

**Ministry of Science and Higher Education of the Republic of Kazakhstan**  
**NAO "Atyrau University named after H.Dosmukhamedov"**  
**Department of Biology and Agricultural Disciplines**

**FINAL CERTIFICATION PROGRAM**  
**educational program 6B01505 – biology teacher**

Atyrau, 2023

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Ministry of Science and Higher Education of the Republic of Kazakhstan

NAO "Atyrau University named after H.Dosmukhamedov"



I APPROVE

Vice-Rector for AV

A.E.Chukurov

« 31 » 01 2023 y.

## FINAL CERTIFICATION PROGRAM

for students of the educational program 6B01505 – biology teacher

The program is developed on the basis of the Rules for the final certification of students from

SMK n 025

Compiled by: Senior lecturer \_\_\_\_\_

senior lecturer \_\_\_\_\_

*Olga M. Makhambet.*

Recommended at the meeting of the department

Protocol № 5 from « 10 » 01 2023y.

Head of the Department \_\_\_\_\_

*[Signature]*

Approved by the Teaching and Methodological Council of the Faculty \_\_\_\_\_

« 12 » 01 2023y. Protocol № 6

Chairman of the UMS \_\_\_\_\_

*[Signature]*

## AGREED

Dean of the Faculty \_\_\_\_\_

*[Signature]*

« 12.01 » 2023y.

Head of the OEIAQaDEP \_\_\_\_\_

*Suleimanova Zh. [Signature]*

« 30.01. » 2023y.

Approved by the Educational and Methodological Council of the University

« 30 » 01 2023y. Protocol № 3



## **1. Goals and objectives of the final certification**

The purpose of the final certification is to determine the level of practical and theoretical preparation of the Bachelor of Biology for the performance of professional duties at the level of the requirements of the state educational standard, which contributes to the demand and stability of graduates in the labor market and continuing their studies in the master's degree.

Tasks of the final certification:

1. assessment of students' ability to apply knowledge and use scientific methods to solve problems related to biology;
2. determination of the level of readiness of students to continue their studies in biology or related disciplines;
3. assessment of the level of development of educational skills and abilities, such as analysis, synthesis, evaluation of information, application of solutions and critical thinking, in the field of biology.;
4. monitoring and evaluation of laboratory skills and abilities related to the processing and interpretation of biological data, conducting experiments and applying scientific methods in work;
5. assessment of students' ability to apply modern technologies and research methods in the field of biology, such as molecular and nanotechnology, genetic engineering methods, etc.

## **2. Competencies submitted for final certification**

During the course , students must demonstrate the formation of the following competencies

### **2.1. universal (basic) competencies (CC):**

Universal (basic competence) is the ability of a specialist to solve a set of professional tasks based on universal, intellectual, communicative, emotional and volitional qualities (knowledge, skills, qualities and abilities).

- Able to learn, gain new knowledge, skills, including in this area
- Able to identify the scientific essence of problems in the professional sphere
- Able to solve problems in professional activity based on analysis and synthesis

### **2.2. General Professional competencies (OPC):**

General professional competence

- The ability of a specialist to solve a set of professional tasks based on integrated knowledge, skills and experience, as well as personal qualities that allow him to effectively carry out professional activities.
- Able to apply knowledge of the basic fundamental sections of biological science in solving professional tasks
- Able to apply methods of collecting, processing, systematization and presentation of field and laboratory information
- Able to analyze data from other sources and identify existing relationships and patterns in the course of experimental research

### **2.3. Professional Competencies (PC):**

Professional competence is the ability of a specialist to solve a set of professional tasks in a chosen field of activity based on specific knowledge, skills, and abilities.

- Able to apply the basics of evolutionary theory, modern ideas about the structural and functional organization of the genetic program of living objects and methods of molecular biology, genetics and developmental biology in professional activities
- Can describe problems and conditions of professional activity, present well-known and own scientific results using the language and apparatus of biological science
- Able to collect, process, analyze and systematize scientific and technical information on a given topic in a selected subject area (biology)



### **3. Scope, structure and content of the final certification**

The final certification to the university is carried out in the form of a comprehensive exam. The final certification is at least 12 academic credits. The duration of FC is 6 weeks. The final certification of the educational program includes:  
- preparation for the comprehensive exam.

