertension, acid-base balance disturbances, and endocrine imbalances. The endpoint of both objectives is to obtain a practical understanding of physiology that students can build upon. | |
| **12. Student's obligation**  **The role of students and their obligations throughout the academic year include:**  **A. Quizzes and daily activities and seminar**  **B. 1st practical examination**  **C. 2nd practical examination**  **D. 3rd practical examination** | |
| **13. Forms of teaching**  Different forms of teaching will be used to reach the objectives of the course:  Using projectors to view PowerPoint slides and laser pointers for further explanation and using the whiteboard and colored pens to illustrate the lab notes or slide preparation, laboratory test, or experiment. | |
| **14. Assessment scheme**  **Course grade**  **The following assignments will determine the grade: Quizzes, activities, participation in lab work, daily questions, and examinations during the year.**  **No.** Exam (Evaluation) Marks  1. Quizzes and daily activities 3%  2. 1st Practical Exam 15%  3. 2nd Practical Exam 15%  4. Lab Activities 2%  **5. Total Scores 35%‌** | |
| 15. **Student learning outcome:**  **After completing this course, students should be able to describe, identify, and/or explain:**   1. The various physiological organ systems and their importance to the integrative functions of the human body. 2. Body fluid compartments and the ionic composition of body fluids. 3. Movement of water and solutes between the fluid compartments. 4. The concept of homeostasis includes setpoints, negative and positive feedback loops, and compensatory responses. 5. Structure of biological membranes. The function of biological membranes, including membrane proteins' role in catalysis, recognition, and transport. 6. Demonstrate an understanding of the components of human blood and the characteristics, functions, abnormalities, and disease states of each. 7. Demonstrate proficiency in the skills necessary to perform blood cell counts and evaluate blood elements within stated limits of accuracy. 8. Motility, secretion, digestion, absorption in the gastrointestinal system. 9. Organization structural and functional organization of the nervous system, including the central and peripheral nervous systems, the autonomic nervous system, and the enteric nervous system. 10. The resting membrane potential, the action potential, and action potential propagation along the axon. 11. Structure and function of skeletal muscle, including excitation-contraction coupling, sliding filament mechanism, force generation, and isometric versus isotonic contractions. 12. Structure and functions of the cardiovascular system, including the mechanical and electrical properties of cardiac muscle function. 13. Reflex regulation of blood pressure. 14. Principles of hormone action, including structure, mechanism of release from the endocrine cell, mode of transport in blood, mechanism of action in target cells, and systemic effects of important hormones. 15. The kidney nephrons' structure and functions including glomerular filtration, tubular reabsorption, tubular secretion, and excretion. | |
| **16-Course Reading List and References‌**  **1-**Textbook of Medical Physiology by Arthur C. Guyton and John E. Hall,  11th edition, 2006.  2-Essentials of Anatomy and Physiology by Valerie C. Scanlon and Tina Sanders,  5th edition, 2007.  ▪ Useful references:  1. Experiments in physiology by Gerald D. Tharp, 5th edition, 1986.  2. A laboratory guide to human physiology by Stuart Ira Fox, 2002.  ▪ Journals and review (internet): | |
| **17. The Topics: Animal physiology lab Lecturer's name: Sarwar N. Jafar** | |
| **18. Practical Topics** | |
| |  |  | | --- | --- | | Topics | Weeks | | 1-Osmosis and cell permeability  Purpose of the lab, Background, Procedure Biological membrane, solutions depending on tonicity | Sarwar N. Jafar  Time: (6 hrs.) | | 2-Blood groups and matching  Purpose of lab, Background, Procedure Crossmatching, blood groups, and pregnancy | Sarwar N. Jafar  Time: (6 hrs.) | | 3. Hemoglobin determination  Purpose of lab, Background, Procedure Function, factors influencing hemoglobin levels | Sarwar N. Jafar  Time: (6 hrs.) | | 4. Red blood cell count  Purpose of lab, Background, Procedure  Mammalian erythrocytes, Data interpretation | Sarwar N. Jafar  Time: (6 hrs.) | | 5. Packed cell volume (PCV) and Blood indices  Purpose of lab, Background, Procedure  Relationship between hematocrit and hemoglobin | Sarwar N. Jafar  Time: (6 hrs.) | | 6. White blood cell count  Purpose of lab, Background, Procedure Clinical significance, Causes of leucocytosis | Sarwar N. Jafar  Time: (6 hrs.) | | 7. Differential white blood cell count  Purpose of lab, Background, Procedure Granulocytes, agranulocytes, Wright's stain | Sarwar N. Jafar  Time: (6 hrs.) | | 8. Blood coagulation  Purpose of lab, Background, Procedure Bleeding time, clotting time | Sarwar N. Jafar  Time: (6 hrs.) | | 9. Erythrocyte sedimentation rate  Purpose of lab, Background, Normal values, Factors affecting the ESR | Sarwar N. Jafar  Time: (12hrs.) | | 10. Blood pressure measurement  Purpose of lab, Background, Systolic blood pressure, Diastolic blood pressure | Sarwar N. Jafar  Time: (6 hrs.) | | 11. Digestion of carbohydrates by salivary amylase  Purpose of lab, Background, Procedure  physical digestion, chemical digestion, maltose test | Sarwar N. Jafar  Time: (6 hrs.) | | 12. Gastric Digestion of Protein  Purpose of lab, Background, Procedure gastric juice, protease pepsin, pH | Sarwar N. Jafar  Time: (6 hrs.) | | 13. Glucose tolerance test  Purpose of lab, Background, Procedure Pancreas, insulin, what is diabetes | Sarwar N. Jafar  Time: (6 hrs.) | | 14. Insulin shock  Purpose of lab, Background, Procedure Hypoglycaemia, symptoms of glucose deficiency | Sarwar N. Jafar  Time: (6 hrs.) | | 15. Microcirculation  Purpose of lab, Background, Procedure Capillary function, autoregulation | Sarwar N. Jafar  Time: (6 hrs.) | | 16. Skeletal muscle physiology  Purpose of lab, Background, Procedure  Simple twitch, stages of a simple twitch, kymograph | Sarwar N. Jafar  Time: (6 hrs.) | | 17. Skeletal muscle physiology  Purpose of lab, Background, Procedure Effect of frequency on skeletal muscle contraction | Sarwar N. Jafar  Time: (6 hrs.) | | 18. Cardiac muscle physiology  Purpose of lab, Background, Procedure The frog heart, pacemaker, heartbeat | Sarwar N. Jafar  Time: (6 hrs.) | | 19. Cardiac muscle physiology  Purpose of lab, Background, Procedure Effects of drugs and temperature on the frog heart | Sarwar N. Jafar  Time: (6 hrs.) | | 20. Reflex action  Purpose of lab, Background, Procedure Reflex arc, spinal shock, crossed extensor reflex | Sarwar N. Jafar  Time: (6 hrs.) | | 21. General urine examination (GUE)  Purpose of lab, Background, Procedure Physical examination, Chemical, microscopic examination | Sarwar N. Jafar  Time: (6 hrs.) | | |
| **19. Extra notes:** | |
| **20. Peer review پێداچوونه‌وه‌ی هاوه‌ڵ** | |