

## Graduate university study – Ecology and conservation

### LEARNING OUTCOMES

Following the successful completion of university graduate study, students attain the foundation of knowledge of fundamental and applied biology, which will enable their further education at the university postgraduate (doctoral) studies in the field of Biology at the Faculty of Science, University of Zagreb or at other universities worldwide, or enable them to partake in scientific research work.

### ATTAINED COMPETENCIES AND TASKS

The university graduate study programme enables theoretical and practical education in all fields of biology (molecular biology, genetics, biodiversity, ecology of systems and ecophysiology, marine biology, population biology of plants and animals, evolution, etc.) and other natural sciences where the majority of tasks involve a high degree of expert knowledge. Graduates independently use the attained current, fundamental theoretical and practical knowledge on organisms and life processes, so as to apply this to existing and new areas of science in resolving biological issues. This knowledge enables them to define and analyse problems, and to evaluate the results and propose the appropriate theoretical and experimental solutions. They master the knowledge on universal elementary life processes, their molecular and structural bases, genetic diversity, genetic changes and their evolutionary dimensions, and also the fact that the success of individual organisms depends on their mutual relationships with other organisms and the environment, and basic knowledge on diversity and forms of organisms, their development and functional position in the ecosystem. Advancing and developing theory and methods, applying scientific knowledge, education in a systematic manner, actively participating in fundamental and applied research.

The attained knowledge will allow for employment in scientific institutions (researchers, junior researchers and scientific associates) and as experts (laboratory heads), they will be trained for work in medical, pharmaceutical, diagnostic, forensic and other laboratories and

biotechnology companies, in agriculture and forestry, conservation and environmental protection, and in state institutions, or in private enterprise.

With the drafting of the graduate thesis, students prove their capability in planning and independently carrying out their own research project, and presenting the results in written and oral form.

### **Expected learning outcomes at the level of the study programme**

Upon completion of the study programme, students will be able to:

1. explain the need for intra- and interdisciplinary cooperation in researching different ecosystems;
2. use highly specialised theoretical and practical knowledge in planning solutions for environmental protection issues, the application of standard and new research methods and taking an interdisciplinary approach;
3. critically appraise the strategic work of the team, with self-analysis of the personal contribution in execution of the task;
4. prepare the documentation of the project proposal for the scientific research;
5. to give a well-argued overview of the project results and methods to the expert and general public, using the appropriate techniques;
6. use, control, design, plan and direct laboratory and field work and studies in analysing the environment;
7. propose procedures and decisions for the needs of spatial planning and environmental protection;
8. associate the ecology of an organism with the environmental conditions at a spatial micro- and macro-scale;
9. conceive effective methods to manage wild populations, taking the legal and administrative limitations into account;
10. identify the significance of plant cover as an indicator of change in the environment, and as an active participant in the formation of environmental conditions or habitat types;
11. analyse the interrelationships of all the biotic and abiotic components with the environmental conditions, with independent recognition and classification of taxa;
12. associate the physiological processes in the organism with the effects of environmental factors;
13. implement research techniques for bacteria and viruses for the needs of analysing microbiological ecosystems;
14. describe the differentiating properties of terrestrial, aquatic and marine ecosystems and the accompanying communities;
15. outline the chemical and biological causes and effects of thermal stratification of the freshwater and marine environment;

16. recognise the factors that influence the growth of phyto- and zooplankton as support to the arguments of the causes and effects of eutrophication.
17. analyse the effects of organic and inorganic pollution on terrestrial aquatic and marine systems;
18. search the contemporary scientific and expert literature for the needs of collecting specific data on the subject of study;
19. process the obtained research results using statistical packages;
20. discuss the results of conducted field and laboratory research in the preparation of scientific or expert reports;
21. present a well-argued position with a critical review of contemporary concepts in ecology and conservation;
22. explain the interactions of abiotic and biotic factors in the environment on the assessment of the quality of individual ecosystem types;
23. differentiate the basic and specific methods that we use in researching different types of ecosystems and recognise their possibilities and limitations;
24. explain the ecological interactions that unfold in various types of ecosystems and the human impacts on them;
25. explain the threats to life in various types of ecosystems and justify the need for their protection;
26. explain the geomorphology, hydrogeology and research methods specific to karst;
27. understand the biogeochemical processes in all trophic levels of individual ecosystems;
28. apply the attained knowledge to the restoration of individual ecosystems;
29. analyse the activity of physical, chemical and biological processes on the emergence and development of the pedosphere and its influence on the biology of living beings;
30. apply the molecular methods in ecological research of plant and animal populations.