ADMISSIONS EXAM
CONTENTS OF BIOLOGY

SCHOOL OF MEDICINE
UNIVERSIDAD DE NAVARRA

Universidad de Navarra

1. UNITS AND DIVERSITY OF LIFE

- Biodiversity. The concept of species. Systems of classification. Basic characteristics of the five kingdoms.
- Levels of organization in living beings.
- Cell theory. The cell: unit of structure and function.
- Models of cellular organization: prokaryotes and eukaryotes.
- Microscopic observations of unicellular organisms and animal tissues.

2. TISSUES, ORGANS, APPARATUSES AND SYSTEMS IN THE HUMAN BEING

- Tissues: epithelial, muscular, nervous, connective.
- Organs.
- Apparatuses: digestive, respiratory, excretory, reproductive.
- Systems: integumentary, nervous, circulatory, endocrine, muscular, skeletal, lymphatic.
- Vital functions: nutrition, relation, reproduction.
- Nutrition function: Stages in the process of nutrition. Nutrients. Balanced diet. Classification of foodstuffs. Vitamins.
- The function of relation. Sensorial receptors. Nerve impulse. Synapse. Central and peripheral nervous systems. Hormonal coordination. Principal hormones.
- Reproduction function. The female and male reproductive apparatus. The formation of gametes. Fecundation and embryonic development. The menstrual cycle.

3. THE MOLECULAR AND PHYSICOCHEMICAL BASIS OF LIFE

- Chemical composition of living beings.
- Bio-elements - principal; secondary; minerals, vitamins and amino-acids.
- Organic biomolecules: carbohydrates, lipids, proteins, and nucleic acids.
- Inorganic biomolecules: water and minerals
- Chemical bonds and their importance in biology.
- Bio-catalysts. Enzymes.

4. CELLULAR MORPHOLOGY, STRUCTURE AND FUNCTION

- Cellular morphology. Structure and function of the cell-membrane, nucleus and cellular organs.

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

- The cell cycle. Stages. Cellular division. Mitosis and meiosis.

- Metabolic processes: anabolism and catabolism. Energy and ATP.

- Cellular respiration and its biological implications. Aerobic and anaerobic pathways. Mitochondria: structure, composition, functions.

- Catabolism of carbohydrates, lipids and proteins.

- Chemosynthesis.

- Methods for studying cells.

5. INHERITANCE. MOLECULAR GENETICS.

- Human genetics, gene, chromosome, inheritance, genotype, phenotype, karyotype.

- Mendel's laws.

- Chromosomal theory of inheritance.

- Sex inheritance. Sex-linked inheritance. Sex-influenced inheritance.

- Molecular genetics or the chemistry of inheritance. Identification of DNA as the carrier of genetic information. Structure and function of DNA.

- RNA: structure, types and function.

- The characteristics and importance of the genetic code and their experimental bases.

- Genomics and proteomics. Genetically modified organisms.

- Alterations in genetic information; mutation. Mutagenic agents. Mutation and cancer. Genetic diseases. Implications of mutation in evolution and the appearance of new species.

6. MICROORGANISMS AND THEIR USES.

- Study of the diversity of microorganisms. Forms of life. Bacteria and viruses: classification, structure, life-cycle.

- Interactions with other living beings. Intervention of microorganisms in biogeochemical cycles.

- Pathogenic microorganisms and infectious diseases. Asepsis and antisepsis.

- Basic concepts in the study and culture of microorganisms.

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

7. IMMUNITY AND ITS APPLICATIONS

- The concept of immunology, the immune system and immunity. Types of immune response.

- Defences of the organism. Inflammatory response. Immunological reactions: cellular and humoral.

- The concept of antigen. The concept of antibody: structure and functions. The antigen- antibody reaction.

- Mechanisms of immune response action. Immunological memory.

- Natural, artificial and acquired immunity. Antiserum and vaccines.

- Dysfunctions of the immune system: allergies and immunodeficiency, acquired immune deficiency syndrome (AIDS) and its effects on the immune system, other immune system illnesses.

- Monoclonal antibodies and genetic engineering.

- Organ transplant and the problems of rejection.