

CELL BIOTECHNOLOGIES

Course Workload		Assessment form (examination/ graded test/ ungraded test)
ECTS	Hours	
3	108	Ungraded test

Students will know the principles of cellular structure, the basics of cellular metabolism and signaling in physiological and pathological conditions, as well as under the influence of changing environmental factors, the main approaches and future prospects of cellular biotechnologies; they will be able to conduct a systematic analysis of the molecular profile of individual cells, use cellular subpopulations in diagnostics and therapy, use the principles of applying biotechnologies in biomedicine and other areas, evaluate the relevance of the main biotechnological methods; they will have the skills to identify new pathological markers for biomedicine, create signaling systems for diagnosis and therapy, as well as detect pathological environmental factors and microenvironment.

Course structure:

1. FUNDAMENTALS OF CELL BIOLOGY

- 1.1. Cell structure.
- 1.2. Principles of signal cascades operation.
- 1.3. Intercellular interactions.
- 1.4. Cell – environment interactions.

2. PRINCIPLES OF SYSTEMS BIOLOGY

- 2.1. Study of signaling pathways based on bioinformatic and experimental approaches.
- 2.2. Selection of suitable targets for diagnostics and therapy in biomedicine.

3. CELLULAR ENGINEERING

- 3.1. Creation of artificial signaling pathways.
- 3.2. Editing signaling systems involved in the pathogenesis of the disease.
- 3.3. Delivery of engineering structures in vivo.

4. CELLULAR BIOTECHNOLOGIES OUTSIDE OF BIOMEDICINE

- 4.1. Biotechnology for the analysis of environmental factors.
- 4.2. Detection of pollution sources.
- 4.3. Waste products processing.

5. ANALYSIS OF CELLULAR MONOSYSTEMS

- 5.1. Creation of a cell population with desired properties.
- 5.2. Analysis of the functional activity and safety of biotechnology applications.

6. HETEROGENEOUS MULTICELLULAR SYSTEMS

6.1. Aggregate populations and multicellular organisms in biotechnology.

6.2. Principles of creation, assessment of intercellular interactions of edited biosystems and application in biotechnology.