al-Farabi Kazakh National University

Faculty of Biology and Biotechnology

Department of Biodiversity and Bioresources

Program of final exam by discipline

### BOT1204 «Botany»

**6B101102 – «Pharmacy»**

**1 course, 2 semester**

Spring semester, 1st year

Form of training-full-time

2023-2024 academic year

### Program of final exam by discipline BOT1204 «Botany» in speciality Speciality 6B101102 – Pharmacy was compiled by lecturer Zaparina Yelena

Reviewed and approved at a meeting of the Department of Biodiversity and Bioresources

From «4» October 2024, Protocol №4

Head of the Department \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Kegenova G.B.

Reviewed and approved at the meeting of the methodical council of biology and biotechnology faculty

From «4» October 2024, Protocol №4

**FORM OF FINAL EXAM IN DISCIPLINE - WRITTEN EXAM:**

**TRADITIONAL - ANSWERS TO QUESTIONS**

The format of the final exam of the discipline - is written offline; proctoring and checking for cheating will be carried out. The goal of the task is to identify the expected results of teaching the discipline.

**EXAM PROCEDURE**

**IMPORTANT** - the exam is held on a schedule that must be known in advance as the students as the teachers.

**Variants of tasks**

Exam questions will be divided on the three blocks.

Exam paper will contain three questions, by one from each block.

**Evaluation criteria**:

Questions from the first block – 30 points

Questions from the second block – 30 points

Questions from the third block – 40 points

**Requirements for the design of the work.** The answers to the tickets should correspond to the content of the question and most fully reflect the results of training.

**Fulfillment steps:** A complete answer to the ticket is made on the day of the exam at the appointed time.

**PROGRAM  
final exam in the discipline «Botany»**

**Module 1. Plant anatomy**

**1.** Explain the structure of the plant cell. Membrane bound & non-membrane bound organelles.

**2.** Anatomical organization of plant tissues. Classification of plant tissue. Features of the structure of cells of meristematic tissues. Meristematic tissue. Primary and secondary meristems. Dermal tissues system: formation and structural features of primary and secondary dermal tissues. Vascular tissue system: origin, structure, location in the body of plants. Mechanical ground tissues: emergence, location in the body of plants, structural features.

**3.** The anatomical organization of the stem of herbaceous plants. The structure of the stem monocots. Anatomical organization of the stem of cereals. A variety of types of structure of the stem of dicotyledonous herbaceous plants.

**4**. Anatomical organization of the stem of woody plants. Histological composition of secondary bark and wood. Formation of the bark. Features of the structure of the stem of conifers.

**5.** Anatomical organization of the leaf. Features of the anatomical organization of a typical leaf. The influence of external factors on the structural organization of the leaf.

**6.** The primary and secondary structure of the roots. The primary structure of the root. The formation and functioning of secondary tissues. The secondary structure of the root.

**Module 2. Plant morphology**.

**1.** The vegetative organs of higher plants. Root morphology. Determination of the root, its function, types of roots according to the nature of growth and origin. Types of root systems depending on habitat conditions. Mycorrhiza. Metamorphosis of the root.

**2.** The morphology of the shoot and the stem. The definition of shoot, the stem as an element of shoot. Buds, types of buds arrangement and leaf arrangement. Types of branching shoots. Metamorphosis of shoots and stems. Types of shoots.

**3.** The vegetative organs of higher plants. Leaf morphology. Leaf - an element of shoot. Functions of leaf, origin. Growth and development of leaf. Three categories of leaves. Metamorphosis of leaves.

**4.** Generative organs of higher plants. Flower. Flower as an organ of sexual reproduction. Androecium and gynoecium, micro and macrosporogenesis. Double fertilization. Inflorescence morphology. Definition, the value of inflorescences. Classification inflorescences.

**5.** The Fruit and Seed. Seed development, seed types: seeds without endosperm, with endosperm and perisperm. The development and structure of the fruit. Classification of fruits. Fruits and seeds adaptations to the dispersion.

