ANNOTATIONS OF THE WORKING PROGRAMMES OF THE COURSES
“BIODIVERSITY” MASTER PROGRAMME
SUBJECT 06.04.01 – «BIOLOGY»

Discipline annotation
«Philosophical problems of natural science»

«Philosophical problems of natural science» is a component of Unit 1 " Disciplines (modules)" and it is mandatory for all students.

Discipline is aimed at the formation of the following competencies:

General cultural competences:

GCC-1 - Ability to abstract thinking, analysis, synthesis;

General professional competence*:*

GPC-8 – Ability to use the philosophical concepts of natural science to form a scientific worldview.

The main topics of the discipline:

1. Introduction. The science. The essence of scientific knowledge. Biological science. Purpose and objectives of the discipline.

2. Fundamentals of the methodology of science. The language of science. A fact in science. Scientific problem. Scientific idea. Scientific hypothesis. Scientific law. Scientific theory. Integration of sciences and general theories. Scientific picture of the world.

3. Theoretical foundations of biology: problems, problems, the nature of theoretical knowledge, its relevance. The logical structure of biological knowledge and the discipline of biology.

4. Organization of life and its main characteristics, principles of organization, the essence of life. Philosophical-methodological and general biological aspects of determining the essence of life.

5. The dialectics of the organization of the living is nature, the principles of biological organization; biological systems, the contradiction of the organization of biological systems; structure and function; change and conservation of biosystems.

6. History of biology. The role of the historical approach in biological research, the relationship between history and the methodology of biology.

7. Methodology of biology. Methodological analysis of the master's thesis performed by the student.

Types of educational work:

Lectures, seminars, independent work of students.

Discipline annotation
«Academic English»

«Academic English» is a component of Unit 1 " Disciplines (modules)" and it is mandatory for all students.

Discipline is aimed at the formation of the following competencies:

General professional competence:

GPC–1 - readiness for communication in oral and written forms either in the state language of the Russian Federation or a foreign language for solving professional problems ;

GPC–2 - readiness to lead a team in the sphere of their professional activity, tolerantly perceiving social, ethnic, confessional and cultural differences;

The main topics of the discipline:

1. Introduction to the class, introduction to academic English: “Principles and Characteristics of Academic English” (material)
2. “Principles and Characteristics of Academic English” (including exercise); “Common Issues in Academic English (for native speakers of Russian)” (material)
3. “Common Issues in Academic English” (including exercises)
4. Reading and writing articles and other items in English
5. Writing and publishing articles in international journals (materials)
6. Makingpresentationsatinternationalconferences
7. Creating e-mails and reports; resources for academic English

Types of educational work:

Lectures, practice, consultations, independent work of students.

Discipline annotation
«Bioinformatics»

«Bioinformatics» is a component of Unit 1 " Disciplines (modules)" and it is mandatory for all students.

Discipline is aimed at the formation of the following competencies:

General professional competence*:*

GPC–7 - readiness to creatively apply modern computer technologies in collecting, storing, processing, analyzing and transferring biological information for solving professional problems;

GPC–9 - the ability to professionally design, present and report the results of scientific research and vocational work on approved forms.

Professional competencies*:*

PC–3 - the ability to apply the methodological basis for designing, performing field and laboratory biological, ecological studies, using modern equipment and computing complexes of the event (in accordance with the direction (profile) of the master's programme).

The main topics of the discipline:

1. Review of modern problems in the field of bioinformatics and ways to solve them
2. Setting up the environment for running bioinformation applications
3. Software for solving problems in genomics
4. Comparative genomics

Types of educational work:

Lectures, practice, consultations, independent work of students.

Discipline annotation
«Academic Writing»

«Academic Writing» is a component of Unit 1 "Disciplines (modules)" and it is mandatory for all students.

Discipline is aimed at the formation of the following competencies:

General cultural competences:

GCC–3 - readiness for self-development, self-realization, use of creativity;

General professional competence:

GPC–1 - readiness for communication in oral and written forms either in the state language of the Russian Federation or a foreign language for solving professional problems ;

GPC–2 - readiness to lead a team in the sphere of their professional activity, tolerantly perceiving social, ethnic, confessional and cultural differences;

GPC–9 - the ability to professionally design, present and report the results of scientific research and vocational work on approved forms.

The main topics of the discipline:

1. Introduction to the topic; using the TSU Research Library for research in English
2. Finding target journals and spotting predatory sources
3. Publicationethicsandpractices
4. Workingwithjournalrequirements
5. Workingwithstyles
6. Workingwithmodelarticles
7. Organizinganarticle
8. WritinganarticleinEnglish

Types of educational work:

Lectures, practice, consultations, independent work of students.

