

Biology BSc programme state exam topics - University of Debrecen

Spring semester of the academic year 2023/24

According to the current university and faculty regulations, the state exam will be an in-person oral exam. Before starting their exams, each student will randomly pick a topic that includes two subtopics (see the list below with subtopics "A" and "B" for each topic). After picking their topics, the students will have 20-25 min to sketch notes for their exam. During the course of the exam, students first briefly present their theses and address any respective question by the board (~5 min as a total). The presentation is expected to be short and concise and should include 5-7 powerpoint slides at most. Following that, the students briefly (~10 min as a total) summarize the two subtopics of their topic and respond to any question by the board. The final grade will be calculated based on the following four grades:

- Thesis grade - by the supervisor
- Thesis presentation grade - by the state exam board
- Grade on subtopic A - by the state exam board
- Grade on subtopic B - by the state exam board

Biology BSc state exam topics

1. **A:** Basic groups, properties and role of biomolecules in the metabolism of plants and animals. **B:** Synthesis pathways and analytical methods to study biomolecules.
2. **A:** The evolution of eukaryotic cells. Biological membranes and transmembrane transport. **B:** The structure and components of pro- and eukaryotic cells.
3. **A:** Molecular mechanism of photosynthesis. **B:** Comparison of alternative photosynthetic pathways and their ecological significance.
4. **A:** Glycolysis and biological oxidation. **B:** Fermentation and its applications in food processing/production.
5. **A:** Information macromolecules (RNA, DNA). **B:** Gene expression and regulation, their biotechnological applications.
6. **A:** Cell cycle and cell division. **B:** Cloning, DNA fingerprinting, GMO and their practical applications.
7. **A:** Inheritance patterns: Mendelian genetics and non-mendelian inheritance mechanisms. **B:** Point mutations, chromosomal abnormalities and their consequences. Genetic linkage and recombination.
8. **A:** Structure, growth and regulation of populations. **B:** Prey-predator interactions, competition, symbiosis. Spatial and temporal changes in communities.
9. **A:** Material and energy fluxes in ecosystems. Biomes and biogeography. **B:** Global environmental changes and their impacts on ecosystems.
10. **A:** Animal and human behaviour. Communication, competition. **B:** Sexual selection, mating and parental care. Animal societies.

11. **A:** Mechanisms of hormonal regulation in plants. **B:** Environmental responses of plants.
12. **A:** The biology of prions and viruses. **B:** Human pathogenic bacteria and fungi.
13. **A:** Mechanisms of defense against pathogens, parasites and predators in microbes and plants. **B:** Innate and adaptive immunity in animals.
14. **A:** The history of life on Earth. **B:** The origin of species: definition, speciation and extinction. Protection of endangered species.
15. **A:** Definition and principles of biological evolution, Types of evolutionary change. **B:** The Hardy-Weinberg equilibrium theorem of population genetics.
16. **A:** Biological classification: systematics and taxonomy. Morphological and molecular evolutionary trees. **B:** Evolution of animals and description of the major animal groups..
17. **A:** The evolution and systematics of plants. **B:** The evolution and systematics of fungi.
18. **A:** Uptake and transport of water and nutrients in vascular plants. **B:** Reproduction in flowering plants.
19. **A:** Sexual and asexual modes of reproduction in animals, plants and microorganisms. **B:** Main stages of animal embryonic development and human ontogeny.
20. **A:** The evolution of the respiratory system in animals. **B:** The evolution of the circulatory system in animals.
21. **A:** Hormonal regulation in animals. **B:** Homeostasis and the nervous system.