ITMO

BASICS OF GENETIC ENGINEERING

Course Workload		Assessment form (examination/ graded test/ ungraded test)
ECTS	Hours	
6	216	Exam

Students will know how to formulate an activity approach in the study of personal development; to describe the concept of skills development in the field of genetic engineering; to explain the effectiveness of the tasks of genetics to obtain recombinant RNA and DNA, the allocation of genes from the body (cells) and the implementation of gene manipulation; to understand the concepts of biotechnology and genetic engineering; explains the purpose of genetic engineering as an applied science; to realize the influence of the selected parameters to achieve the planned result; to formulate the basic methods of creating gene banks and their use for analysis; to know the concept of "socio-cultural differences"; to justify the reasons for the manifestation of cultural characteristics in human behavior; to be familiar with the concept of "non-discriminatory environment"; to be aware of discriminatory ways of interaction in the performance of professional tasks; to substantiate the actual problems of genetic engineering, explains the main methods of creating gene banks and their use for the analysis of genomic sequences; to describe the theoretical and applied aspects of selection of organisms on the target product; to formulate the main achievements and new developments in the field of artificial genome manipulation; to describe the methods and models used in modern DNA technologies for scientific and industrial purposes; to explain the principles of modern technological equipment for solving research problems in the field of genetic engineering.

Course structure:

1. GENETIC ENGINEERING TECHNOLOGIES

   1.1. Introduction: The history of genetic engineering.
   1.2. Methods of gene isolation and analysis.
   1.3. Switching off and modifying genes.
   1.4. Methods of gene delivery to the cell.
   1.5. Methods of analysis of gene expression products.

2. ADVANCES IN GENETIC ENGINEERING

   2.1. Transgenic bacteria.
   2.2. Transgenic animals.
   2.3. Transgenic plants.
   2.4. Human genetic engineering.

3. CURRENT TRENDS IN GENETIC ENGINEERING

   3.1. Programmable exonucleases for gene modification.
   3.2. Meganucleases.
   3.3. Transposons.
   3.4. Recombinases.
   3.5. Chemical agents for DNA cleavage.