Discipline annotation
«History and methodology of biology»

«History and methodology of biology» is a component of Unit 1 " Disciplines (modules)" and it is mandatory for all students.

Discipline is aimed at the formation of the following competencies:

General cultural competences:

GCC–2 - readiness to act in non-standard situations, to bear social and ethical responsibility for the decisions made;

General professional competence:

GPC–5 - the ability to apply knowledge of history and methodology of biological sciences to solve fundamental professional problems

Professional competencies*:*

PC– 4 - Ability to generate new ideas and methodological solutions.

The main topics of the discipline:

1. 1. Introduction. The science. The essence of scientific knowledge. Biological science. Purpose and objectives of the discipline.
2. 2. Fundamentals of the methodology of science. The language of science. A fact in science. Scientific problem. Scientific idea. Scientific hypothesis. Scientific law. Scientific theory. Integration of sciences and general theories. Scientific picture of the world.

3. 3. Theoretical foundations of biology: problems, the nature of theoretical knowledge, its relevance. The logical structure of biological knowledge and the discipline of biology.
4. 4. Organization of life and its main characteristics, principles of organization, the essence of life. Philosophical-methodological and general biological aspects of determining the essence of life.
5. 5. The dialectics of the organization of the living is nature, the principles of biological organization; biological systems, the contradiction of the organization of biological systems; structure and function; change and conservation of biosystems.
6. 6. History of biology. The role of the historical approach in biological research, the relationship between history and the methodology of biology.
7. 7. Methodology of biology. Methodological analysis of the master's thesis performed by the student.

Types of educational work:

Lectures, seminars, consultations, independent work of students.

Discipline annotation
«Bioethics and modern problems of biology»

«Bioethics and modern problems of biology» is a component of Unit 1 "Disciplines (modules)" and it is mandatory for all students.

Discipline is aimed at the formation of the following competencies:

General cultural competences:

GCC–2 - readiness to act in non-standard situations, to bear social and ethical responsibility for the decisions made.

General professional competence*:*

GPC–3 - readiness to use fundamental biological ideas in the sphere of professional activity for setting and solving new tasks.

Professional competencies:

PC–1 - the ability to creatively use knowledge of the fundamental and applied sections of disciplines (modules) that determine the direction (profile) of the master's programme in scientific and industrial-technological activities;

PC–2 - the ability to plan and implement professional activities (in accordance with the direction [profile] of the master's programme).

1.Subject of bioethics. Features of the development of modern scientific knowledge and the history of the formation of bioethics. Principles of ethical treatment of animals.

2.Ethics as a science of morality. Basic ethical concepts. Justice by Aristotle.

3.Protection of the rights of test subjects. Lessons of Nuremberg.

4.Basic values and principles of bioethics. Features of European and American bioethics.

5.The history of the relationship of man to animals. Unity of all living things on Earth. Bioethics in various philosophical doctrines.

6.Bioethical problems and views on them of various philosophical and religious schools. Jainism, Judaism, Hinduism, Islam, Christianity.

7. Implementation of bioethical principles in the scientific research activities of the biologist: from theory to practice.

8.Bioethical aspects of working with animals in laboratories and in the scientific process. The concept of the three R.

9.Fundamentals of animal welfare. Further ways of development. Movement for the struggle of animal rights.

10.Laboratory experimentation (scientific and educational experiment).

11.Ethical problems of new reproductive technologies. Fetal tissues are their importance for science.

12. Social and ethical-legal problems associated with the use of biotechnology.

13.Ethical problems of modern science. Ethical problems of genetic engineering experiments. Nanotechnology. Cloning.

14.Problems of xenotransplantation in modern society. Ways of further development.

15 Ethical problems of euthanasia. Society and the right to die. Palliative care.

16 Legislative regulation of bioethical situations. The Helsinki Declaration, the Convention on Abortion the Convention on genetic technology and other documents.

17.Instructive materials, bioethical problems, acting in accordance with the legislation of the Russian Federation.

18. The main international normative documents in the field of bioethics (UNN, UNESCO, Council of Europe, etc.)International recommendations (ethical code) for carrying out biomedical research using animals. European Convention. Draft of the Universal Declaration on Bioethics and Human Rights of UNESCO.

Types of educational work:

Lectures, seminars, consultations, independent work of students.

Discipline annotation
«Ecology and Evolution»

«Ecology and Evolution» is a component of Unit 1 "Disciplines (modules)" and it is mandatory for all students.

