

ENTRANCE EXAM SYLLABUS

A candidate applying for enrolment in the first year of study takes the entrance exam according to the programme adopted by the Teaching - Scientific Council. Knowledge and performance testing is based on the answers to the test questions. The test questions are from Chemistry and Biology for Integrated Academic Studies in Medicine.

BIOLOGY

The programme for test taking in Biology course at the entrance exam for The Faculty of Medicine includes the following subject areas and topics:

CELL BIOLOGY

TOPIC 1. PROKARYOTIC AND EUKARYOTIC CELL

TOPIC 2. PLASMA MEMBRANE

- Unit 1. Structure and functions of plasma membrane
- Unit 2. Transport across a plasma membrane (passive, active, vesicular transports)

TOPIC 3. CYTOPLASM

- Unit 1. Cytoplasm - structure and functions
- Unit 2. Cytoplasmic organelles in animal cells
- Unit 3. Cytoskeleton

TOPIC 4. NUCLEUS

TOPIC 5. EUKARYOTIC CELL CYCLE

- Unit 1. Introduction to the cell cycle
- Unit 2. Interphase
- Unit 3. Mitotic cell division

TOPIC 6. VIRUSES

TOPIC 7. BACTERIA AND ARCHAEA

ANIMAL PHYSIOLOGY

TOPIC 1. NERVOUS SYSTEM

TOPIC 2. SENSES

TOPIC 3. BODY FLUIDS. CIRCULATORY SYSTEM

TOPIC 4. RESPIRATORY SYSTEM

TOPIC 5. DIGESTIVE SYSTEM

TOPIC 6. EXCRETORY SYSTEM. OSMOREGULATION

TOPIC 7. ENDOCRINE GLANDS. HUMORAL REGULATION

TOPIC 8. THERMOREGULATION

DEVELOPMENTAL BIOLOGY

TOPIC 1. REPRODUCTION OF ANIMALS

- Asexual and sexual reproduction

TOPIC 2. GAMETOGENESIS

- Meiosis - meiosis I, meiosis II
- Oogenesis - general pattern of eggs formation
- Spermatogenesis - general pattern of spermatozoa formation

TOPIC 3. FERTILIZATION

TOPIC 4. EARLY STAGES OF EMBRYOGENESIS AND ORGANOGENESIS

- Cleavage and implantation. Blastula. Blastocyst
- Egg types according to distribution of yolk in the cytoplasm
- Cleavage patterns
- Gastrulation: Gastrula. Types of cell movements
- Neurulation and development of axial organs (neural tube, notochord, gut tube)
- Cell differentiation
- Fate mapping
- Embryonic induction

TOPIC 5. EXTRAEMBRYONIC MEMBRANES

- Yolk sac, amnion, chorion, allantois
- Placenta and types of placenta

TOPIC 6. HUMAN PRENATAL DEVELOPMENT

- Cleavage and implantation
- Mammalian extra-embryonic membranes and the placenta

- Gastrulation and organogenesis
- Fetal period

MOLECULAR BIOLOGY

TOPIC 1. NUCLEIC ACIDS AND PROTEINS

- Unit 1. DNA
- Unit 2. RNA
- Unit 3. Molecular organization of eukaryotic chromosomes
- Unit 4. Proteins

TOPIC 2. DNA REPLICATION

TOPIC 3. TRANSCRIPTION

TOPIC 4. TRANSLATION

TOPIC 5. REGULATION OF GENE EXPRESSION

GENETICS

TOPIC 1. BASIC PRINCIPLES OF GENETICS

- Unit 1. Basic genetic concepts and terms: Heredity, chromosome, genes and chromosomes, homologous chromosomes, gene/allele, homozygous/heterozygous, dominant/recessive allele, genotype, phenotype
- Unit 2. Monohybrid cross: Mendel's first law (principle of segregation), test cross
- Unit 3. Dihybrid cross: Mendel's second law (principle of independent assortment)
- Unit 4. Non-Mendelian inheritance: incomplete dominance, codominance, polygenic inheritance, multiple allele traits (inheritance of blood groups), epistasis, linked genes

TOPIC 2. SOURCES OF GENETIC VARIABILITY

Unit 1. RECOMBINATIONS

- Recombination of genes and chromosome mapping

Unit 2. MUTATIONS

- Definition and types of mutations: germinal/somatic mutation, spontaneous/induced mutation, point mutation, gene mutation, chromosomal mutations (aberrations)
- Gene mutations: base substitutions, missense/nonsense/neutral/silent mutations, frameshift mutations

- Numerical chromosomal aberrations: Polyploidy, Aneuploidy (primary and secondary nondisjunction)
- Structural chromosomal aberrations: Unbalanced/Balanced aberrations - Deletion, Duplication, Inversion, Translocation
- Mutagenic factors: environmental mutagens

TOPIC 2. POPULATION GENETICS

- Unit 1. Genetic structure of population
- Unit 2. Hardy–Weinberg principle: Factors that alter genetic (Hardy-Weinberg) equilibrium

HUMAN GENETICS

TOPIC 1. HUMAN CHROMOSOMES AND HUMAN KARYOTYPE

TOPIC 2. CHROMOSOMOPATHIES

TOPIC 3. PATTERNS OF MENDELIAN INHERITANCE IN HUMANS

TOPIC 4. GENETIC COUNSELING AND PRENATAL DIAGNOSTICS