University of Ss. Cyril and Methodius in Trnava
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# EDUCATIONAL OBJECTIVES AND OUTPUTS

## Part A: Information on the study programme

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| **Faculty/Institute** | Faculty of Natural Sciences | | | |
| **Field of study** | 3. Biology | | | |
| **Study programme** | Molecular biology | | | |
| **Level of study** | third | | | |
| **Academic degree** | ☐ Bc. | ☐ Mgr. | ☐ Ing. | ☒ PhD. |
| **Form of study** | ☒ full-time | | ☐ part-time | |
| **Language** | English | | | |
| **Place of education** | Faculty of Natural Sciences UCM in Trnava | | | |

## Part B: Defining the objectives and outcomes of education in relation to the profile subjects of the study programme

| **Educational objectives** | | **Educational objectives description** | | |
|---|---|---|---|---|
| **Study semester** | **Profile subject** | **Educational outcomes** | | |
| | | **Acquired knowledge*** | **Acquired skills*** | **Acquired competencies and transferable competencies*** |
| **Study and pedagogical-educational activities** | Independent study of literature according to the recommendation of the supervisor | | **x** | |
| | Methods in molecular biology | **x** | | |
| | Genomics for doctoral students | **x** | | |
| | Proteomics for doctoral students | **x** | | |
| | Functional analysis of proteins and modelling | **x** | | |
| | Selected chapters on the physiology and molecular biology of plant stress | **x** | | |
| **Creative activity** | first-author publication in a scientific journal registered in the Web of Science databases and included in Q1 according to JCR IF | | | **x** |
| | publication in a scientific journal registered in the Web of Science databases and classified in Q1 according to JCR IF | | | **x** |
| | first-author publication in a scientific journal registered in the Web of Science databases and included in Q2 according to JCR IF | | | **x** |

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| | publication in a scientific journal registered in the Web of Science databases and included in Q2 according to JCR IF | | | **x** |
| | first-author publication in a scientific journal registered in the Web of Science databases and included in Q3 according to JCR IF | | | **x** |
| | publication in a scientific journal registered in the Web of Science databases and included in Q3 according to JCR IF | | | **x** |
| | publication in a scientific journal registered in the Web of Science databases and classified in Q4 according to JCR IF | | | **x** |
| | publication in a scientific journal registered in the Web of Science or Scopus databases without inclusion in Q1-Q4 in JCR IF | | | **x** |

* Knowledge, skills, competencies, and transferable competencies are mentioned only in those profile subjects that lead to their acquisition. It is not necessary to list all types of educational outcomes for each profile subject, and conversely, if we get all outcomes with a profile subject, they are listed in each column.

The aim of the study in the PhD. study program Molecular biology is the development of intellectual and creative abilities, and practical skills in the field of molecular biology.

After successful completion of the subject **Independent study of professional literature according to the recommendation of the supervisor I, II**, the student

- acquires the ability to search for and process professional literature on the topic of the dissertation.
- A student also will be able to use the acquired and studied literary sources in the elaboration of the literature overview, the design of the experimental part of the work, the evaluation of the results and the discussion of the results within the experimental part of the work.

Upon successful completion of the course **Methods in molecular biology**, the doctoral student

- will improve and expand their knowledge of the methodological approaches and principles of contemporary molecular biology with the possibilities of their applications in several disciplines and practices.

The student will gain knowledge after successful completion of the course **Genomics for doctoral students** in molecular biology, genetics, biochemistry and genomics,

- about new trends and practices in molecular biology, genomics and medicine,
- about new methods in the study and analysis of biological systems,
- about the possibilities of the graduate's application in scientific or diagnostic practice and the solution of practical tasks.