**Module 3. Plant systematic**

1. The general characteristics of Algae. The general characteristic of algae. Major divisions of algae (Cyanophyta, Chlorophyta, Phaeophyta). (Cyanophyta).
2. General characteristics of the kingdom of Fungi. Fungi classification, major divisions of fungi (Chytridiomycota, Zygomycota, Ascomycota, Basidiomycota, Deuteromycota . Oomycetes (water molds*).*

General characteristics of Lichens. Morphological types. Symbiotic character of lichen.

1. Nonvascular plants.General characteristic of the Mosses. Classification, phylum Marchantiophyta and Bryophyta. Main representatives, their characteristics.
2. Pteridophyta (ferns and allies). General characteristic. Class Lycopodiopsida (lycophytes) and its general characteristic. *Lycopodium* ( “club moss”), features of morphology and reproduction. Heterospory in *Selaginella.*
3. Class Equisetopsida(horsetails), general characteristic. Features of morphology and reproduction.
4. General characteristic of Class Polypodiopsida (Ferns). Features of morphology and reproduction. Heterosporous Water Ferns.
5. General characteristic of Gymnosperms.Division Pinophyta (Coniferophyta).Features of morphology and reproduction.
6. Division Angiospermae. Structure of flower. Families Asteraceae, Ranunculaceae, Fabaceae. Rosaceae.
7. Class Monocotyledones (Liliopsida), families Liliaceae, Poaceae, Cyperaceae.

**The main sources:**

1. Crang**,** Richard,Lyons-Sobaski**,** Sheila**,** Wise, Robert. Plant Anatomy. Springer. – 2018. – 732 p.
2. Shipunov A. Introduction to Botany. 2018. – 181 p. http://ashipunov.info/shipunov/school/biol\_154/ eBook
3. Raven P., Evert R.F., Eichhorn S.E. Biology of Plants. By W. H. Freeman and Company 2013. – 864 p.
4. Milena Martinková, Martin Čermák, Roman Gebauer, Zuzana Špinlerová. Plant Botany.An introduction to plant anatomy, morphology and physiology. Brno, 2014. 103 p. eBook
5. Michael G. Simpson. Plant Systematics*.* Third Edition. Elsevier. – 2019. – 754 p. eBook
6. Charles B. Beck. An Introduction to Plant Structure and Development. Cambridge University Press. 2011. – 465 p. eBook

**Additional sources:**

<http://elibrary.kaznu.kz/ru/>

https://study.com/academy/topic/introduction-to-plant-anatomy.html <https://botanydepot.com/2021/01/20/videos-plant-systematics-lectures-by-bruce-kirchoff/>

<https://cms.botany.org/media/collection/id.24.html>

<https://www.brainkart.com/subject/Plant-Anatomy_249/>

https://www.easybiologyclass.com/plant-anatomy-online-tutorials-lecture-notes-study-materials/

https://study.com/academy/topic/plant-anatomy-morphology.html

**Grading Criteria:**

A (90-100%) - the student has thoroughly studied the study material; consistently and comprehensively answers the questions posed; freely applies the acquired knowledge in practice.

B (75-89%) - the student knows the study material; does not make serious mistakes in answering; the student is able to apply the acquired knowledge in practice.

C (60-74%) - student knows only basic material, does not always give a clear and complete answer.

D (50-59%) - the student has some idea of the studied material; cannot answer the questions completely and correctly, he/she makes serious mistakes while answering.