#### **3.1 Comprehensive examination**

The purpose of the comprehensive exam is to determine the level of professional training of the graduate and his ability to solve practical problems in the field of professional activity.

The comprehensive exam is conducted in an oral ticket format. Before the comprehensive exam, students are consulted on issues submitted for final certification.

The comprehensive exam is conducted in one stage: the first stage is passing the exam on tickets at an open meeting of the attestation commission. During the ticket exam, the examinee is given 1 hour to prepare for the answer. The student answers the questions of the examination card publicly. Members of the IC have the right to ask additional questions in order to determine the depth of knowledge of the student on the topics under consideration. The duration of the oral answer to the questions of the examination ticket should not exceed 30 minutes. When preparing for the answer to the exam, it is allowed to use this ka program and the literature specified in paragraph 3.3 of this program.

#### **3.2 List of disciplines with questions submitted for the comprehensive exam**

##### **Questions about botany**

1. What do you know about the plant cell. Highlight the differences from animal cells.
2. What do you know about leaf function and leaf fall?
3. Give a description of the tissues of higher plants.
4. What do you know about the flower formula, flower diagram?
5. Give a description of complex types of inflorescences
6. Explain the significance of myrestemic tissues in plants.
7. Describe the types of simple inflorescences
8. What do you know about the structure of the flower, the function that flower companions perform?
9. Give a description of juicy fruits.
10. What do you know about the escape and its branching?
11. Give a description of the escape modifications
12. What do you know about the generative organs of a plant?
13. Describe Androcea and explain the process of microsporogenesis
14. What do you know about the vegetative organs of a plant?
15. Give a description of fruits and types of fruits
16. What do you know about conductive tissue, types and its significance for the plant?
17. Genetse and explain its construction.
18. What do you know about the main fabric and its types?
19. Root function, explain the root changes
20. What do you know about external and internal separating fabrics?
21. Explain the morphology of the leaves
22. What do you know about mechanical fabric and its types?
23. Explain the process of double fertilization of indoor plants.
24. Explain the stem function and stem morphology.
25. What do you know about emerging tissues and their types



26. What do you know about cornier and the root zone.
27. What do you know about basic fabrics and its types?
28. Bud and types of buds.
29. what do you know about plant tissues
30. Explain the morphology of the escape.

### Questions on Human and animal Physiology

1. The subject of the purpose, objectives and methods of physiology. Its connection with other medical and biological disciplines. The history of the development of the discipline "Human and animal Physiology.
2. Irritation and irritants. Adequate and inadequate stimuli. Classification of stimuli. The laws of rhythmic irritation are optimum and pessimum. Parabiosis and its stages.
3. Effects of direct current action on excitable formation. The laws of irritation (strength-duration, force gradient, the law of accommodation, the law of the polar action of the current).
4. History of the study and methods of registration of bioelectric phenomena (Galvani, Matteuchi). Excitability and excitement. Excitable tissues. The significance of excitation processes in the activity of living entities. A neuron is a structural and functional unit of the nervous system. Structure and functions of nerve fibers. Myelin and myelin-free fibers
5. The mechanism and speed of excitation through nerve fibers. Synapses. The structure of synapses. The mechanism of excitation in neuromuscular synapses.
6. Nerve centers, their organization and properties (one-sidedness and delay of excitation, summation, occlusion, transformation of rhythm, aftereffect phenomenon, fatigue). Conducting excitation in the central nervous system.
7. Reflex as the main act of nervous activity. Classification of reflexes. Reflex arc. Mono- and polysynaptic reflex arcs. Spinal cord. Reflex and conduction functions of the spinal cord.
8. Functions of the medulla oblongata. Functions of the midbrain. Functions of the cerebellum. The autonomic nervous system. The hypothalamus is the highest subcortical center of regulation of vegetative functions.
9. The role of the brain stem and cerebellum in the regulation of motor function. Motor activity of the body. Stages of formation of the motor act. Smooth muscles. Structure and functions.
10. I.P. Pavlov's teaching about analyzers. Their classification, general principles of construction and functioning. Classification of receptors, their main properties and functions Visual analyzer. Color vision (3-component theory of color perception).
11. Auditory analyzer. The mechanism of perception of sounds of different frequencies. Vestibular analyzer.
12. Olfactory analyzer. Taste analyzer. Skin analyzer. Motor analyzer. Interoceptive Analyzer
13. The teaching of I. M. Sechenov and I. P. Pavlov about conditioned reflexes. The difference between conditioned reflexes and unconditional ones. The mechanism of formation of conditioned reflexes.
14. Conditioned reflexes. The conditions necessary for their education. Inhibition of conditioned reflexes: unconditional and conditional. Analysis and synthesis of irritations.
15. I and II alarm systems. Dynamic stereotype. Types of human GNI. Memory, its types. Mechanisms of short- and long-term memory. Purposeful behavior. General theory of functional systems by P.K. Anokhin.
16. Classification, properties, types, mechanism of action and physiological functions of hormones. The intermediate portion of the pituitary gland, its hormones. Neurohypophysis, its hormones.
17. Male sex glands, hormones. Their physiological significance, mechanism of action. Female sex glands, sex hormones, their physiological significance and mechanism of action.