Student after successful completion of the course **Proteomics for doctoral students**:

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- will understand the methods of proteomics as a separate scientific discipline in the solution of systems biology and will be able to use its tools in related fields.
- will be able to inform about the issues and possibilities of proteomic analysis and the use of the knowledge it provides.
- has the necessary basic knowledge of advances in molecular biology, medical proteomics, pharmaceutical proteomics, plant proteomics, environmental proteomics and other related fields.
- will be able to take a comprehensive approach to solve the problem and systematically use new knowledge
- acquires the competence to apply new knowledge and procedures in proteomic analysis in research.

Upon successful completion of the course **Molecular Biology for doctoral students**, the student will

- gain current knowledge about the current state and perspectives of research in the field of molecular biology;
- acquire an overview of the latest methods and trends in research and practical application of molecular biology in various fields of biology, medicine, pharmacy, agriculture, food and molecular biotechnology.

Upon successful completion of the course **Functional analysis of proteins and modelling**, the PhD-student

- will thoroughly understand the principles of the formation of protein molecules. To do this, it is necessary to accomplish a detailed knowledge of the structure of real (i.e. biochemically characterized) proteins and be able to apply them to hypothetical proteins obtained from sequence and structural databases (GenBank, UniProt and PDB), e.g., in predicting their structure and function (eventually the specificity for enzymes) as well as in their structural comparison.

Upon successful completion of the course **Selected chapters on the physiology and molecular biology of plant stress**, the student will gain:

- an overview of the latest knowledge on selected physiological effects of environmental factors on plant vitality and physiology;
- an overview of the state-of-the-art knowledge on selected molecular changes and responses of plants under stress conditions;
- an overview of selected modern methods for the detection of physiological and molecular changes in plants during growth under stressful environmental conditions
- skills for integrating knowledge in different scientific fields
- skills for selecting methods for implementing research ideas

After completing selected courses in the creative activity as **first-author publication in a scientific journal registered in the Web of Science databases and included in Q1 according to JCR IF; publication in a scientific journal registered in the Web of Science databases and classified in Q1 according to JCR**

**IF; first-author publication in a scientific journal registered in the Web of Science databases and included in Q2 according to JCR IF; publication in a scientific journal registered in the Web of Science databases and included in Q2 according to JCR IF; first-author publication in a scientific journal registered in the Web of Science databases and included in Q3 according to JCR IF; publication in a scientific journal registered in the Web of Science databases and included in Q3 according to JCR IF; publication in a scientific journal registered in the Web of Science databases and classified in Q4 according to JCR IF; publication in a scientific journal registered in the Web of Science or Scopus databases without inclusion in Q1-Q4 in JCR IF**

- knowledge and overview of the basic scientific methods, knows the problems and tendencies of the development of science in the field of the dissertation topic
- Ability to define specific problems and methods of their solution, is ready to solve them
- The student acquires the competence to decide on the form and method of presenting the results of his/her work in the form of scientific publications
- He/she will be able to assess the quality of his/her results and correctly identify suitable and sufficiently high-quality scientific journals for their publication
- The student will be competent to participate in a scientific team of a training or other workplace, or in a team applying the results of research in practice, not only by experimental manual work in the laboratory, but also by proper presentation of the results of experiments and their discussion with the scientific community

As a result of completing individual subjects, the dissertation is comprehensively processed for four years to the extent defined in the Act on Higher Education Institutions of the Ministry of Education, Science, Research and Sports of the Slovak Republic. The result of education is competence, ie the student acquires the ability:

- identify the problem for finding a scientific solution
- propose a scientific hypothesis,
- verify the hypothesis by appropriately set experiments
- evaluate the results and process them into a dissertation
- solve problems arising during the experimental part of the dissertation
- suggest appropriate procedures for modifying the experiment
- work independently in the laboratory, but also work in a team
- communicate with experts on the topic of his dissertation, but also about related topics
- present their results to experts in the form of presentations and discussions
- publish the results in the form of publications in scientific journals of high quality and impact

Prepared by: Assoc. Prof. Ľubica Uváčková, PhD.

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