**Laboratory work #1**

**Title:** Introduction to Genetics. Model organisms used in Genetics.

**Aim:** to provide information about the most prospective and classic animal model organisms approached in Genetics.

**Questions:**

1. List all animals approached in Genetics as model organisms to study inheritance and variability.
2. Characterize their properties and find any disadvantages.
3. Which organisms have more advantages for the study than the others.

**Form of class:** online in Miscosoft Teams

**Literature:** Internet resources

**Laboratory work #2**

**Title:** The 1st and the 2nd Mendelian Laws. Monohybrid cross and its practical usage

**Aim:** to provide information about the main laws of inheritance and variability and meet students with Gregor Mendel fundamental investigations.

**Questions:**

1. Formulate the 1st Mendelian Law.
2. Formulate the 2nd Mendelian Law

**Form of class:** online in Miscosoft Teams

**Literature:** Internet resources

**Laboratory work #3**

**Title:** Allelic genes interactions.

**Aim:** to provide information about all types of interactions between allelic genes, including complete dominance, incomplete dominance, co-dominance, and superdominance.

**Questions:**

1. List all types of interactions and characterize them.
2. What is the difference between incomplete dominance and co-dominance?
3. What is the difference between outbreeding and inbreeding?
4. Characterize heterosis and inbreeded depression (transgression).

**Form of class:** online in Miscosoft Teams

**Literature:** Internet resources

**Laboratory work #4**

**Title:** The 3rd Mendelian Law. Dihybrid, trihybrid and polyhybrid crosses.

**Aim:** to provide information about the 3rd Mendelian Law and its practical usage.

**Questions:**

1. List all ratios which are observed in phenotype and genotype in dihybrid cross.
2. List all ratios which are observed in phenotype and genotype in trihybrid cross.
3. List all ratios which are observed in phenotype and genotype in polyhybryd cross.

**Form of class:** online in Miscosoft Teams

**Literature:** Internet resources

**Laboratory work #5**

**Title:** Non-allelic genes interactions. Epistasis, complimentary, polymerism, and pleiotropy.

**Aim:** to provide information about all types of interactions between non-allelic genes, including epistasis, complementary, polymerism, and pleiotropy.

**Questions:**

1. What is the difference between dominant and recessive epistasis?
2. What is the difference between cumulative and non-cumulative polymerism?
3. How non-allelic genes can impact each other?
4. Give examples of pleiotropy.

**Form of class:** online in Miscosoft Teams

**Literature:** Internet resources

**Laboratory work #6**

**Title:** Crossing-over genetic problems and their practical usage.

**Aim:** to provide information about meiosis, crossing-over and combinative variability as a part of natural evolution.

**Questions:**

1. Give explanation of crossing-over and explain its practical usage.
2. In what stage of meiosis does crossing-over occur?
3. Solve genetic problems.
4. Calculate the probability of crossing-over according to the distance between genes.

**Form of class:** online in Miscosoft Teams

**Literature:** Internet resources

**Laboratory work #7**

**Title:** Chi-square method for analysis and its practical usage.

**Aim:** to demonstrate how do statistical methods work and its practical usage.

**Questions:**

1. Solve statistical problems and explain the obtained results.

**Form of class:** online in Miscosoft Teams

**Literature:** Internet resources

**Laboratory work #8**

**Title:** Hugo de Vries theory of mutagenesis. Somatic and sex-linked diseases. Genetic problems and their practical usage.

**Aim:** provide information about the main types and classes of mutations, their impact on living organisms, and practical usage.

**Questions:**

1. Classify all mutations according their characteristics.
2. What is the difference between somatic and sex-linked mutations?
3. What is the difference between dominant and recessive autosomal mutations?
4. What is the difference between dominant and recessive sex-linked mutations?
5. Make a list of autosomal and sex-linked diseases.

**Form of class:** online in Miscosoft Teams

**Literature:** Internet resources

**Laboratory work #9**

**Title:** Pedigree analysis and its practical usage for detection diseases and abnormalities

**Aim:** to provide information about the structure and symbols of pedigree tree and its practical usage for the study diseases and abnormalities.

**Questions:**

1. Make your family pedigree tree and explain the obtained results.

**Form of class:** online in Miscosoft Teams

**Literature:** Internet resources

**Laboratory work #10**

**Title:** t-Test for analysis and its practical usage.

**Aim:** to demonstrate how do statistical methods work and its practical usage.

**Questions:**

1. Solve statistical problems and explain the obtained results.

**Form of class:** online in Miscosoft Teams

**Literature:** Internet resources

**Laboratory work #11**

**Title:** Genetics of populations. Hardy-Weinberg Equilibrium and its practical usage.

**Aim:** to provide information about the structure and the main parameters of a population, explain the principles of Hardy-Weinberg Equilibrium and its practical usage.

**Questions:**

1. Solve genetic problems.
2. Characterize populations according to the provided information.

**Form of class:** online in Miscosoft Teams

**Literature:** Internet resources

**Laboratory work #12**

**Title:** Molecular basis of inheritance. Model of DNA and RNA.

**Aim:** to provide information about the molecular basis of inheritance and variability, DNA, RNA, and protein structure, and the central dogma of molecular biology.

**Questions:**

1. Describe the central dogma of molecular biology.
2. What is the role of RNA in transcription/translation processes?
3. Make a list of Genetic code parameters.
4. Solve genetic problems.

**Form of class:** online in Miscosoft Teams

**Literature:** Internet resources

**Laboratory work #13**

**Title:** Molecular genetics problems and their practical usage.

**Aim:** provide information about the molecular basis of inheritance and variability, DNA, RNA, and protein structure, and the central dogma of molecular biology.

**Questions:**

1. Solve genetic problems.

**Form of class:** online in Miscosoft Teams

**Literature:** Internet resources

**Laboratory work #14**

**Title:** Types of selection. Charles Darwin theory of natural selection and its practical usage.

**Aim:** to provide information about the Theory of Evolution, natural, sex, and artificial selection. The principal laws of life.

**Questions:**

1. What is the difference between directive, stabilizing, and disruptive selection?
2. What is the difference between divergent, convergent, and parallel evolution?
3. What is the difference between homologous and analogous organs?
4. Make a list of evidences of evolution.

**Form of class:** online in Miscosoft Teams

**Literature:** Internet resources

**Laboratory work #15**

**Title:** Modern methods of gene engineering and their practical usage.

**Aim:** to provide information about the modern methods approached in Genetics, Biotechnology, and Biomedicine, used for genes editing.

**Questions:**

1. Describe the current methods of gene engineering.
2. List their advantages and disadvantages.
3. Give any examples of the practical usage of these methods in everyday life.

**Form of class:** online in Miscosoft Teams

**Literature:** Internet resources