18. The thyroid gland, its hormones. Regulation of thyroid gland functions. Hyper- and hypofunction of the pancreas, its hormones. The mechanism of their action. Hyper- and hypofunction of the pancreas. Parathyroid glands, their hormones.
19. The concept of the internal environment of the body. Homeostasis. The blood system. Composition, quantity, properties, main functions of blood: density, viscosity, osmotic pressure, active reaction (pH).
20. Composition, properties of blood plasma. Erythrocytes, their meaning. Hemoglobin, its quantity, structure, properties. Hemoglobin compound. Leukocytes, their meaning. Types of leukocytes, quantity, function. Platelets, their number, structure and functions. The process of blood clotting. Clotting factors. Blood groups. The ABO system. Rh factor. Rules of blood transfusion
21. The importance of the cardiovascular system. The general scheme of blood circulation. Features of the microstructure of the heart muscle. Basic and atypical muscle tissue of the heart. The conducting system of the heart. Conducting excitation in the heart muscle. The speed of conduction through the main and atypical tissues of the heart.
22. Excitability of the heart muscle. Membrane potential and action potential in various parts of the heart. Contractility of the heart muscle. The structure, physiological properties and functions of the contractile myocardium. Laws of heart contraction.
23. Automatism of the heart. The sinus node as a driver of the heart rate. The mechanism of automation. External manifestations of the activity of the heart. Electrocardiography (ECG). Heart tones.
24. The meaning of breathing. External and internal breathing. Physiology of the respiratory tract. The mechanism of inhalation and exhalation. Vital capacity of the lungs. Spirometry. Pulmonary ventilation. Minute volume of breathing.
25. Transfer of gases by blood. The role of physical and chemical factors in the transfer of gases. Partial pressure of oxygen and carbon dioxide in the alveolar air and their tension in the blood. Regulation of breathing. The respiratory center, its departments. Automation of the respiratory center.
26. The importance of digestion and research methods. Types of digestion. Digestion in the oral cavity. Composition, quantity and properties of saliva. Regulation of salivation. Digestion in the stomach. Composition and properties of gastric juice. Nervous and humoral regulation of the secretory function of the stomach.
27. Digestion in the 12 duodenum. The composition and properties of pancreatic juice. Regulation of pancreatic secretion. The role of the liver in digestion. The composition and properties of bile, its formation, excretion and significance in digestion.
28. The importance of metabolism, its main stages. Anabolism and catabolism. The plastic role of metabolism. Protein metabolism. Nitrogen balance. Positive and negative nitrogen balance. The biological value of proteins. End products of protein metabolism.
29. The significance of allocation processes. The final products of exchange. The organs of excretion, their participation in maintaining the homeostasis of the body. The process of urination. The mechanism of urination. Glomerular filtration. The composition of primary urine. Reabsorption in the tubules. The composition of secondary urine. Secretion in the tubules. The final urine and its composition. The process of urination. The factors that determine it.
30. The meaning of the skin. The receptor function of the skin. Thermoregulatory function of the skin. Heat transfer of the body. Human body temperature and its daily fluctuations. Isothermy, its meaning. Chemical and physical heat regulation. Regulation of heat generation and heat transfer.



