Ministry of Agriculture of the Russian Federation
Federal State Budgetary Educational Institution
of Higher Education
«St. Petersburg State University of Veterinary Medicine»

APPROVED BY
Vice-Rector for Educational
Work and Youth Policy
Sukhinin A.A.
April 10, 2026

Department of feeding and breeding of animals

EDUCATIONAL WORK PROGRAM

for the discipline

«BOTANY»

The level of higher education
SPECIALIST COURSE

Specialty 36.05.01 Veterinary Medicine
Profile: «General clinical veterinary medicine»
Full-time education

Education starts in 2026

Reviewed and adopted
at the meeting of the department
on March 04, 2026.
Protocol No. 6

Head of the Department
Feeding and Breeding of animals
Candidate of Veterinary Medicine, Associate Professor
Suyazova I.V.

Saint Petersburg
2026

1. AIMS AND OBJECTIVES OF DISCIPLINE

The main **goal of studying** the discipline "Botany" in the training of veterinarians is to develop in students theoretical knowledge of the morphology and anatomy of the vegetative and generative organs of plants, plant taxonomy, as well as practical skills necessary for mastering the compulsory disciplines.

To achieve this goal, it is necessary to solve the following **tasks**:

- to acquaint students with the diversity of algae, higher spore plants, to study the features of their biology, ecology, distribution and role in nature, significance for humans, application in veterinary medicine;
- study the diversity of higher seed plants, the features of their anatomy, morphology, biology, ecology, distribution and role in nature, significance for humans, application in veterinary medicine.

2. THE LIST OF THE PLANNED RESULTS OF THE DISCIPLINE (MODULE), CORRELATED WITH THE PLANNED RESULTS OF THE REALISED EDUCATIONAL PROGRAM

As a result of mastering the discipline, the student prepares for the following types of activities, in accordance with the educational standard of Federal State Educational Standard of Higher Education 36.05.01 "Veterinary Medicine".

Area of professional activity:

13 Agriculture

2.1. The student's competencies formed (acquired) as a result of mastering the discipline

Studying the discipline should form the following competencies:

A) Professional competencies (PC):

PC–9 - Development of recommendations for special feeding of sick animals for therapeutic purposes:

PC-9 ID-1 To know the types of dietary regimes, the principles of feed choice, using digital technologies, norms, feeding regimes in animal diet therapy.

2. THE PLACE OF DISCIPLINE IN THE STRUCTURE OF THE MPEP

Discipline B1.V.DV.03.02 "Botany" is an elective discipline of the federal state educational standard of higher education in the specialty 36.05.01 "Veterinary Medicine" (specialty level).

Mastered: in the 2nd semester - full-time form of study.

When teaching the discipline "Botany", the knowledge and skills acquired by students in mastering the following disciplines are used: Latin, inorganic and analytical chemistry, organic and physical chemistry, biological chemistry. The discipline "Botany" is the basis on which the study of subsequent disciplines is built, such as:

1. Toxicology
2. Veterinary pharmacology
3. Feeding animals with the basics of feed production
4. Animal hygiene
5. Internal non-communicable diseases
6. Pharmacognosy

4. THE SCOPE OF DISCIPLINE AND TYPES OF ACADEMIC WORK

4.1 Scope of the discipline for full-time study

Type of educational work	Hours	Semester
		2
Classroom classes (total)	**37**	**37**
Including		
Lectures, including interactive forms	10	10
Practical lessons (PL), including interactive forms, including:	27	27
Practical training (PT)	4	4
Self-study	**35**	**35**
Type of intermediate and final certification (test, exam)	Test	Test
Total labor intensity: hours/credits	**72/2**	**72/2**

5. THE CONTENT OF THE DISCIPLINE AND TYPES OF CLASSES

5.1 The content of the discipline (full-time education)

#	The title	Achieved competences	Semester	Types of academic work, including students' self-study and labor intensity (in hours)			
				Lectures	Practical lessons	Practical training	Self-study
1	Botany is like science. Sections of botany. The plant as a whole organism. Structure and functions of a plant cell	PC - 9 - Development of recommendations for special feeding of sick animals for therapeutic purposes: PC-9 ID-1 To know the types of dietary regimes, the principles of feed choice, using digital technologies, norms, feeding regimes in animal diet therapy.	2	2	2		4
2	Structural components of the cell. Spare nutrients and inclusions. Cell wall.		2	-	3	1	4
3	Plant tissues. Classification of fabrics. Educational tissues or meristem. Integumentary tissues. Conductive, mechanical, basic and excretory.		2	-	3		3
4	Vegetative organs of a plant. Root, stem and leaf.		2	-	2		4
5	Plant propagation. Generative organs. Flower, inflorescence. Seed and fruit.		2	-	3	1	4
6	General characteristics of lower plants - bacteria, algae, fungi, slime molds, lichens. Features, origin, life cycles, taxonomy and ecology of lower plants.		2	2	2		4
7	Basics of plant taxonomy. Spore-bearing higher plants. Bryophytes, Psilophytes, Lycophytes, Horsetails, Ferns.		2	2	2		4
8	Division Gymnosperms. Origin, life forms, structural features.		2	2	3	1	4
9	Angiosperms. Origin, life forms, structural features.		2	2	4	1	4
TOTAL				**10**	**23**	**4**	**35**