Discipline is aimed at the formation of the following competencies:

General cultural competences:

GCC–2 - readiness to act in non-standard situations, to bear social and ethical responsibility for the decisions made.

General professional competence:

GPC–6 - ability to use knowledge of the fundamentals of the biosphere theory, understanding of modern biosphere processes for a systematic assessment of geopolitical phenomena and forecasting the consequences of implementing socially significant projects.

The main topics of the discipline:

1 The Scope of Ecology
2 The Ecosystem
3 Energy in Ecological Systems
4 Biogeochemical Cycles
5 Limiting and Regulatory Factors
6 Population Ecology and Evolution
7 Community Ecology and Evolution
8 Ecosystem Development
9 Landscape Ecology
10 Regional Ecology: Major Ecosystem Types and Biomes
11 Global Ecology

Types of educational work:

Lectures, seminars, consultations, independent work of students.

Discipline annotation
«Statistics»

«Statistics» is a component of Unit 1 "Disciplines (modules)" and it is mandatory for all students.

Discipline is aimed at the formation of the following competencies:

General professional competence:

GPC–4 - the ability to independently analyze available information, identify fundamental problems, set the task and perform field, laboratory biological research in solving specific problems using modern equipment and computing facilities, be responsible for the quality of work, and the scientific reliability of the results

Professional competencies*:*

PC–3 - the ability to apply the methodological basis for designing, performing field and laboratory biological, ecological studies, using modern equipment and computing complexes of the event (in accordance with the direction (profile) of the master's programme).

PC– 4 - Ability to generate new ideas and methodological solutions.

The main topics of the discipline:

1. α-diversity
2. β and γ-diversity
3. Distribution and density of biodiversity
4. Comparisons and evaluations of environmental interventions on biodiversity
5. Alternative measures and qualitative biodiversity
6. Learning the Software EstimateS
7. Basics of statistics applied to the study of biodiversity

Types of educational work:

Lectures, seminars, consultations, independent work of students.

Advanced courses

Discipline annotation
«Ecosystem services, environmental economics and politics»

«Ecosystem services, environmental economics and politics» is a component of Unit 1 "Advanced courses" and it is mandatory for all students.

Discipline is aimed at the formation of the following competencies:

General professional competence:

GPC–4 - the ability to independently analyze available information, identify fundamental problems, set the task and perform field, laboratory biological research in solving specific problems using modern equipment and computing facilities, be responsible for the quality of work, and the scientific reliability of the results

GPC–9 - the ability to professionally design, present and report the results of scientific research and vocational work on approved forms.

Professional competencies*:*

PC–3 - the ability to apply the methodological basis for designing, performing field and laboratory biological, ecological studies, using modern equipment and computing complexes of the event (in accordance with the direction (profile) of the master's programme).

PC– 4 - Ability to generate new ideas and methodological solutions.

The main topics of the discipline:

1. Environmental management regulation development
2. Basics of environmental policy
3. Environmental impact assessment
4. Economic value of bio-diversity
5. Bio-diversity management

Types of educational work:

Lectures, seminars, consultations, independent work of students.

Discipline annotation
«Conservation Genetics»

«Conservation Genetics» is a component of Unit 1 "Advanced courses" and it is mandatory for all students.

Discipline is aimed at the formation of the following competencies:

General professional competence*:*

GPC–3 - readiness to use fundamental biological ideas in the sphere of professional activity for setting and solving new tasks.

Professional competencies*:*

PC–3 - the ability to apply the methodological basis for designing, performing field and laboratory biological, ecological studies, using modern equipment and computing complexes of the event (in accordance with the direction (profile) of the master's programme).

The main topics of the discipline:

1. Introduction in conservation genetics (subjects, methods and goals)
2. Outline of genome organization
2.1 Structural and functional organization of eukaryotic genomes (nuclear, mitochondrial and plastid)
2.2 Structural and functional organization of genes
3. Genetic processes in natural populations
3.1 Basic principles and conceptions of population genetics
3.2 Natural population and its genetic structure.
3.3 The mating systems in natural population
3.4. Microevolution processes in natural populations
4. Insight into conservation genetics
4.1 Genetic risks in populations
4.2 Genetic approaches for endangered species in nature and in captivity
4.3 Conservation genetics toolbox

Types of educational work:

Lectures, seminars, consultations, independent work of students.

Discipline annotation
«Microbiologic diversity»

«Microbiologic diversity» is a component of Unit 1 "Advanced courses" and it is mandatory for all students.

