Thematic plan of seminar-type classes
in discipline «Molecular biology»
for students of 2025 year of admission
under the educational programme
cipher 35.05.01 Pharmacy,
specialisation (profile) Pharmacy
(Specialist's degree),
form of study full-time
for the 2025-2026 academic year

№	Thematic blocks	Practical training (PT) [1]	Hours (academic) [2]
Semester 2			
1.	Introduction to molecular biology. Main classes of biomolecules. Information and energy transformation in the cell	-	4
2.	Nucleic acids: structure and biological functions. Levels of DNA compaction. Replication and repair: mechanisms and biomedical significance.[1] Stages of the implementation of genetic information.[2]	PT	4
3.	Transcription and translation processes and its stages[1]. Post-transcriptional modifications of RNA. Genetic code and its properties. Regulation of gene expression in prokaryotes. Drugs that regulate gene expression. [2]	PT	4
4.	Regulation of gene expression in prokaryotes and eukaryotes.[1] The "operon" theory. Drugs – replication inhibitors, modulators of gene expression [2]	PT	4
5.	Methods for studying the structure and function of nucleic acids. [1] Polymerase chain reaction (PCR). Sequencing. Prospects for the use of gene therapy in the treatment of diseases. [2]	PT	4
6.	**Midterm tests 1 "Matrix biosyntheses". [1]**	PT	4
7.	Classification and function of proteins. Mechanisms of enzymatic catalysis. [1] Peptides and proteins. Levels of structural organization and classification of proteins. Enzymes: classification and biological role. Fundamentals of kinetics of enzymatic reactions.[2]	PT	4
8.	Principles of coordination of metabolic pathways.[1] Regulation of enzymatic activity. Mechanisms of enzymes induction and inhibition. [2]	PT	4
9.	Post-translational modifications of proteins. [1] Protein folding and its disorders. Molecular mechanisms of proteinopathies. Proteins and enzymes as biomarkers. Proteins and enzymes as targets for drugs.[2]	PT	4
10.	Methods for determining enzymatic activity. [1] Enzyme-linked immunosorbent assay. Application and diagnostic value of ELISA. The use of enzymes in molecular genetic research. Methods for studying the structure of proteins. [2]	PT	4
11.	Structure and functions of biological membranes.[1] Membrane proteins. Mechanisms of transport of substances across the membrane. Intercellular contacts.[2]	PT	4

12.	Receptor function of biological membranes.[1] Receptor signal transduction pathways. Metabotropic and ionotropic receptors. Catalytic receptors. Molecular mechanisms of signal transduction from nuclear and cytoplasmic receptors. Regulation of receptor activity.[2]	PT	4
13.	**Midterm tests 2 "Regulation of enzyme activity. Biological membranes. Transduction of the receptor signal".**	PT	4
14.	The cell cycle and its regulation. [1] Phase of mitosis. Proteins and enzymes in the regulation of cell proliferation.[2]	PT	4
15.	Cell damage. The role of necrosis and apoptosis in health and pathology. [1]	PT	4
16.	Molecular genetic mechanisms of tumor transformation of cells and metastasis. [1]	PT	4
17.	Principles of development and study of antitumor drugs. [1]	PT	4
18.	**Midterm tests 3 "Regulation of proliferative activity of cells. Mechanisms of cell death. Oncogenesis". [1]**	PT	4
	Total		72

[1] – PT (Practical training)
[2] – one thematic block includes several classes, the duration of one class is 45 minutes, with a break between classes of at least 5 minutes

Considered at the department of Fundamental Medicine and Biology meeting, protocol of «22» May 2025. № 10

Head of the Department A.V. Strygin