6. THE LIST OF EDUCATIONAL AND METHODOLOGICAL SUPPORT FOR STUDENTS' SELF WORK

6.1. Guidelines for self - work

1. Vinogradova, N.D. Botany: guidelines for studying the discipline and completing independent work for students majoring in 36.05.01 "Veterinary Science" in full-time, part-time, and part-time education / N. D. Vinogradova; Ministry of Agriculture of the Russian Federation, SPbGUVM. - Saint Petersburg: FGBOU VO SPbGUVM, 2020. - 34 p. - URL: https://search.spbguvm.informsystema.ru/viewer.jsp?aWQ9Mzg2JnBzPTM0 (accessed: 04.03.2026). - Access mode: for authorized users of the SPbGUVM electronic library.
3. Matserushka A.R. Textbook for laboratory and practical classes in the discipline "Botany" / A.R. Matserushka, I.V. Lunegova, V.V. Alexandrov, Ya.I. Chagina. - St. Petersburg : SPbGAVM, 2014. – 112 p.
4. Textbook for laboratory and practical classes in the discipline "Botany" / A. R. Matserushka, I. V. Lunegova, V. V. Aleksandrov, Ya. I. Chagina; SPbGAVM. - St. Petersburg: Publishing house of SPbGAVM, 2014. - 110 p.

6.2. Literature for self-work

1. Yakovlev, G.P. Botany: textbook for universities / G. P. Yakovlev, V. A. Chelombitko, V. I. Dorofeev; edited by R.V. Camelina. - 3rd ed., rev. and additional - St. Petersburg: SpetsLit, 2008. - 687 p.
2. Suvorov, V.V. Botany with the Basics of Geobotany: for the Specialty "Agronomy and Soil Science" / V.V. Suvorov, I.N. Voronova. - 2nd ed., revised and enlarged. - Leningrad: Kolos, Leningrad Branch, 1979. - 560 p. - (Textbooks and teaching aids for higher agricultural educational institutions).
3. Korenev, G. V. Plant growing with the basics of selection and seed production: textbook / G. V. Korenev, P. I. Podgorny, S. N. Shcherbak. - 3rd revised and supplemented, reprint. - St. Petersburg: Quadro, 2022. - 576 p. - URL: https://elibrica.com/9a160422-01ae-4a92-91f6-304b55b14cc0 (date of access: 04.03.2026). - Access mode: for authorized users of the Elibrica electronic library system.

7. THE LIST OF BASIC AND ADDITIONAL LITERATURE NECESSARY FOR THE EDUCATION OF THE DISCIPLINE

a) basic literature:

1. Naida, N.M. Botany: a textbook / N. M. Naida. - St. Petersburg: Prospect Nauki, 2022. - 320 p. - - URL: https://www.prospektnauki.ru/ebooks/books/botn0.php (accessed: 24.062025). - Access mode: for authorized users of the Prospect Nauki electronic library system.

8. THE LIST OF RESOURCES OF THE INFORMATION AND TELECOMMUNICATION NETWORK "INTERNET" NECESSARY FOR EDUCATION OF THE DISCIPLINE

1. ELS "SPBGUVM"
2. University information system "RUSSIA"
3. Full-text database POLPRED.COM
4. Scientific electronic Library ELIBRARY.RU
5. Russian Scientific Network
6. Full-text interdisciplinary database on agricultural and environmental sciences ProQuest AGRICULTURAL AND ENVIRONMENTAL SCIENCE DATABASE
7. Electronic books of the publishing house "Prospekt Nauki" http://prospektnauki.ru/ebooks/
8. Collection "Agriculture. Veterinary medicine" publishing house "Quadro" ELS "Elibris" publishing house "Quadro" https://elibrica.com/

9. METHODOLOGICAL INSTRUCTIONS FOR STUDENTS ON MASTERING THE DISCIPLINE

In the process of mastering the discipline "Botany", the student must attend lecture-type classes, during which he must take notes; attend seminar-type classes with the obligatory completion of all the teacher's assignments in the workbook for practical classes. Study sections and complete teacher assignments provided for independent work.

Recommendations for working on lecture material

When preparing for a lecture, the student is recommended to:

1) review the recordings of the previous lecture and recall previously studied material in memory;

2) it is useful to review the material of the future lecture;

3) if independent study of individual fragments of the topic of the last lecture is assigned, then it must be completed without delay;

4) prepare yourself psychologically for the lecture.

For each lecture, practical lesson and laboratory work, the number, topic, list of issues covered, volume in hours and links to recommended literature are provided.

Recommendations for preparing for practical classes

Practical (seminar) classes constitute an important part of students' professional training in the discipline "Botany".

The main goal of conducting practical (seminar) classes is to develop analytical, creative thinking in students by acquiring practical skills. Practical classes are also conducted with the aim of deepening and consolidating the knowledge gained at lectures and in the process of independent work on regulatory documents, educational and scientific literature. When preparing for a practical lesson for students, it is necessary to study or repeat theoretical material on a given topic.

When preparing for a practical lesson, the student is recommended to adhere to the following algorithm;

1) get acquainted with the plan of the upcoming lesson;

2) study the literary sources that were recommended.

Practical (seminar) classes perform the following tasks:

- stimulate regular study of recommended literature, as well as attentive attention to the lecture course;

- consolidate the knowledge gained in the process of lecture training and independent work on literature;
- expand the scope of professionally significant knowledge, skills and abilities;
- allow you to check the correctness of previously acquired knowledge;
- instill skills of independent thinking and oral presentation;
- promote free use of terminology;
- provide the teacher with the opportunity to systematically monitor the level of students' independent work.