Discipline is aimed at the formation of the following competencies:

General professional competence*:*

GPC–3 - readiness to use fundamental biological ideas in the sphere of professional activity for setting and solving new tasks.

Professional competencies*:*

PC–3 - the ability to apply the methodological basis for designing, performing field and laboratory biological, ecological studies, using modern equipment and computing complexes of the event (in accordance with the direction (profile) of the master's programme).

The main topics of the discipline:

1. Biodiversity in General. Great Plate Count Anomaly and Molecular Methods for Biodiversity Studies.
2. Genomics in Microbiology.
3. Metabolic Diversity of Microorganisms
4. The Emerging Novel Groups of Microorganisms.
5. Microbial Communities. Extremophiles and polyextremophiles.

Types of educational work:

Lectures, seminars, consultations, independent work of students.

Discipline annotation
«GIS»

«GIS» is a component of Unit 1 "Advanced courses" and it is mandatory for all students.

Discipline is aimed at the formation of the following competencies:

General professional competence*:*

GPC–7 - readiness to creatively apply modern computer technologies in collecting, storing, processing, analyzing and transferring biological information for solving professional problems;

GPC–9 - the ability to professionally design, present and report the results of scientific research and vocational work on approved forms.

The main topics of the discipline:

1. Basic ideas of ArcGIS. Composing the map «Regions of Russia».
2. ArcCatalog. Geographic data formats. Feature classes.
3. Composing the map «The fragment of the vegetation map». Methods: Georeferencing the scanned image by coordinates. Topology. Digitizing lines.
4. Comparison of images with differences in 10 years. Automatic georeferencing to a raster.
5. Composing the map «Rare plants». Methods: imagery interpretation, creation of raster catalog, joining and relating tables, page layouts.
6. Composing the map «Metals (Zn, Cu) in the soil». Method: Spatial analyst.
7. A 3D representation of the study area (3-d modeling).
8. Satellite images, indices used in biology (vegetative, soil).

Types of educational work:

Lectures, practice, consultations, independent work of students.

Discipline annotation
«Environmental physiology»

«Environmental physiology» is a component of Unit 1 "Advanced courses" and it is mandatory for all students.

Discipline is aimed at the formation of the following competencies:

General professional competence*:*

GPC–3 - readiness to use fundamental biological ideas in the sphere of professional activity for setting and solving new tasks.

Professional competencies:

PC–1 - the ability to creatively use knowledge of the fundamental and applied sections of disciplines (modules) that determine the direction (profile) of the master's programme in scientific and industrial-technological activities;

The main topics of the discipline:

1 The Nature and Levels of Adaptation
2 Fundamental Mechanisms of Adaptation
3 The Problems of Size and Scale
4 Water, Ions, and Osmotic Physiology
5 Water Balance, Osmoregulation, and Excretion
6 Metabolism and Energy Supply
7Respiration and Circulation
8 Temperature and its Effects
9 Excitable Tissues: Nervous Systems and Muscles
10 Hormones and Chemical Control Systems
11 Marine Life
12 Shorelines and Estuaries
13 Fresh Water
14 Special Aquatic Habitats
15 Terrestrial Life
16 Extreme Terrestrial Habitats
17 Parasitic Habitats

Types of educational work:

Lectures, seminars, consultations, independent work of students.

Discipline annotation
«Systematics and phylogenetics»

«Philosophical problems of natural science» is a component of Unit 1 "Advanced courses" and it is mandatory for all students.

Discipline is aimed at the formation of the following competencies:

General professional competence:

GPC–4 - the ability to independently analyze available information, identify fundamental problems, set the task and perform field, laboratory biological research in solving specific

problems using modern equipment and computing facilities, be responsible for the quality of work, and the scientific reliability of the results

Professional competencies*:*

PC–3 - the ability to apply the methodological basis for designing, performing field and laboratory biological, ecological studies, using modern equipment and computing complexes of the event (in accordance with the direction (profile) of the master's programme).

The main topics of the discipline:

1. Introduction to the course, the objectives of taxonomy and phylogenetics.
2. Taxonomy and nomenclature
3. Species and their boundaries
4. Overview of the concepts of species
5. The theory of evolution is the basis of phylogeny. Speciation.
6. Divergence: morphological, ecological-geographic and molecular.
7. Levels of taxonomy.
8. Morphological systematics. Fenetics.Characters in the morphological systematics.
9. Molecular systematics. Characters in molecular taxonomy.
10. Phylogenetic classification and trees. Verification of the evolutionary hypothesis
11. Treatment of biodiversity in taxonomy.
12. Hybrid Complexes and Net Evolution
13. Population-genetic approach in taxonomy
14. Phylogeography-geographical approach to population genetics and taxonomy.

