**Seminar Manual**

**Genome regulation**

Lecturer Kenzhebaeva S.S. d.b.s., professor

**PT 1.** The structure of the eukaryotic genome. Replays, the satellite DNA. The unique genome sequences. The mobile genome elements. The intermittent eukaryotic genes.

**PT 2.** The regulation levels of metabolism

**PT 3.** The lactose operon. Regulation of transcription of lambda phage development. Principles of DNA recognition by regulatory proteins (CAP-protein and lambda phage repressor)

**PT 4** The attenuation of transcription. Regulation of the tryptophan operon expression. "Riboswitches". The mechanisms of transcription termination

**PT 5.** The regulation of gene expression at the level of transcription in eukaryotes

**PT 6** The mRNA stability. Alternative splicing. The speed of mRNA transport through the nuclear membrane. The time of mRNA life

**PT 7.** The concept of operon and regulon. The control on the transcription initiation level. A promoter, an operator and regulatory proteins. The positive and negative control of the gene expression. The control at the transcription termination level. **PT 8.** The catabolism-controlled operons: models of lactose, galactose, arabinose and maltose operons. The attenuator-controlled operons: tryptophan operon model

**PT 9.** Antibiotics acting on the stages of translation

**PT 10.** Folding and degradation of proteins as components of regulatory systems

**PT 11.** Organization of genome regulation at organells

**PT 12.** The role of genome rearrangements in the regulation of gene action

**PT 13.** The charting of gene expression regulation at the transcriptional levels **PT 14.** The charting of gene expression regulation at the translational levels

**PT 15.** The initiation of translation in eukaryotes: initiation factors, initiator codons, 5'-untranslated region and cap-dependent "end" of initiation. "Internal" cap-independent initiation in eukaryotes. Transpeptidation. Inhibitors of transpeptidation: chloramphenicol, lincomycin, amitsetin, streptogramins, anisomycin. Translocation. Participation of elongation factor EF2 (EF-G) and GTP. Translocation inhibitors: fusidic acid, viomycin, their mechanisms of action.