Recommendations for working with literature

Working with literature is an important stage of a student's independent work in mastering a subject, contributing not only to consolidation of knowledge, but also to broadening his horizons, mental abilities, memory, ability to think, present and confirm his hypotheses and ideas. In addition, research skills necessary for future professional activities are developed.

When starting to study literature on a topic, it is necessary to make notes, extracts, and notes. In addition, it is necessary to learn how to immediately compile a card index of specialized literature and publications of sources, both proposed by the teacher and identified independently, as well as refer to bibliographic reference books, chronicles of journal articles, book chronicles, and abstract journals. In this case, publications of sources (articles, book titles, etc.) should be written on separate cards, which must be filled out in accordance with the rules of bibliographic description (surname, initials of the author, title of work. Place of publication, publisher, year of publication, number of pages, and for journals articles – journal name, year of publication, page numbers). On each card, it is advisable to record the thought of the author of the book or a fact from this book on only one specific issue. If the work, even in the same paragraph or phrase, contains further judgments or facts on another issue, then they should be written out on a separate card. The presentation should be concise, accurate, without subjective assessments. On the back of the card you can make your own notes about this book or article, its contents, structure, what sources it was written on, etc.

Assessment of knowledge, abilities, and skills that characterize the stages of developing competencies in the discipline "Botany" is carried out in the form of ongoing monitoring and intermediate certification.

Current monitoring is carried out throughout the semester in order to determine the level of students' knowledge acquisition, the formation of skills and abilities, to improve teaching methods, organize educational work and provide students with individual assistance.

Current control includes testing the knowledge, skills and abilities of students:
- in class (survey)
- based on the results of completing individual tasks;
- based on the results of checking the quality of lecture notes, workbooks and other materials;
- based on the results of the students' report during an individual consultation with the teacher, conducted during independent work hours, on existing debts.

The intermediate certification procedure takes place in accordance with the Regulations on the forms, frequency and procedure for ongoing monitoring of academic performance and intermediate certification of students of the Federal State Budgetary Educational Institution of Higher Education of St. Petersburg State Academy of Aerial Medicine dated January 28, 2016.

Interim certification is carried out at the end of the 2nd semester and represents a final assessment of knowledge in the discipline in the form of a credit. Interim certification is carried out orally.

10. EDUCATIONAL WORK

As part of the implementation of the discipline, educational work is carried out to form a modern scientific worldview and a system of basic values, the formation and development of spiritual, moral, civil and patriotic values, a system of aesthetic and ethical knowledge and values, attitudes of tolerant consciousness in society, the formation in students of the need to work as the first vital necessity, the highest value and the main way to achieve success in life, to understand the social significance of your future profession.

11. THE LIST OF INFORMATION TECHNOLOGIES USED IN THE IMPLEMENTATION OF THE EDUCATIONAL PROCESS

11.1 The educational process in the discipline "Botany" provides for the use of information technologies:

- ✓ conducting practical classes using multimedia;
- ✓ interactive technologies (conducting dialogues, collective discussion of various approaches to solving a particular educational and professional problem);
- ✓ interaction with students via email;
- ✓ joint work in the Electronic Information and Educational Environment of St. Petersburg State University of Mathematics and Mathematics : https://spbg u vm.ru/ academy / eios

11.2. Software

List of licensed and freely distributed software, including domestically produced ones

No.	Name of technical and computer training aids recommended by sections and topics of the program	License
1	MS PowerPoint	67580828
2	LibreOffice	free software
3	OS Alt Education 8	AAO.0022.00
4	ABIS "MARK-SQL"	02102014155
5	MS Windows 10	67580828
6	System ConsultantPlus	503/ CL
7	Android OS	free software

12. THE MATERIAL AND TECHNICAL BASE NECESSARY FOR THE IMPLEMENTATION OF THE DISCIPLINE EDUCATIONAL PROCESS

The title of the discipline (module), practice in accordance with the curriculum	The title of special rooms and rooms for self-work	Equipment of special rooms and rooms for self-work
Botany	359 (196084, St. Petersburg, Chernigovskaya str., building 5) Classroom for conducting seminar-type classes, group and individual consultations, ongoing monitoring and intermediate certification	*Specialized furniture:* desks, chairs, blackboard, chalk, cloth. *Visual aids and educational materials:* herbariums. *Technical teaching aids:* multimedia projector, screen, laptop.

	340 (196084, St. Petersburg, Chernigovskaya str., building 5) Classroom for conducting seminar-type classes, group and individual consultations, ongoing monitoring and intermediate certification	*Specialized furniture:* desks, chairs, stools, blackboard, chalk, cloth. *Visual aids and educational materials:* herbariums. *Technical teaching aids:* multimedia projector, screen, laptop.
	342 (196084, St. Petersburg, Chernigovskaya str., building 5) Classroom for conducting seminar-type classes, group and individual consultations, ongoing monitoring and intermediate certification	*Specialized furniture:* desks, chairs, stools, blackboard, chalk, cloth. *Technical teaching aids:* multimedia projector, screen, laptop.