Types of educational work:

Lectures, seminars, consultations, independent work of students.

Discipline annotation
«Biodiversity and biogeography»

«Biodiversity and biogeography» is a component of Unit 1 "Advanced courses" and it is mandatory for all students.

Discipline is aimed at the formation of the following competencies:

General professional competence*:*

GPC–3 - readiness to use fundamental biological ideas in the sphere of professional activity for setting and solving new tasks.

GPC–6 - ability to use knowledge of the fundamentals of the biosphere theory, understanding of modern biosphere processes for a systematic assessment of geopolitical phenomena and forecasting the consequences of implementing socially significant projects.

Professional competencies:

PC–2 - the ability to plan and implement professional activities (in accordance with the direction [profile] of the master's programme).

The main topics of the discipline:

1. What is Biodiversity
2. How biodiversity has evolved and is evolving
3. How biodiversity structure itself
4. How biodiversity is spread on Earth
5. Why is biodiversity important and what are the causes of its decline
6. Analysing and measuring biodiversity
7. Techniques for monitoring and sampling of biodiversity

Types of educational work:

Lectures, seminars, consultations, independent work of students.

Discipline annotation
«Conservation biology»

«Conservation biology» is a component of Unit 1 "Advanced courses" and it is mandatory for all students.

Discipline is aimed at the formation of the following competencies:

General cultural competences:

GCC–2 - readiness to act in non-standard situations, to bear social and ethical responsibility for the decisions made.

General professional competence*:*

GPC–6 - ability to use knowledge of the fundamentals of the biosphere theory, understanding of modern biosphere processes for a systematic assessment of geopolitical phenomena and forecasting the consequences of implementing socially significant projects.

Professional competencies:

PC–2 - the ability to plan and implement professional activities (in accordance with the direction [profile] of the master's programme).

The main topics of the discipline:

1.Habitat destruction
2.Habitat fragmentation and landscape change
3. Overharvesting, Invasive species
4. Climate change
5. Fire and biodiversity,
6.Extinctions and the practice of preventing them

Types of educational work:

Lectures, seminars, consultations, independent work of students.

Specialised Courses (one out of two is mandatory)

Discipline annotation
«Global changes and environmental dynamics»

«Global changes and environmental dynamics» is a component of Unit 1“Specialised Courses”. One out of two disciplines is mandatory for all students"

Discipline is aimed at the formation of the following competencies:

General cultural competences:

GCC–3 - readiness for self-development, self-realization, use of creativity;

General professional competence:

GPC–6 - ability to use knowledge of the fundamentals of the biosphere theory, understanding of modern biosphere processes for a systematic assessment of geopolitical phenomena and forecasting the consequences of implementing socially significant projects.

GPC-8 – Ability to use the philosophical concepts of natural science to form a scientific worldview.

The main topics of the discipline:

1. Earth's history, geological time, history of life.
2.Structure of the Earth as a planet, geologic and geomorphic processes, Earth materials and the rock cycle.
3. Ecosystem structure and dynamics, biosphere and its evolution, big five extinction events.
4. Climate change and variations, externalforcings, radiative perturbations from greenhouse gases and dust, feedbacks, glacial-interglacial dynamics. Current climate change.
5. Relationship of climate to ecosystem distribution and structure, climatic (landscape) zonality and classification of climates.
6. Climatic controls and determination of landscapes spatial distribution and possible change over time.

Types of educational work:

Lectures, seminars, consultations, independent work of students.

Discipline annotation
«Landscape ecology and diversity»

«Landscape ecology and diversity» is a component of Unit 1 "Specialised Courses". One out of two disciplines is mandatory for all students"

Discipline is aimed at the formation of the following competencies:

General cultural competences:

GCC–2 - readiness to act in non-standard situations, to bear social and ethical responsibility for the decisions made.

General professional competence*:*

GPC–6 - ability to use knowledge of the fundamentals of the biosphere theory, understanding of modern biosphere processes for a systematic assessment of geopolitical phenomena and forecasting the consequences of implementing socially significant projects.

Professional competencies:

PC–2 - the ability to plan and implement professional activities (in accordance with the direction [profile] of the master's programme).

