

Learning outcomes for the graduate study of molecular biology

1. Integrate the theoretical basics of genetics, immunology, evolution and cell biology in the context of organisation of the genome at the level of chromosomes and chromatin.
2. Link data on DNA sequences with the structure of the chromosome and gene expression at the tissue and cell levels.
3. Analyse the basic properties of expression vectors and apply the fundamental principles of recombinant protein expression, the purification of recombinant proteins and procedures that are carried out in the study of interactions among proteins.
4. Link the representation and manner of activity of the most important mutagens and carcinogens with tumour emergence and progression.
5. Explain the mechanisms of emergence of tumour diseases, emphasising their common properties and recommended target treatments based on the disturbed signal pathway.
6. Determine the significance of viruses for the origin and evolution of the living world, the development of molecular sciences on life and innovative disease therapy.
7. Discuss the role of molecular biology in the context of researching plant pathogens, the diseases they cause, and the general host-pathogen interaction.
8. Apply the concepts of population and quantitative genetics in relevant branches of biology (botany, zoology, evolutionary biology and ecology) and applied biology (conservation biology, agronomy, medicine and forensic science).
9. Use the laws of thermodynamics to understand biochemical processes at the molecular level.
10. Link the structure, symmetry and property of molecules with phenomena in the rotation spectrums for linear, spherical, symmetrical and asymmetrical rotors, for the purpose of better understanding the structure and function of proteins.
11. Critically select an adequate biophysical model to resolve a specific biological problem.
12. Monitor and critically evaluate the primary scientific publications in computer biology, and independently apply the method of computer genomics on the publically available biological data.
13. Justify the selection of materials and methods in research, in line with the ethical principles of national and international laws and directives.
14. Apply methods in molecular biology and the appropriate devices in diagnosing viral diseases, leukaemia, criminal processing, determining relations and migration of peoples.
15. Assess the literature with the selection of relevant data to support or refute the scientific results of others, following the criteria of preparation and presentation of a scientific review paper as a model applicable for the presentation of one's own or another's work to the expert public.
16. Design an experiment, taking into account the principles of the scientific method and experimental approach to resolving scientific problems and planning of scientific research.
17. Participate in team work and adapt to the requirements of the work environment.
18. Prepare the documentation for a project proposal of a scientific study. Assess the quantity of necessary material resources for an experiment, and prepare the budget for materials, equipment and labour.

19. Critically evaluate a project proposal, study results and overview, scientific paper, journals and the work of scientists.
20. Improve the use of different laboratory techniques and methods as needed in diagnostics, criminal studies and similar expert and scientific analyses.