Developer:

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Annex 1

Ministry of Agriculture of the Russian Federation
Federal State Budgetary Educational Institution
of higher education
"Saint Petersburg State University of Veterinary Medicine"

Department of Feeding and Breeding animals

FUND OF ASSESMENT TOOLS
for the discipline
«BOTANY»

Level of higher education
SPECIALIST COURSE

Specialty 36.05.01 Veterinary medicine
Profile: «General clinical veterinary medicine»
Full-time education

Education starts in 2026

Saint Petersburg
2026

1. PASSPORT OF THE FUND OF ASSESMENT TOOLS

№	Acquired competence	Assessed modules of a discipline	Assesment tool
1	PC–9 - Development of recommendations for special feeding of sick animals for therapeutic purposes: PC-9 ID-1 To know the types of dietary regimes, the principles of feed choice, using digital technologies, norms, feeding regimes in animal diet therapy.	Botany is like science. Sections of botany. The plant as a whole organism. Structure and functions of a plant cell	Test, survey
2		Structural components of the cell. Spare nutrients and inclusions. Cell wall.	Test, survey
3		Plant tissues. Classification of fabrics. Educational tissues or meristem. Integumentary tissues. Conductive, mechanical, basic and excretory.	Test, survey
4		Vegetative organs of a plant. Root, stem and leaf.	Test, survey
5		Plant propagation. Generative organs. Flower, inflorescence. Seed and fruit.	Test, survey
6		Basics of plant taxonomy. Spore-bearing higher plants. Bryophytes, Psilophytes, Lycophytes, Horsetails, Ferns.	Test, survey
7		Division Gymnosperms. Origin, life forms, structural features.	Test, survey
8		Angiosperms. Origin, life forms, structural features.	Test, survey

1. LIST OF ASSESSMENT TOOLS

No.	Name evaluation tool	Brief description of the evaluation tool	Presentation of the assessment tool in the fund
1.	Oral questioning	A means of monitoring the assimilation of educational material of a topic, section or sections of a discipline, organized as a training session in the form of an interview between a teacher and students	Questions on topics/sections of the discipline
2.	Test	A system of standardized tasks that allows you to automate the procedure for measuring the level of knowledge and skills of a student	A fund of test assignments

2. INDICATORS AND CRITERIA FOR ASSESSING COMPETENCIES AT VARIOUS STAGES OF THEIR FORMATION, DESCRIPTION OF ASSESSMENT SCALES

Table 3

Planned results of competency acquaired	The level of development				Assesment tool
	Unsatisfactory	Satisfactory	Good	Exellent	
PC–9 - Development of recommendations for special feeding of sick animals for therapeutic purposes:					
PC-9 ID-1 To know the types of dietary regimes, the principles of feed choice, using digital technologies, norms, feeding regimes in animal diet therapy	The level of knowledge below the minimum requirements, there were gross mistakes	The minimum acceptable level of knowledge, many minor errors	The level of knowledge in extent, consistent with training program training program, admitted a few minor mistakes	The level of knowledge in extent, consistent with training program level of knowledge in the scope of the training program, without errors.	Oral questioning, tests

3. A LIST OF CONTROL TASKS AND OTHER MATERIALS, NECESSARY FOR THE ASSESSMENT OF KNOWLEDGE, SKILLS AND WORK EXPERIENCE

3.1. Typical tasks for the current control of academic progress

3.1.1 Questions for knowledge survey (writing variant)

Competency assessment questions:

PC–9 - Development of recommendations for special feeding of sick animals for therapeutic purposes

PC-9 ID-1 To know the types of dietary regimes, the principles of feed choice, using digital technologies, norms, feeding regimes in animal diet therapy.

For section 1:

1. When and why did botany emerge as a science?
2. What are the objectives of botany?
3. What is the role of plants in nature and human life?
4. What special sciences are included in botany?
5. What are the tasks of morphology, taxonomy, ecology, and physiology of plants?

For section 2:

1. What research methods are used in cytology?
2. What is a protoplast? What cell components are called protoplast derivatives?
3. The structure of the cytoplasm. Structure and properties of biological membranes.
4. What organelles does the cytoplasm consist of? What are their structure and functions?
5. Plastids, their classification.
6. What is the function of the kernel? What organelles does it consist of? What are their structure and functions?

For section 3:

1. What is fabric? What are the different tissue groups?
2. Signs of meristematic tissue.
3. Epidermis. Which plant organs are covered with epidermis? Features of the structure of epidermal cells.
4. Stomatal apparatus, its functions.
5. What is the function of mechanical tissue? What are the features of the structure of mechanical tissue cells?
6. Conductive tissues, features of their structure.
7. Excretory tissues.

For section 4:

1. Which organs are called vegetative and which generative?
2. What is a root and what are its functions?
3. What types of roots are there?
4. What zones does the root consist of? The structure of the root hair.
5. What is a stem, what are its functions?
6. What is a leaf and what are its functions? What is heterophylly ?
7. Features of the structure of needles.
8. What is an escape. Escape structure.
9. What is a kidney?

For section 5:

1. What is the purpose of the flower? Which parts of it are of stem origin and which are leafy?
2. Which plants are called monoecious and which are dioecious?

3. Perianth and its types.
4. Types of androecium. What is the structure of the stamen?
5. Types of gynoecium?
6. Structure of the ovule.
7. Where and how does microsporogenesis occur ?
8. Where and how does megasporogenesis occur?
9. Pollination methods.
10 Classification of seeds.
11. Classification of fruits.