The main topics of the discipline:

1. Introduction to Landscape Ecology. The origin of landscape ecology. Terminology and main definitions.
2. Bio, Geo and Landscape Diversity. Differences
3. Main principles of Landscape Sphere. Zonality of Landscapes
4. Azonality of Landscapes. Types of Azonality
5. Remote methods of Landscape Study.
6. Global Land Cover and Land Use models

Types of educational work:

Lectures, seminars, consultations, independent work of students.

Discipline annotation
«Geobotany»

«Geobotany»is a component of Unit 1 "Specialised Courses". One out of two disciplines is mandatory for all students"

Discipline is aimed at the formation of the following competencies:

General professional competence:

GPC–3 - readiness to use fundamental biological ideas in the sphere of professional activity for setting and solving new tasks.

GPC–6 - ability to use knowledge of the fundamentals of the biosphere theory, understanding of modern biosphere processes for a systematic assessment of geopolitical phenomena and forecasting the consequences of implementing socially significant projects.

Professional competencies:

PC–2 - the ability to plan and implement professional activities (in accordance with the direction [profile] of the master's programme).

The main topics of the discipline:

1. Introduction to geobotany.
2. Mutual relations of plants in plant communities.
3. Organization of plant communities.
4. The influence of plant communities on the environment.
5. Classification of plant communities.
6. Dynamics of plant communities.
7. Influence of the environment on the distribution of plant communities in space and the structure of the vegetation cover.
8. Some methods of field research of plant communities and the problem of representativeness of field materials.

Types of educational work:

Lectures, seminars, consultations, independent work of students.

Discipline annotation
«Soil geography»

«Soil geography»is a component of Unit 1 “Specialised Courses”. One out of two disciplines is mandatoryfor all students"

Discipline is aimed at the formation of the following competencies:

Generalprofessionalcompetence:

GPC–4 - the ability to independently analyze available information, identify fundamental problems, set the task and perform field, laboratory biological research in solving specific problems using modern equipment and computing facilities, be responsible for the quality of work, and the scientific reliability of the results

Professional competencies*:*

PC–3 - the ability to apply the methodological basis for designing, performing field and laboratory biological, ecological studies, using modern equipment and computing complexes of the event (in accordance with the direction (profile) of the master's programme).

The main topics of the discipline:

1. Subject of the soil geography. The methodology, tasks and brief history of the study.
2. Factors of soil formation, the nature of soil-forming process. Classifications, nomenclature and diagnostics of soils.
3. The basic laws of soil geography. The patterns of geographical distribution, formation of soils and soil cover. Soil Zones of the World.
4. Soil cover of the polar belt.
5. Soil cover of the boreal belt.

6. Soil cover of the subboreal belt.
7. Soil cover of the subtropical, tropical belt.
8. Soil of mountain areas.

Types of educational work:

Lectures, seminars, consultations, independent work of students.

Discipline annotation
«Lichens, algae, fungi, mosses identification and diversity»

«Lichens, algae, fungi, mosses identification and diversity» is a component of Unit 1 “Specialised Courses”. One out of two disciplines is mandatory for all students"

Discipline is aimed at the formation of the following competencies:

General professiona lcompetence:

GPC–4 - the ability to independently analyze available information, identify fundamental problems, set the task and perform field, laboratory biological research in solving specific problems using modern equipment and computing facilities, be responsible for the quality of work, and the scientific reliability of the results

Professional competencies:

PC–1 - the ability to creatively use knowledge of the fundamental and applied sections of disciplines (modules) that determine the direction (profile) of the master's programme in scientific and industrial-technological activities;

The main topics of the discipline:

1. System of the organic world and the place in it of algae, fungi, lichens and mosses.
2. Features of the structure and diversity of blue-green algae. Division Cyanophyta
3. Characteristics, diversity and ecology of Red algae. Division Rhodophyta
4. Diversity, features and ecological significance of Green algae. Division Chlorophyta
5. Characteristics of the divisions Cryptophyta and Dinophyta
6. Diversity and representatives of the division Ochrophyta: classes Golden, yellow-green, diatoms
7. Peculiarities of the structure and ecology of the representatives of the class Phaeophyceae.
8. Department of Euglenophyta
9. Slime molds, their features and diversity. Division Myxomycota.
10. Representatives of the Oomycota division
11. Lower fungi: Chytridiomycota, Zygomycota
12. Characteristics and diversity of the Ascomycota division
13. Diversity, ecological significance and peculiarities of the representatives of division Basidiomycota

14 .. Lichens: the phenomenon of the symbiotic organism, diversity and structural features.

15. Diversity and peculiarities of the structure of mosses

Types of educational work:

Lectures, practice, consultations, independent work of students.

