

**American University of Beirut
Faculty of Arts & Sciences
Department of Biology
Syllabus**

Course number: Biology 247
Course title: Animal Physiology

Textbook: Animal Physiology, Mechanisms and Adaptations by David Randall, Warren Burggren & Kahleen French, 5th edition.

Course description:

The course is a study of the fundamental principles and mechanisms that govern body functions in animals, with an emphasis on the molecular aspects.

Course objectives:

By the end of this course the student should be able to :

- 1- Understand the basic principles that govern body functions
- 2- Relate function to structure from the molecular to the organismic level
- 3- Understand the concepts of homeostasis
- 4- Predict animal responses to changes in the internal and external environment
- 5- Compare the different modes by which organisms have adapted to survive similar environmental challenges
- 6- Interpret experimental results based on acquired knowledge
- 7- Apply basic principles to new situations

Course policy:

Attendance: Students are expected to attend classes regularly. In case a meeting is missed, it is the responsibility of the student to cover, on his own, the material discussed in class during his absence.

Missed exams: No make-up will be given for a missed exam unless a valid reason is presented. In case of illness only medical reports issued by the infirmary are accepted.

Class discussions: students are expected to participate in class discussions throughout the term. The extent of their participation will have its impact on the final grade.

Means of evaluation:

Quiz I: 30% (5th week)
Quiz II: 30% (10th week)
Final : 35%
Participation in class discussions : 5%

Course outline:

| Topic | Chapter |
|-------------------------------------------------------------------|---------|
| Membranes, channels and Transport Types of transport processes | 4 |

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|---------------------------------------------------|----|
| Osmotic properties of cells | |
| The Physical Basis of Neuronal Functions | 5 |
| Passive electrical properties of membranes | |
| Electrochemical gradients | |
| Resting and action potentials | |
| Communication along and between neurons | 6 |
| Signal propagation within and between neurons | |
| Chemical nature of neurotransmitters | |
| Postsynaptic mechanisms | |
| Synaptic plasticity | |
| Sensing the environment | 7 |
| General properties of sensory perception | |
| Chemoreceptors | |
| Mechanoreceptors | |
| Thermoreceptors | |
| photoreceptors | |
| Glands and hormones | 9 |
| Cellular secretions | |
| Secretory mechanisms | |
| Endocrine & exocrine secretions | |
| Hormones and intracellular signaling | |
| Muscles and animal movements | 10 |
| Skeletal muscle structure and fiber types | |
| Mechanics of muscle contraction | |
| Regulation of muscle contraction | |
| Energetics of muscle contraction | |
| Cardiac muscle | |
| Skeletal muscle | |
| Circulation | 12 |
| Electrical and mechanical properties of the heart | |
| Hemodynamics | |
| Peripheral circulation | |
| Gas exchange and acid-base balance | 13 |
| Oxygen and carbon dioxide in blood | |
| Regulation of body pH | |
| Gas transfer in air | |
| Gas transfer in water | |
| Regulation of gas transfer | |
| Respiratory responses to extreme conditions | |
| Ionic and osmotic balance | 14 |
| Osmoregulation in aqueous and terrestrial | |
| Environments | |
| Osmoregulatory organs | |
| Mammalian kidney | |
| Extrarenal osmoregulatory organs | |