**Procedure for checking for plagiarism (if any)**

Originality - not less than 60%

Borrowing - no more than 30%

## CRITERIA-BASED ASSESSMENT RUBRICATOR

*(for all forms except standard oral/written testing)*

**Discipline: Botany. Form:** a writing offline on platform**. Platform:** IS Univer

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| **№** | **Score**  **Criteria** | **DESCRIPTORS** | | | | |
| **«Excellent»** | **«Good»** | **«Satisfactory»** | **«Unsatisfactory»** | |
| **90-100 %** | **70-89 %** | **50-69 %** | **25-49 %** | **0-24 %** |
| **1.** | Knowledge and understanding of the theory and concept of the course | The questions are answered exhaustively, illustrated with examples where necessary; The answers are presented in a competent scientific language, all terms and concepts are used correctly and disclosed correctly. | The answers to the questions are generally correct, but with some  inaccuracies that are not  of a fundamental nature. Not all terms of the course are used correctly, there are some incorrect statements and grammatical /  stylistic errors of presentation. The answers are not adequately illustrated with  examples. | The answers to the questions are fragmentary, correct conclusions are interspersed with incorrect ones. The content blocks of the course necessary for the full disclosure of the topic have been missed. The student is generally oriented in the subject of the training course, but has problems with the disclosure of specific issues. | The answers do not correspond to the content of the questions. The key concepts for the training course contained in the questions are interpreted incorrectly. | There are no answers to the questions  ; the student's ignorance or misunderstanding of most or the most important part of the educational material is revealed.  Violation of the Rules of the final control. |
| **2.** | Application of the chosen methodology and technology to specific applied tasks | The technology and methodology of the course is applied with deep content, taking into account the specifics of the direction of training of students; scientific concepts are freely applied to the task set, followed by logical and evidence-based disclosure of the main problem. | The methodology of the course and the knowledge gained by the student are poorly integrated and adapted to the solution of specific practical tasks proposed in the copies. the student's knowledge is adapted; the answers are poorly structured, there are insignificant factual errors in the answer that he is able to correct  on his own, thanks to the leading question. | Course Tools  they are used superficially, differ in low content, there are inaccuracies in the answer, the logic of the presentation is violated, there is no meaningfulness of the presented  material, there is no idea of interdisciplinary connections. | Incorrectly applies the essential part of the discipline, makes significant factual errors that the student cannot correct on his own, the student finds it difficult to answer most of the additional questions on the content of the exam or does not give correct answers. | Inability to apply knowledge to solve tasks and explain the phenomena of the course; when answering (one question), he makes more than 3-4 gross mistakes that he cannot correct even with the help  of a teacher, he has not fully mastered the material. Violation of the Rules of the final control. |
| **3.** | Evaluation and analysis of the applicability of the | Availability of the ability to integrate, substantiate and | Integration and analysis of the application of methods and technology of the course | Superficial substantiation | The lack  of validity and analysis of the application of the | Lack of ability to apply course methods when giving |

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|  | chosen methodology to the proposed practical task, justification of the result obtained | analyze methods and technologies for  to a certain topic, structuring of the answer, to the analysis of 5 provisions of existing theories,  scientific schools, directions on the question of examination  of the ticket, the answers are illustrated  examples and visual materials, including from the student's own practice; demonstrates the ability to conduct a  dialogue and enter into a scientific discussion. | , followed by the use of visual materials to consolidate their reasoning through the use of scientific concepts with the assumption of minor errors in the reproduction of knowledge;  analysis of 3-4 provisions of existing theories, scientific schools, directions on the issue of the examination ticket. | of the laws and principles of the course, weak application of the main volume of material in accordance with the training program with difficulties in its independent reproduction and the requirement of leading questions; | methods and technology of the course, the manifestation of difficulty in providing answers to questions  of a reproducing nature. | examples;  Violation of the Rules of the final control. |

**RUBRICTOR FOR CRITERIAL ASSESSMENT OF FINAL CONTROL**

*(for standard oral/written forms)*

**Discipline: Botany. Form:** a writing offline on platform**. Platform:** IS Univer

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| **№** | **Score**  **Score** | **DESCRIPTORS** | | | | |
| **«Excellent»** | **«Good»** | **«Satisfactory»** | **«Unsatisfactory»** | |
| **90-100 %** | **70-89 %** | **50-69 %** | **25-49 %** | **0-24 %** |
| **1 question**  **30 points** | Knowledge and understanding of the theory and concepts of the course | The "excellent" rating is given for the answer, which contains an exhaustive disclosure of all three questions, a detailed argumentation of each conclusion and statement, is built logically and consistently, supported by examples from the developed topics of classroom classes | The "good" rating is given for an answer that contains a complete, but not exhaustive coverage of all issues, a shortened argumentation of the main provisions | The "satisfy flax" rating is given for an answer that contains incomplete coverage of the questions proposed in the ticket, superficially argues the main points, allows compositional imbalances in the presentation, violations  of the logic and sequence of the presentation of the | Incorrect coverage of the issues raised, erroneous argumentation, factual and speech errors, the assumption of an incorrect conclusion. | Ignorance of basic concepts, theories, etc. Violation of the Rules of the final control. |