For section 6:

1. The structure of sphagnum mosses.
2. The structure of lycophytes.
3. Distinctive features of horsetails.
4. What is the difference between fern and other modern spores?

According to section 7:

1. How is the ovule structured in gymnosperms?
2. How are male and female gametophytes formed in gymnosperms?
3. Differences between gymnosperms and higher spores.
4. Distribution and importance of conifers in nature and human life.

According to section 8:

1. Life cycle of angiosperms.
2. Origin of the flower.
3. Differences between gymnosperms and angiosperms.

3.1.2 Tests

Competency assessment tests :

PC–9 - Development of recommendations for special feeding of sick animals for therapeutic purposes

PC-9 ID-1 To know the types of dietary regimes, the principles of feed choice, using digital technologies, norms, feeding regimes in animal diet therapy

1.Mosses, unlike other higher plants, do not have

1. Stems
2. Roots
3. Leaves
4. Fabrics

2. Angiosperms, unlike gymnosperms, have

1. Sexual method of reproduction
2. Cellular structure
3. Roots and shoots
4. Flower and fruit with seeds

3.Plants are classified based on

1. Similarities of structure, taking into account their relationship
2. Habitat communities
3. Their practical significance
4. Similarities in structure, even without taking into account kinship

4. Ferns are higher spore plants, since

1. In their development there is an alternation of generations
2. Have roots and conducting vessels in the stem
3. Reproduce by spores
4. They have a cellular structure and are capable of photosynthesis

5.Algae belong to the plant kingdom because they have

1. Roots and shoots
2. Cellular structure
3. Thallus
4. Ability to photosynthesize

6. The main feature by which plants are classified as one species is

1. Greatest relatedness
2. Similarity in internal characteristics
3. Similarity in habitat
4. Similarity in appearance

7. Plants whose flower has four petals, four sepals, and the fruit is a pod are classified as

1. Paslenovs
2. Compositae
3. Cruciferous
4. Liliaceae

8.Pinnate and forked venation of leaves is characteristic of the class

1. Coniferous
2. Dicotyledons
3. Sagovnikovs
4. Monocots

9. Tissue that provides plant growth -

1. Educational
2. Main
3. Conductive
4. Mechanical

10.Which tissue is a derivative of parenchyma?

1. Meristem
2. Epidermis
3. Phloem
4. Storage

11.What tissue cells contain chloroplasts?

1. Pericycle
2. Mesophyll
3. Sclerenchyma
4. Xylem

12. Tissue through which the downward flow of substances passes -

1. Lub
2. Sclerenchyma
3. Pericycle
4. Wood

13.Due to the activity of which tissue do lateral roots appear?

1. Lateral meristem
2. Pericycle
3. Apical meristem
4. Epidermis

14.Which zone ensures root growth in length?

1. Root cap
2. Stretch zone
3. Division zone
4. Venue area

15. Endoderm function

1. Support

2. Conductive
3. Selective transport
4. Storage

16. Complete the list: leaf, bud, node, internode...

1. Flower
2. Fetus
3. Root
4. Stem

17.Which bud does NOT contain a growth cone?

1. Apical
2. Lateral
3. Vegetative
4. Generative

18. The set of pistils of a flower is called

1. Gynoecium
2. Ovary
3. Androecium
4. Perianth

19. The transfer of water with dissolved mineral salts from the root to the leaf occurs due to

1. Nearby transport
2. Long-distance transport
3. Downward current
4. Diffusion

20.Name the shortened shoot

1. Mustache
2. Rhizome
3. Stolon
4. Bud

21.What is the name of the type of reproduction in which new plant individuals develop from organs such as roots, stems, leaves?

1. Generative
2. Vegetative
3. Somatic
4. Natural

22.Name the type of reproduction, the basis of which is the plant's ability to regenerate

1. Generative
2. Reproductive
3. Vegetative
4. Artificial

23.Which of the following is NOT characteristic of the rhizome, bulb and tuber of flowering plants?

1. Have a stem
2. Have kidneys
3. Participate in vegetative propagation
4. They are modifications of the root

24.Name the process underlying vegetative propagation

1. Fertilization
2. Meiosis
3. Pollination
4. Regeneration

25.What is a leaf axil?

1. The space inside a folded leaf blade
2. Distance between stem and leaf blade
3. The angle between the leaf and the part of the stem located above
4. The angle between the leaf and the lower part of the stem

26.Name the characteristic by the presence of which leaves are called compound

1. Have several petioles
2. Have several leaf blades on one petiole
3. Have reticulate venation
4. They have a complex cutout of the edge of the leaf blade

27.What is located between the guard cells of the stomata?

1. Thick membrane shared by two cells
2. Gap
3. System of cytoplasmic bridges
4. Cambium

28.Name the process that is carried out through the stomata of flowering plants

1. Absorption of mineral salts
2. Water suction
3. Movement of water vapor, oxygen and carbon dioxide
4. Vegetative propagation

29.What can be said about the presence and location of stomata in water lilies?

1. None
2. Located only on the upper side of the sheet
3. Located only on the underside of the sheet
4. Located on the top and bottom sides of the sheet

30. In which part of flowering plants do the cells contain a lot of chloroplasts?

1. Leaf peel
2. Leaf pulp
3. Wood
4. Lub

31.What happens in the leaves of most plants at night?