Discipline annotation
«Aquatic and terrestrial invertebrates identification and diversity»

«Aquatic and terrestrial invertebrates identification and diversity»is a component of Unit 1 “Specialised Courses”. One out of two disciplines is mandatory for all students"

Discipline is aimed at the formation of the following competencies:

General professional competence:

GPC–4 - the ability to independently analyze available information, identify fundamental problems, set the task and perform field, laboratory biological research in solving specific problems using modern equipment and computing facilities, be responsible for the quality of work, and the scientific reliability of the results

Professional competencies:

PC–1 - the ability to creatively use knowledge of the fundamental and applied sections of disciplines (modules) that determine the direction (profile) of the master's programme in scientific and industrial-technological activities;

The main topics of the discipline:

1. Bio-diversity of terrestrial invertebrates
2. Principles of invertebrates taxonomy. Zoological Nomenclature.
3. Practical identification of invertebrates: key features in the different taxonomic groups.
4. Aquatic invertebrates: classification and identification.
5. Terrestrial invertebrates: classification and identification.
6. Features of taxonomy of insects.

Types of educational work:

Lectures, seminars, consultations, independent work of students.

Discipline annotation
«Vascular plants identification and diversity»

«Vascular plants identification and diversity» is a component of Unit 1 “Specialised Courses”. One out of two disciplines is mandatory for all students"

Discipline is aimed at the formation of the following competencies:

General professional competence:

GPC–4 - the ability to independently analyze available information, identify fundamental problems, set the task and perform field, laboratory biological research in solving specific problems using modern equipment and computing facilities, be responsible for the quality of work, and the scientific reliability of the results

Professional competencies:

PC–1 - the ability to creatively use knowledge of the fundamental and applied sections of disciplines (modules) that determine the direction (profile) of the master's programme in scientific and industrial-technological activities;

The main topics of the discipline:

1. Vertebrates: systematics and evolution
2. General characteristics of vertebrate classes
3. Distribution of vertebrates and its determinants
4. Vertebrate diversity: current state and problems
5. Superclasses Petromyzontom orphi Pisces: classification and identification
6. Classes Amphibia and Reptilia: classification and identification
7. Class Aves: classification and identification
8. Class Mammalia: classification and identification

Types of educational work:

Lectures, seminars, consultations, independent work of students.

Discipline annotation
«Vertebrates diversity»

«Vertebrates diversity» is a component of Unit 1 “Specialised Courses”. One out of two disciplines is mandatory for all students"

Discipline is aimed at the formation of the following competencies:

General professional competence:

GPC–4 - the ability to independently analyze available information, identify fundamental problems, set the task and perform field, laboratory biological research in solving specific problems using modern equipment and computing facilities, be responsible for the quality of work, and the scientific reliability of the results

Professional competencies:

PC–1 - the ability to creatively use knowledge of the fundamental and applied sections of disciplines (modules) that determine the direction (profile) of the master's programme in scientific and industrial-technological activities;

The main topics of the discipline:

1. Vertebrates: systematics and evolution
2. General characteristics of vertebrate classes
3. Distribution of vertebrates and its determinants
4. Vertebrate diversity: current state and problems
5. SuperclassesPetromyzontomorphии Pisces: classification and identification
6. Classes Amphibia and Reptilia: classification and identification
7. Class Aves: classification and identification
8. Class Mammalia: classification and identification

Types of educational work:

Lectures, practice, consultations, independent work of students.

Unit 2. Practice including research work

U2. Practice including research work

Variable part

Obtaining of primary professional skills (Educational practice)

Educational practice is a component of Unit 2 "Practices" and it is mandatory for all students.

Educational practice is aimed at the formation of the following competencies:

general professional competence:

GPC–4 - the ability to independently analyze available information, identify fundamental problems, set the task and perform field, laboratory biological research in solving specific problems using modern equipment and computing facilities, be responsible for the quality of work, and the scientific reliability of the results

The main stages of educational practice:

1. Introductory briefing. Introduction to the practice plan.
2. Familiarity with the methodological literature on the research topic
3. The development of research methods
4. Approval of the theme of the master's thesis
5. Preparation and approval of individual master's thesis plan.
6. Providing information from the supervisor on the results of educational practice.

Method of educational practice conducting: Stationary

Obtaining of professional skills and professional practice (Internships)

Obtaining of professional skills and professional practice is a component of Unit 2 "Practices" and it is mandatory for all students.