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|  |  |  |  | material, does not illustrate theoretical positions with examples from the developed lecture notes |  |  |
| **2 question**  **30 points** | Application of the chosen methodology and technology to specific practical tasks | Complete completion of the training task, a detailed, reasoned answer to the question posed, followed by the solution of practical tasks of the course; | Partial fulfillment of the educational task, incomplete, sometimes reasoned answer to the question posed with incomplete solution of practical tasks of the course; illiterate use of the norms of the scientific language of the  course | The material is presented in fragments, with a violation of logical sequence, factual and semantic inaccuracies are allowed, theoretical knowledge of the course is used superficially | An irrational method of solving a task or an insufficiently thought-out response plan; inability to solve tasks, perform tasks in a general way; making mistakes and shortcomings that exceed the norm | Inability to apply knowledge, algorithms to solve tasks; inability to draw conclusions and generalizations. Violation of the Rules of the final control |
| **3 question**  **40 points** | Evaluation and analysis of the applicability of the chosen methodology to the proposed practical task, justification of  the result obtained | 1-2 inaccuracies in the presentation of the material are allowed, which do not affect the conclusions that are generally correct (+ visualization of the results of the justification by means of graphical data) | 3-4 inaccuracies in the use of conceptual material, minor errors in generalizations and conclusions that do not affect a good overall level of task performance are allowed. | Conclusions on the applicability of sound scientific statements are vague and unconvincing, there are stylistic and grammatical errors, as well as inaccuracies in the processing of the results of a practical solution | The task was completed with the grossest mistakes, the answers to the questions are incomplete, conceptual material and argumentation are poorly used. | The task has not been completed, there are no answers to the questions posed, materials and analysis tools have not been used. Violation of the Rules of the final control |

## Formula for calculating the final grade:

Final grade **(FI) = (%1+%2+%3+%4+%5+%6, etc.) / K**, where % is the level of task completion by criterion, K is the total number of criteria.

## Example of calculating the final score

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| --- | --- | --- | --- | --- | --- | --- |
| **№** | **Score**  **Criteria** | **«Excellent»** | **«Good»** | **«Satisfactory»** | **«Unsatisfactory»** | |
| **90-100 %** | **70-89%** | **50-69%** | **25-49%** | **0-24%** |
| **1.** | **Criteria** 1 | 100 |  |  |  |  |
| **2.** | **Criteria** 2 |  | 75 |  |  |  |
| **3.** | **Criteria** 3 |  |  | 60 |  |  |
| **4.** | **Criteria** 4 |  |  |  | 45 |  |
| **5.** | **Criteria** 5 | 100 |  |  |  |  |
| **6.** | **Criteria** 6 |  |  |  | 49 |  |
|  | **Final %** | **200** | **75** | **60** | **94** | 200+ 75 + 60 + 94 = **429**  **429 / 6 criteria= 71,5 Final score, as % = 72** |

Based on percentage obtained during the calculation, we can compare the score with the rating scale.

**72 points** range from 70 points to 89 points, which corresponds to the “Good” category according to the grading scale.

Thus, with this calculation, the project will be rated **72 points “Good”** in accordance with the point-rating letter system for assessing educational achievements

students with their transfer to the traditional grading scale and ECTS.

## Score-rating letter system of assessment of accounting for educational achievements

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| --- | --- | --- | --- |
| **Grade** | **Digital equivalent**  **points** | **points,**  **% content** | **Assessment according to the**  **traditional system** |
| А | 4,0 | 95-100 | Great |
| А- | 3,67 | 90-94 |
| В+ | 3,33 | 85-89 | Fine |
| В | 3,0 | 80-84 |
| В- | 2,67 | 75-79 |
| С+ | 2,33 | 70-74 | Satisfactorily |
| С | 2,0 | 65-69 |
| С- | 1,67 | 60-64 |
| D+ | 1,33 | 55-59 |
| D- | 1,0 | 50-54 |
| FX | 0 | 25-49 | Unsatisfactory |