1. Photosynthesis only
2. Just breathing
3. Only photosynthesis and evaporation
4. Only breathing and evaporation

32.Indicate the environmental factor, increasing the intensity of which reduces the evaporation of water by the plant

1. Air temperature
2. Air humidity
3. Wind power
4. Illumination

33.Name the tissue in the leaf of a terrestrial flowering plant that is located third in relation to the upper surface of the leaf

1. Spongy tissue
2. Skin with many stomata
3. Columnar fabric
4. Peel with a small number of stomata

34. Conductive tissues include...

1. Phloem
2. Meristem
3. Cork
4. Skin

35. Where is the apical meristem located?

1. At the tip of the shoot and the tip of the root
2. At the base of the leaf
3. At the center of the stem
4. Between phloem and xylem

36. Sieve tubes perform the following function:

1. Conduct a solution of organic substances
2. Conduct a solution of mineral salts
3. Store organic matter
4. Ensure shoot growth in length

37.Name the fabric to which wood is classified:

1. Pokrovnaya
2. Educational
3. Conductive
4. Mechanical

38.Which of the following is most characteristic of the cells of the educational tissue of flowering plants?

1. Division
2. Nutrient storage
3. Photosynthesis and carbohydrate formation
4. Conducting chemical compounds into other tissues

39.Name the tissue of the tip of a young root located under the root cap.

1. Pokrovnaya
2. Educational
3. Conductive
4. Mechanical

40.Which organisms should plants be classified according to their method of nutrition?

1. Heterotrophs
2. Chemosynthetic autotrophs
3. Photosynthetic autotrophs
4. Mixotrophs

41.Which taxonomic group should all plants be classified as?

1. Class
2. Genus
3. Order
4. Kingdom

42.Which of the following is NOT characteristic of plants?

1. Photosynthesis
2. Organic matter capture
3. Transport of solutions of mineral salts and organic substances
4. Vegetative propagation

43.What does the word BOTANE mean in Greek?

1. Live
2. grass, plant
3. Grow
4. Green

44. Which of the following is characteristic not only of plants, but also of most animals?

1. Inorganic compounds are used as the main source of the substance
2. Lead an attached (stationary) lifestyle
3. Solar energy is used as the main energy source
4. Have a cellular structure

45.Name the main characteristic by the presence of which flowering plants are classified as a group of higher plants.

1. Multicellularity
2. The body is dismembered into organs
3. There is a flower
4. Presence of sexual reproduction

46.What term refers to the organs of a flowering plant, the main functions of which are nutrition, respiration, growth and development of the plant?

1. Auxiliary
2. Vegetative
3. Main
4. Generative

47.Name all the organs of a flowering plant that are part of the vegetative shoot.

1. Stem
2. Stem and leaves
3. Stem, leaves and buds
4. Stem, leaves, buds and flowers

48.Name a group of organisms whose representatives are classified as lower plants

1. Bryophytes
2. Green algae
3. Ferns
4. Angiosperms

49.What function does the root NOT perform?

1. Transport
2. excretory
3. Generative reproduction function
4. Vegetative propagation function

50 . Which root is not part of the taproot system?

1. Main
2. Air
3. Subordinate
4. there is no right answer

51.Which of the following is characteristic of root vessels?

1. Contain cytoplasm
2. They have transverse partitions between adjacent cells located one above the other
3. Have holes in the side cell walls
4. Transports organic matter from leaves to roots

52.Name the structures of flowering plants through which water and mineral salts move from the root to the stem.

1. Root hairs
2. Intercellular spaces
3. Vessels
4. Sieve tubes

53. Nodule bacteria absorb substances from the soil air, which are converted into chemical compounds that are easily absorbed by plants. Name this substance.

1. Nitrogen
2. Oxygen
3. Carbon dioxide
4. Hydrogen

54.What is the term for the symbiosis of the root of a higher plant and the fungus that has settled on it?

1. Pip
2. Root vegetable
3. Fruiting body

4. Mycorrhiza

55. Name the main feature by which the root system is classified as fibrous.

1. There are lateral roots
2. There are adventitious roots
3. There is a main root
4. No well-developed main root

56.What are the parts of the stem on which leaves develop called?

1. Growth cones
2. Growth zones
3. Nodes
4. Sinuses

57.What is the name of an underground modified shoot that has the following structure: a long stem, often thickened, with scale-like underdeveloped leaves or scars from leaves on the nodes, with buds and usually adventitious roots?

1. Pip
2. Rhizome
3. Tuber
4. Root vegetable

58.Name the modifications of shoots...

1. Adventitious roots
2. Roots
3. Flowers
4. Root tubers

59.Which of the following is absent from the vegetative buds of flowering plants?

1. Rudimentary leaves
2. Rudimentary buds
3. Rudimentary buds
4. Rudimentary stems

60.What organ is the bulb a modification of?

1. The escape
2. Lateral root
3. Adventitious root
4. Stem

3.2 Standart tasks for intermediate certification

3.2.1 Questions for testing

Formed competence:

PC–9 - Development of recommendations for special feeding of sick animals for therapeutic purposes

PC-9 ID-1 To know the types of dietary regimes, the principles of feed choice, using digital technologies, norms, feeding regimes in animal diet therapy

List of questions for testing

1. Object and methods of botany. Main branches of botany. The meaning of plants.
2. The structure of a plant cell.
3. Similarities and differences in the structure of plant and animal cells.
4. Cytoplasm. Features of the structure of biological membranes. Structure and functions of single-membrane organelles.
5. Mitochondria: submicroscopic structure, shape, size, functions.
6. Plastids. Types of plastids, their structure, functions. Ontogenesis and interconversion of plastids.
7. Vacuole: structure, chemical composition of cell sap, functions.