## Questions on the methodology of teaching biology

1. The main stages of the development of the theory and methodology of teaching biology in a secondary school. Formation of methods of teaching natural science at the end of the XVIII century . Practical - descriptive, descriptive-systematic, biological, ecological and evolutionary directions of the development of natural science in school. Contribution of B. E. Raikov, I. I. Polyansky, N.A.Rykov, N.M.Verzilina, V. M. Korsunskaya, T. M. Musaulov in the development of the theory of teaching and upbringing biology in general education and vocational schools.
2. Forms of teaching biology.General information about the forms of education. Specific features and functions of biology teaching forms.
3. The lesson is the main form of teaching biology. The structure of the biology lesson. Lesson services. Typology of biology lessons. Types of lesson planning.
4. Biology curricula. Training program services. School textbooks on Biology: structure, functions. The system of concepts in teaching biology.
5. Extracurricular work in biology, its types. Description of various types of extracurricular work in biology (based on a comparative analysis of methodological literature).
6. Biological education in the pedagogical system. The structure of the system of biological education of schoolchildren. System components: goal, motivation, design, content, action, management, result and evaluation.
7. The problem of student's career guidance in teaching biology. Education of students in teaching biology. Nationalistic, aesthetic, hygienic, ecological education.
8. Classification of teaching methods and the possibility of their application in teaching biology in accordance with the purpose and content of education. Features of verbal methods of teaching biology. The role of visual methods in biology lessons. Practical methods of teaching biology.
9. The material base of biology education. Didactic and methodological requirements for the organization of a biology classroom, a corner of wildlife, an educational and practical area.
10. Methodological foundations of the organization of biological research: requirements for the organization of scientific research, formulation of the problem, definition of the main objectives of the study, preparation of the program according to the research methodology.
11. Control of educational achievements in biology. Criteria-based assessment of students' academic achievements. System, types and forms of control of educational achievements. Assessment for training.
12. Technological specifics of the mixed lesson, which assumes an uncompromising structure, often conducted in the conditions of a traditional learning system.
13. Problematic technologies in biology teaching. Modular learning technology. Design technology. Gaming technologies. Technology case. Critical thinking technology.
- 14.opportunities provided by modern information and communication technologies to take into account the laws of biology teaching.
- 15.the trend of integration in the structure of the school biology course from the Soviet period to sovereign Kazakhstan.
16. Topseruen is a form of teaching biology, its features. Classification of topsiders conducted on the subject of biology. Structure, purpose and content of topsiders of the discipline biology.



17. methods of organizing and conducting experiments in nature. Comparative analysis of the literature on the theory and methods of conducting experiments on biology.
18. the importance of using prefabricated visual aids in teaching chapters related to the structural individual levels of life included in the content of the 10th grade subject in the course "general biology"
19. the importance of using animations depicting the passage of these processes in teaching topics related to life processes, which are part of the content of the biology course. What features of the development of medium and short-term plans in biological education.
20. the problem of full-fledged performance of biological educational services in the application of test tasks in Biology subjects at the senior stage of the school.
21. strategic directions of development of education in the country, including biological education. Description of teaching models for the updated educational program. The strategy of self-assessment and evaluation of classmates in the learning process.
22. Laboratory lesson-a form of teaching school biology. Features of the organization of the laboratory lesson, structure, requirements for it.
23. theoretical foundations and technology based on the synopsis of reference signals by V. F. Shatalov for the development of conceptual schemes of disciplines in the school biology course.
24. prospects for replacing common scientific methodological positions in the field of theory of education and training of Biology in modern conditions. The role of biological knowledge in the new century. Ways to develop visualization skills in reading in students.
25. equipment for teaching biology (classification and description). Special characteristics of additional education in biology. The methodology of organizing biological Olympiads and competitions.
26. the problem of compliance with didactic principles in the development of PowerPoint slides on biology topics and their use during the lesson. Features of the new format teacher.
27. the concept of teaching Natural Sciences by T. M. Musakulov: the main ideas, principles and goals and their implementation. Features of subject, pedagogical, technological knowledge.
28. ways to connect the lessons of the school biology course with the work in the corner of living nature, in the educational and experimental section.
29. the need to plan selective courses for the course "general biology" of the natural and mathematical orientation, the requirements for their organization and conduct.
30. the role of ecological and valeological culture in the expected results of school biological education. The importance of Using Houseplants in educational work. The effectiveness of the use of local materials in teaching biology.



