Odesa I. I. Mechnikov National University

Faculty of Biology

Department of Microbiology, Virology and Biotechnology

COURSE SYLLABUS

Course title: Stem Cells and Their Applications

Workload	Credits – 3, Hours – 90, Content Modules – 2
Semester, Year of Study	Full-time program: Year – 1, Semester – 1 (Autumn)
Days, Time, Place	According to the schedule
Workplace	Faculty of Biology, Department of Microbiology, Virology and Biotechnology
Consultations	The consultation schedule is provided by the instructor during the first lecture

COMMUNICATION

Communication in the classroom is conducted according to the schedule. Outside class hours, students may ask questions during consultations (the schedule is provided by the instructor during the first class).

Other forms of communication include offline and online Zoom consultations.

COURSE ANNOTATION

The subject of the discipline is modern methods for the development of antimicrobial agents, international quality standards in the production of antimicrobial agents, as well as the consequences and ethical aspects of the development and application of antimicrobial agents.

Prerequisites: Basic knowledge of «General Cytology», «Cell Biology», «Genetics», «Molecular Biology», «Biochemistry», and «Human Physiology», including cell structure, cell division, and differentiation.

Postrequisites: Application of knowledge of stem cell biology, classification, differentiation, sources, and therapeutic applications in biomedical research, bachelor's and master's thesis projects, and future professional practice.

Purpose of the course "Stem Cells and Their Applications" is to familiarize applicants with the theoretical foundations of life, differentiation, methods of obtaining and classification of stem cells and to provide a system of knowledge on the main areas of use of stem cells in medicine to future specialists - applicants for higher education in

specialty G21 Biotechnology and Bioengineering

Objectives of the discipline:

1. To form in applicants a thorough systematic knowledge of the processes of life of stem cells.

2. To form methodological competencies regarding the main methods of obtaining, features of differentiation and classification of stem cells;

3. To form an idea of umbilical cord blood banks, the organization of its procurement, testing, typing, cryogenic storage in liquid nitrogen;

4. To form professional special competencies of fundamental knowledge of technologies in the treatment of leukemia and lymphoma, diabetes, Parkinson's disease, Alzheimer's disease, thromboembolic stroke, as well as in overcoming the consequences of chemotherapy;

5. To form professional special competencies on ethical issues of the use of embryonic stem cells and the prospects for their transplantation.

Learning Outcomes

As a result of studying the specialized course, students should

know:

- the main processes of stem cell life;
- methods of obtaining, features of differentiation and classification of stem cells;
- methods of procurement, testing, typing, cryogenic storage of umbilical cord blood in liquid nitrogen;
- technologies of using stem cells in the treatment of leukemia and lymphoma, diabetes, Parkinson's disease, Alzheimer's disease, thromboembolic stroke, as well as in overcoming the consequences of chemotherapy;
- ethical problems of using embryonic stem cells and the prospects of their transplantation.

be able to:

- implement the acquired systematized knowledge to solve specific research and practical tasks, when preparing and writing course, bachelor's, qualification, master's theses;
- independently search for modern scientific literature in electronic databases, analyze and systematize it.

COURSE DESCRIPTION

Forms and Methods of Instruction

The course is delivered in the form of lectures (22 hours)*, practical classes (8 hours)*, and organized independent student work (60 hours)*.

The main training of students is carried out during lectures and practical classes; however, a significant part is also based on independent study of the subject.

During the teaching of the discipline, the following instructional methods are applied:

According to the sources of knowledge:

- verbal methods (narration, lecture, discussion, explanation, seminars, conversation);

- visual methods (illustration, demonstration, observation).

According to the type of cognitive activity:

- explanatory and illustrative methods.

According to the formation of practical skills and abilities:

practical classes, development of schemes and tables, preparation of structured notes, compilation of a glossary of terms.

* may vary for Ukrainian and English language classes

COURSE CONTENT

CONTENT MODULE I. SOURCES OF OBTAINING, CHARACTERISTICS, FEATURES OF DIFFERENTIATION AND MODERN CLASSIFICATION OF STEM CELLS

TOPIC 1. Subject, goal and objectives of the course. Goals, objectives, objects and methods of the course "Stem cells and their application".

TOPIC 2. Characteristics of stem cells.

TOPIC 3. Mechanisms of stem cell commitment.

TOPIC 4. Embryonic stem cells and stem cells of adult organisms.

CONTENT MODULE II. USE OF STEM CELLS IN MEDICINE

TOPIC 5. Use of stem cells in medicine and scientific research.

TOPIC 6. Ethical problems of the use of embryonic stem cells.

ASSESSMENT

Modular control for each content module is carried out using a survey.

The final assessment is the result of the total control (weighted average of the grades for each content module).

The applicant's level of knowledge is assessed on a 100-point scale. The table below determines the specific weight of the grade for each module in the overall grade for the discipline.

Grading Scale (National and ECTS)

Score	ECTS	National grade
90–100	A	Passed
85–89	B	Passed
75–84	C	Passed
70–74	D	Passed

60–69	E	Passed
35–59	FX	Retake allowed
0–34	F	Failed – mandatory repetition

COURSE POLICY

Policy on deadlines and resubmission: Assignments submitted late without valid reasons are graded at a reduced score (75% of the maximum possible points for the respective type of activity). Resubmission of module assessments is permitted only with the approval of the Dean's Office and upon presentation of valid reasons (e.g., medical certificate).

Policy on academic integrity: Cheating during tests is prohibited (including the use of mobile devices).

Policy on attendance and lateness: Attendance is a mandatory component of assessment and is awarded points. For valid reasons (e.g., illness, employment, international internship), learning may take place online upon agreement with the course instructor.

Mobile devices: Mobile devices may be used only during online testing and practical classes.

Classroom conduct: In accordance with the "Internal Regulations of Odesa I. I. Mechnikov National University" (http://onu.edu.ua/pub/bank/userfiles/files/documents/kd_2020_dodatok4.pdf), students must: comply with internal regulations; treat university property (equipment, teaching materials, instruments, etc.) with care; be disciplined and neat; maintain cleanliness and order in all educational premises; and follow safety instructions.