8. Cell membrane: its chemical structure and physical properties.
9. Cell nucleus: chemical composition, morphological structure, functions.
10. Meristems: classification; structural features of meristem cells.
11. Assimilation, storage, pneumatic tissues: structural features of cells, functions. Epidermis and its structure. Types of stomatal apparatus.
12. Principles of operation of the stomatal apparatus.
13. Periderm: structural features, functions.
14. Excretory tissues.
15. Mechanical tissues: structural features of collenchyma, sclerenchyma, sclereid cells. Location of mechanical tissues in the plant body.
16. Phloem: tissues that make up it. Cytological structural features and histogenesis of sieve elements.
17. Evolution of sieve elements.
18. Xylem: the tissues that make up it. Features of the structure of cells of tracheal elements, their histogenesis, evolution.
19. Evolutionary changes in the structure of tracheal elements.
20. Conductive bundles and their types.
21. Root and its functions. Young root zones.
22. Structure and functions of the root cap.
23. Types of root systems. Modifications and metamorphoses of roots.
24. The escape. Types of shoot growth (branching).
25. Kidney: structure, functions. Types of kidneys. The process of budding.
26. Stem: functions, morphological types.
27. Sheet. Morphological types of leaves.
28. Anatomical and morphological features of the leaf structure of a light-loving plant.
29. Anatomical and morphological features of the leaf structure of a shade-loving plant.
30. Diversity of leaves (leaf formations, heterophylly).
31. The phenomenon of leaf fall: its biological significance.
32. Types of shoot modifications.
33. Vegetative propagation of plants: its biological significance.
34. Types of sexual reproduction: its biological significance. The structure of gametangia.
35. Flower. Morphological types of flowers. Flower formula and diagram.
36. The structure of the perianth and its types.
37. Androecium. Origin and evolution. Morphological and anatomical structure of the stamen. Microsporogenesis . Development of the male gametophyte. Microgametogenesis .
38. Gynoecium. Origin and evolution of the gynoecium.
39. Formation of the ovary and its biological significance.
40. The structure of the ovule. Megasporogenesis. Development of the female gametophyte.
41. Double fertilization in angiosperms and its biological meaning. Deviations from normal fertilization.
42. Classification of inflorescences. Their biological significance.
43. Biological role of inflorescences.
44. Pollination of plants. Self-pollination and cross-pollination. Adaptation of plants to cross-pollination.
45. Biological significance of cross pollination.
46. Plant pollination: types.
47. Adaptation of plants to pollination by insects.
48. Adaptation of plants to wind pollination.
49. Methods of dispersal of fruits and seeds.
50. Features of the life cycle of gymnosperms.
51. Life cycle of angiosperms.
52. Division *Rhyniophyta* . Role in the construction of phylogenetic systems.

53. Characteristics of the Psilote department .
54. Department of Moss: general characteristics, principles of classification, origin.
55. Evolutionary characteristics of the *Drepanophycopsida classes* and *Lycopodiopsida* .
56. Order *Lepidocarpales* : structural features, origin, development, ecology; geological role; diversity.
57. Mosses and hypotheses of their origin.
58. General characteristics and classification of mosses.
59. Practical significance and protection of mosses.
60. Ferns: general characteristics and origin.
61. Relationship between the life forms of ferns and habitat conditions.
62. Gymnosperms: general characteristics and evolution of the life cycle.
63. Class Ginkgoaceae: anatomical and morphological characteristics, environmental features, biology, geography.
64. Characteristics of *Magnoliophyta* , their taxonomic division.
65. Origin, diversity, evolution of the gynoecium.
66. Androecium in angiosperms: origin, diversity, evolutionary development.
67. Subclass *Magnoliidae* . Position of Magnoliaceae in various phylogenetic systems.
68. Division of angiosperms into monocotyledons and dicotyledons; separation reliability.
69. Order Liliales : general characteristics, phylogenetic relationships, evolutionary development, biology. Different interpretations of taxon volume.
70. Leaf and homologous formations in various departments of higher plants.

4.METHODOLOGICAL MATERIALS DETERMINING PROCEDURES FOR ASSESSING KNOWLEDGE, ABILITIES AND SKILLS AND ACTIVITY EXPERIENCE CHARACTERIZING THE STAGES OF COMPETENCY FORMATION

4.1. Criteria for assessing students' knowledge when conducting an oral survey:

- **Mark "excellent"** - the student clearly expresses his point of view on the issues under consideration, giving relevant examples.
- **Mark "good"** - the student makes some errors in the answer
- **Mark "satisfactory"** - the student discovers gaps in knowledge of the basic educational and normative material.
- **Mark "unsatisfactory"** - the student reveals significant gaps in knowledge of the basic principles of the discipline, inability, with the help of the teacher, to obtain the correct solution to a specific practical problem.

4.2. Criteria for assessing students' knowledge during testing:

The test result is assessed on a percentage rating scale. Each student is offered a set of test tasks consisting of 38 questions:
- The mark **"excellent"** – 90% or more correct answers.
- The mark **"good"** – 80% or more correct answers.
- The mark **"satisfactory"** – 70% or more correct answers.
- The mark **"unsatisfactory"** – less than 70% correct answers

4.3. Criteria for assessing knowledge during the test:

The mark "**accepted** " must correspond to the parameters of any of the positive ratings ("excellent", "good", "satisfactory").