### 3.3 List of literature allowed for use in the comprehensive exam

1. Сәтбаева Х.Қ., Өтепбергенов А.А., Нилдібаева Ж.Б. Адам физиологиясы. (Оқулық).- Алматы.Издательство «Дәуір», 2005. – 663 бет.
2. Рымжанов К.С., Толенбек И.М. Адам мен жануарлар физиологиясы. Алматы. Қайнар, 2002.-419 бет.
3. Физиология человека: учебник / под ред. В.М.Покровского, Г.Ф.Коротько. – М.: Медицина, 2007. 4. Нормальная физиология: Учебник для мед. вузов / Агаджанян Н.А., Смирнов В.М. (ред.).- 3-е изд.- М.: Академия, 2010.
4. Агаджанян Н.А., Тель Л.З., Циркин В.И. Физиология человека. - М., Новгород: изд-во НГМА, 2010. 6. Физиология человека и животных: учебник для вузов /авт.: Апчел В.Я., Даринский Ю.А., - М.: Академия, 2011.
5. Чувин Б.Т. Физиологическая регуляция функций организма человека. – М.: ВЛАДОС, 2003.
6. Физиология человека и животных: учебник для вузов / авт.: Апчел В.Я., Даринский Ю.А.- М.: Академия, 2011.
7. Ботаника / Э.Э. Әметов.- Алматы: Дәуір, 2005.- 512 бет.ил. 267- (Университеттердің, ауылшаруашылық оқу орындарының студенттеріне арналған оқулық).
8. Botany [Text]: Textbook / S.K. Imankulova, L.B. Seilova, K. I. Shalabaev, D.M. Amanbekova, A.Sh. Shokanova.- Almaty: Association of higher educational institutions of Kazakhstan, 2016.- 280p.
9. Өсімдіктер физиологиясы: Оқу құралы / С.Ж. Атабаева.- Алматы: Бастау, 2015.- 272 б.
10. Атырау өңіріндегі өсімдіктер дүниесі атласы. Атлас растительного мира Атырауской области.- Атырау: "Ақжелкен", 2013.- 252б.
11. Атырау аймағы флорасы /Флора Атырауской области: Оқу-әдістемелік құрал/учебно-методическое пособие / У.Г. Шайхмежденова, А.М. Утешқалиева.- Атырау: Х.Досмұхамедов ат.АтМУ-тіб.о., 2015.- 312 б.(19, 5 б.т.).Геоботаника / Н.М. Мұхитдинов.- Алматы: Дәуір, 2011.- 384 б.
12. Дәрілік өсімдіктер: Оқулық / Мамурова А.Т., Мухитдинов Н.М.- Алматы: ҚР жоғары оқу орындарының қауымдастығы, 2013.- 400б.
13. Биоразнообразие растений: Учебник / Нестерова С.Г. Паршина Г.Н.- Алматы: Қазақ университеті, 2006.- 306 с.
14. Өсімдіктердің молекулалық тіршілігі: Т.2. Оқулық / Джонс Р.; Оэм Х., Томас Х., Воланд С.,- Алматы: Дәуір, 2017 ж.- 552 б.
15. Қисымова А.Қ., Обаев С.Н. Биологияны оқыту әдістемесі. Жалпыбөлім: дәріс курсы. Алматы, 2010.
16. Мырзабаев А.Б. Биологияны оқыту әдістемесі. – Қарағанды, 2006.
17. Торманов Н., Абылайханова Н.Т. Биологияны оқытудың инновациялық әдістері. Оқу құралы.-Алматы: 2013. -206 б.
18. Жұмағұлова Қ.Ә. және т.б. «Биология» пәні бойынша құзыреттерді қалыптастыру мен дамытудың әдістемесі. – Астана, 2012.
19. Темпл Ч., Стилл Дж., Мередит К. Бірлескен оқу. «Сыни ойлауды оқу мен жазу арқылы дамыту» жобасы үшін әзірленген V- құрал. - Алматы,2012. – 78 б.
20. ҚР Президенті Н.Назарбаевтың Қазақстан халқына «Нұрлы жол -болашаққа бастар жол» /Егемен Қазақстан, 11 Қараша, 2014.
21. Жұмағұлова Қ.Ә. Биологияны оқытуда қалыптасатын іс-әрекеттер (презентациялар, сызбалар) мұғалімдерге, студенттерге арналған оқу- әдістемелік құралы. Астана: 2015-41



