Home tasks of Molecular Methods in biotechnology

Home task 1. Main approaches of extraction of nucleic acids from different biological materials

Protocol of extraction of DNA from plant cells;

1. Protocol of extraction of DNA from animal tissue
2. Protocol of extraction of DNA from microorganisms
3. Protocol of extraction of DNA from blood
4. Methods of DNA detection

Home task 2

Main approaches of extraction of RNA from different biological materials

1. Methods of extraction of RNA from plant cells
2. Methods of extract of microRNA
3. How to prepare cDNA?
4. DNA Separation Techniques. Construction of Small RNA cDNA Libraries for Deep Sequencing MicroRNA-Profiling in Formalin-Fixed Paraffin-Embedded Specimens Functional Analysis of miRNAs in the Immune System: Gain-of-Function Expression of miRNAs in Lymphocytes

Home task 3 Methods of purification degree of nucleic acids and visualization

1. The methods used for estimation of purification degree of nucleic acids, visualization
2. Multiple cloning site (MCS)characterization and use in molecular biotechnology
3. Principles for choice of vectors in molecular cloning
4. Different types of endonucleases and their use in molecular biotechnology

Home task 4 Proteome Analysis methods

1. Whole-protein mass analysis is primarily conducted using either time-of-flight (TOF) MS, or Fourier transform ion cyclotron resonance (FT-ICR).
2. FAIRE-Seq (Formaldehyde-Assisted Isolation of Regulatory Elements) is a method in molecular biology used for determining the sequences of DNA regions in the genome associated with regulatory activity.
3. Quantitative Proteome Analysis. Methods and applications
4. Gateway cloning technology
5. Preparation samples for protein sequencing
6. Home task 5 Types of PCR and their applications
7. Protocols of Real-Time PCR
8. Protocols *Allele-specific PCR*
9. Protocols *Convective PCR*
10. Protocols of *Asymmetric PCR*
11. Protocols of *Dial-out PCR*
12. Applications of fluorescence in situ hybridization (FISH) in detecting genetic aberrations of medical significance.
13. Major features of primers design.
14. Genetic and physical mapping
15. DNA library

# Home task 6. Molecular markers: It’s application in crop improvement. Molecular markers for biodiversity analysis

1. AFLP molecular marker and its steps of applications
2. SSR molecular marker and its steps of applications
3. RAPD molecular marker and its steps of applications
4. KASP molecular marker and its steps of applications
5. QTL applications

CRISPR gene editing applications l

1. Targeted gene mutation
2. Gene therapy
3. Creating chromosome rearrangement
4. Study gene function with stem cells
5. Transgenic animals
6. Endogenous gene labeling
7. Targeted transgene addition