The mark "**not accepted** " rating should correspond to the parameters of the "unsatisfactory" rating.

The mark "**excellent**" - all types of academic work provided by the curriculum. The student demonstrates the compliance of knowledge, skills, abilities, skills given in the tables of indicators, operates the acquired knowledge, skills, abilities, skills, applies them in situations of increased complexity. At the same time, there may be inaccuracies, difficulties in analytical operations, transfer of knowledge and skills to new, non-standard situations.

The mark "**good**" - all types of academic work provided by the curriculum. The student demonstrates the compliance of knowledge, skills, abilities, skills given in the tables of indicators, operates the acquired knowledge, skills, abilities, skills, applies them in standard situations. There may be minor errors, inaccuracies, difficulties in analytical operations, transfer of knowledge and skills to new, non-standard situations.

The mark «**satisfactory**» - not performed one or more types of academic work provided by the curriculum. The student demonstrates incomplete compliance of knowledge, skills, skills given in the tables of indicators, significant errors are made, there is a partial lack of knowledge, skills, skills for a number of indicators, the student has significant difficulties in operating knowledge and skills in their transfer to new situations.

The mark «**unsatisfactory**» - not fulfilled types of academic work provided by the curriculum. demonstrates incomplete compliance of knowledge, skills, skills given in the tables of indicators, significant errors are made, shows the lack of knowledge, skills, skills for a large number of indicators, the student has significant difficulty in operating knowledge and skills in their transfer to new situations.

5. ACCESSIBILITY AND QUALITY OF EDUCATION FOR DISABLED PEOPLE

If necessary, disabled people and persons with limited health capabilities are given additional time to prepare an answer for the test.

When carrying out the procedure for assessing the learning outcomes of people with disabilities and people with limited health capabilities, their own technical means may be used.

The procedure for assessing the learning outcomes of people with disabilities and people with limited health capabilities in the discipline provides for the provision of information in forms adapted to the limitations of their health and perception of information:

For people with visual impairments:	– in printed form in enlarged font, – in the form of an electronic document.
For people with hearing impairments:	– in printed form, – in the form of an electronic document.
For persons with musculoskeletal disorders	– in printed form, device: – in the form of an electronic document.

When carrying out the procedure for assessing the learning outcomes of disabled people and persons with limited health capabilities in the discipline, it ensures the fulfillment of the following additional requirements depending on the individual characteristics of the students:

a) instructions on the procedure for conducting the assessment procedure are provided in an accessible form (orally, in writing);

b) an accessible form for submitting assignments of assessment tools (in printed form, in printed form in enlarged font, in the form of an electronic document, assignments are read out by the teacher);

c) an accessible form of providing answers to assignments (written on paper, typing answers on a computer, orally).

If necessary, for students with disabilities and people with disabilities, the procedure for assessing learning outcomes in the discipline can be carried out in several stages.

The procedure for assessing the learning outcomes of disabled people and persons with limited health capabilities is permitted using distance learning technologies.

Program abstract of the discipline
B1.V.DV.03.02 "Botany"
specialty 36.05.01 Veterinary Medicine
Profile: «General clinical veterinary medicine»

Purpose of mastering the discipline: the main purpose of studying the discipline "Botany" in the training of veterinarians is to develop in students theoretical knowledge of the morphology and anatomy of the vegetative and generative organs of plants, plant taxonomy, as well as practical skills necessary for mastering the compulsory disciplines.

Place of discipline in the curriculum: discipline B1.V.DV.03.02 "Botany" is an elective discipline of the Federal State Educational Standard of Higher Education in specialty 36.05.01 "Veterinary" (specialty level), the discipline is studied: in the 2nd semester.

Requirements for the results of mastering the discipline: Studying the discipline should form the following competencies: PC-9.

PC-9. Development of recommendations for special feeding of sick animals for therapeutic purposes:

PC-9 ID-1 To know the types of dietary regimes, the principles of feed choice, using digital technologies, norms, feeding regimes in animal diet therapy.

Brief content of the discipline:

To achieve this goal, it is necessary to solve the following **tasks** :

- to acquaint students with the diversity of algae, higher spore plants, to study the features of their biology, ecology, distribution and role in nature, significance for humans, application in veterinary medicine;
- study the diversity of higher seed plants, the features of their anatomy, morphology, biology, ecology, distribution and role in nature, significance for humans, application in veterinary medicine.

Know: the morphological structure of the vegetative and generative organs of monocotyledonous and dicotyledonous plants; general patterns of plant growth and development; types of plant reproduction: vegetative, asexual, sexual; taxonomy of monocotyledonous and dicotyledonous plants.

Be able to: identify the morphological features of the structure of organs of flowering plants (root, leaf, stem, flower, fruit, seed); identify the anatomical features of the structure of organs of flowering plants; work with plant identification books and identify plants; visually recognize plants of various botanical families and economic-botanical groups, know their basic biological, economically useful properties and features;

Know: techniques for identifying plants and making herbariums; skills of applying acquired knowledge in scientific research and practical activities.

The complexity of the discipline is: 2 credit units (72 hours).

Final control of the discipline: test