## Recommendations for students to prepare for the comprehensive exam

- Before the comprehensive exam, students are provided with advice on preparing for FC. The methodology of work on preparation for the CE, sources, literature are recommended;
- information is given about the nature of exam questions, about the need to pay attention to difficult, key points when answering;
  - rights and obligations of the student on the exam;
  - time, place and procedure of the exam;
  - students are encouraged to write questions that arise during the preparation for identification at consultations;
  - the evaluation criteria for the exam are brought to the attention of students.

### 3.5 Criteria for evaluating the results of the state exam

Criteria for assessing knowledge: The results of the state exam in the specialty are evaluated in points: 90-100 points - "excellent", 70-89 points - "good", 50-69 points - "satisfactory", 0-50 points - "unsatisfactory".

The level of knowledge is determined by the presence of reproductive, independent and creative thinking; understanding of the laws of political processes; culture of speech (language literacy, logic).

The "excellent" rating is given with: - independent thinking, with elements of creativity, knowledge of the course structure and the topic being presented, the ability to analyze the material and draw conclusions; - full assimilation of the program material; - knowledge of the main literature, recommended sources.

The answer is rated "good" if: - there is independent thinking, knowledge of the structure of the material and its competent presentation; - assimilation of the program material (minor inaccuracies in the answers are possible); - knowledge of basic literature.

The "satisfactory" rating is given for: - reproductive thinking, poor knowledge of the course structure, concepts, course logic, and political patterns; - assimilation of the essence of the stated question (there may be noticeable gaps in the knowledge of events, facts); - poor knowledge of the main literature.

The rating "unsatisfactory" is given when: - inability to reproduce the material of the theoretical course, explain the significance of events, facts of political history; - ignorance of political theory, the main events and facts of political history; - a superficial acquaintance with the mandatory literature.

With the current monitoring of academic performance, students' academic achievements

### A point-rating letter system for evaluating students' academic achievements with translation into the traditional scale of assessments

by letter system	in points	Evaluation	
		in % content	according to the traditional system
A	4,0	95 – 100	excellent
A-	3,67	90 – 94	
B+	3,33	85 – 89	good
B	3,0	80 – 84	
B-	2,67	75 – 79	
C+	2,33	70 – 74	
C	2,0	65 – 69	satisfactory
C-	1,67	60 – 64	
D+	1,33	55 – 59	
D	1,0	50 – 54	
FX	0,5	25-49	unsatisfactory
F	0	0-24	



**3. Features of the final certification for the disabled and persons with disabilities**

For students with special educational needs, the form of final certification is established *taking* into account individual psychophysical characteristics (oral, written on paper, written computer, testing form, etc.). If necessary, students are given additional time to prepare an answer to the exam.