

# BIOLOGY ENTRANCE EXAM SYLLABUS

SCHOOL OF MEDICINE

UNIVERSITY OF NAVARRA

## 1. UNITY AND LIFE DIVERSITY

Biodiversity. Species concept. Classification systems. Fundamental characteristics of the five kingdoms.

Levels of organization of living beings.

Cell theory. The cell: unit of structure and function.

Models of cellular organization: prokaryotes and eukaryotes.

Microscopic observations of single-celled organisms and animal tissues.

## 2. TISSUES, ORGANS, DEVICES AND SYSTEMS IN THE HUMAN BEING

Tissues: epithelial, muscular, nervous, connective.

Organs.

Systems: digestive, respiratory, excretory, reproductive.

Systems: integumentary, nervous, circulatory, endocrine, muscular, skeletal, lymphatic.

Vital functions: nutrition, relationship, reproduction.

Nutrition function. Stages of the nutrition process. The nutrients. Balanced diet. Food classification. Vitamins.

Relational function. Sensory receptors. Nerve impulse. Synapse. Central and peripheral nervous system. Hormonal coordination. Main hormones.

Reproduction function. Female and male reproductive system. The formation of gametes. Fertilization and embryonic development. Menstrual cycle.

## 3. MOLECULAR AND PHYSIOCHEMICAL BASIS OF LIFE

Chemical composition of living beings.

Bioelements: primary, secondary, trace elements.

Organic biomolecules: carbohydrates, lipids, proteins and nucleic acids.

Inorganic biomolecules: water and mineral salts.

Chemical bonds and their importance in Biology.

Biocatalysts. Enzymes.

#### 4. MORPHOLOGY, STRUCTURE AND CELLULAR FUNCTIONS

Cell morphology. Structure and function of the cell envelope, nucleus and organelles.

Membranes and their function in cellular exchanges. Transport of molecules across the membrane. Selective permeability. The processes of endocytosis and exocytosis.

The cell cycle. Phases. Cellular division. Mitosis and meiosis.

Metabolic processes: anabolism and catabolism. Energy and ATP.

Cellular respiration, its biological meaning. Aerobic and anaerobic pathways. The mitochondria: structure, composition and functions.

Catabolism of carbohydrates, lipids and proteins.

Chemosynthesis.

Cellular study methods.

#### 5. THE INHERITANCE. MOLECULAR GENETIC

Human genetics, genes, chromosomes, inheritance, genotype, phenotype, karyotype.

Mendel's Laws.

Chromosomal theory of heredity.

Inheritance of sex. Sex-linked inheritance. Inheritance influenced by sex.

Molecular genetics or chemistry of heredity. Identification of DNA as a carrier of genetic information. Structure and function of DNA.

RNA: structure, types and function.

Replication, transcription and translation mechanisms.

The characteristics and importance of the genetic code and the experimental evidence on which it is based.

Genomics and proteomics. Genetically modified organisms.

Alterations in genetic information; the mutations. Mutagenic agents. Mutations and cancer. Genetic diseases. Implications of mutations in the evolution and appearance of new species.

## 6. THE WORLD OF MICROORGANISMS AND ITS APPLICATIONS

The study of the diversity of microorganisms. Their ways of life. Bacteria and viruses: classification, structure, life cycle.

Interactions with other living organisms. Intervention of microorganisms in biogeochemical cycles.

Pathogenic microorganisms and infectious diseases. Asepsis and antisepsis.

Introduction to the methods of study and cultivation of microorganisms.

Use of microorganisms in industrial processes. Social and economic importance.

## 7. IMMUNITY AND ITS APPLICATIONS

Concept of immunology, immune system and immunity. Types of community response. Defenses of the organism. Inflammatory response. Immunological reactions: cellular and humoral.

Concept of antigens. Concept of antibodies: structure and functions. Antigen-antibody reaction.

Mechanism of the immune response. Immunological memory.

Natural and artificial acquired immunity. Vaccines and sera.

Disorders of the immune system: allergies and immunodeficiencies, acquired immunodeficiency syndrome (AIDS) and its effects on the immune system, other diseases of the immune system.

Monoclonal antibodies and genetic engineering.

Organ transplantation and rejection problems.