Obtaining of professional skills and professional practice is aimed at the formation of the following competencies:

General professional competence:

GPC–2 - readiness to lead a team in the sphere of their professional activity, tolerantly perceiving social, ethnic, confessional and cultural differences;
GPC–3 - readiness to use fundamental biological ideas in the sphere of professional activity for setting and solving new tasks;
GPC–4 - the ability to independently analyze available information, identify fundamental problems, set the task and perform field, laboratory biological research in solving specific problems using modern equipment and computing facilities, be responsible for the quality of work, and the scientific reliability of the results;
GPC–7 - readiness to creatively apply modern computer technologies in collecting, storing, processing,
GPC–9 - analyzing and transferring biological information for solving professional problems;
the ability to professionally design, present and report the results of scientific research and vocational work on approved forms.

Professional competencies:

PC–1 - The ability to creatively use knowledge of the fundamental and applied sections of disciplines (modules) that determine the direction (profile) of the master's programme in scientific and industrial-technological activities;
PC–2 - The ability to plan and implement professional activities (in accordance with the direction [profile] of the master's programme);
PC–3 - The ability to apply the methodological basis for designing, performing field and laboratory biological, ecological studies, using modern equipment and computing complexes of the event (in accordance with the direction (profile) of the master's programme;
PC–4 - Ability to generate new ideas and methodological solutions;

The main stages of obtaining of professional skills and professional practice:

The preparatory stage includes training and certification on safety, preparation and approval of individual programme of practice, individual tasks. Search and analysis of literature on the subject of research.
The internship (laboratory) stage includes instructing at the enterprise; acquaintance with the organization (enterprise), rules of internal labor regulations; performance of field, experimental works; collecting, processing and systematization of the actual material, measurements, etc.; the

Head from the organization makes the response-the characteristic on the graduate student.
The reporting stage. Practice dairy is formalized. The head of the organization is a review-characteristic of the Intern. The report on practice which is given together with the diary and the response-the characteristic from the head of practice on production (in the organization) on Department of Cytology and genetics to the scientific head is made. The report with presentation for protection of the report for 5-7 minutes is made.

Method of Obtaining of professional skills and professional practice conducting: Exit / stationary

Undergraduate practice

Undergraduate practice is a component of Unit 2 "Practices" and it is mandatory for all students.

Undergraduate practice is aimed at the formation of the following competencies:

General professional competence:

GPC–4 - the ability to independently analyze available information, identify fundamental problems, set the task and perform field, laboratory biological research in solving specific problems using modern equipment and computing facilities, be responsible for the quality of work, and the scientific reliability of the results;

GPC–6 - the ability to use knowledge of the fundamentals of the biosphere theory, understanding of modern biosphere processes for a systematic assessment of geopolitical phenomena and forecasting the consequences of implementing socially significant projects;

GPC–9 - analyzing and transferring biological information for solving professional problems;

the ability to professionally design, present and report the results of scientific research and vocational work on approved forms.

Professional competencies:

PC–1 - The ability to creatively use knowledge of the fundamental and applied sections of disciplines (modules) that determine the direction (profile) of the master's programme in scientific and industrial-technological activities;

PC–4 - Ability to generate new ideas and methodological solutions;

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The main stages of undergraduate practice:

Stage 1-Preparatory

Familiarization with the goals and objectives of undergraduate practice.Drawing up and approval of individual practice tasks.Correction of the master's thesis plan.

Stage 2 - Main

Execution of individual tasks of undergraduate practice.Registration of results of the performed researches.Preparation of the manuscript of the master's thesis.The study of practical experience in accordance with the theme of the master's thesis.

Stage 3-Final

Preparation of the main chapters of the master's thesis.Preparation of an oral report on the master's thesis.

Method of undergraduate practice conducting: Stationary

Research work

Research work is a component of Unit 2 "Practices" and it is mandatory for all students.

Research work is aimed at the formation of the following competencies:

Generalprofessionalcompetence:

GPC–1 - readiness for communication in oral and written forms either in the state language of

the Russian Federation or a foreign language for solving professional problems;

GPC–3 - readiness to use fundamental biological ideas in the sphere of professional activity for setting and solving new tasks;

GPC–7 - readiness to creatively apply modern computer technologies in collecting, storing, processing,

GPC–9 - analyzing and transferring biological information for solving professional problems;

the ability to professionally design, present and report the results of scientific research and vocational work on approved forms.

Professionalcompetencies:

PC–1 - The ability to creatively use knowledge of the fundamental and applied sections of disciplines (modules) that determine the direction (profile) of the master's programme in scientific and industrial-technological activities;

PC–2 - The ability to plan and implement professional activities (in accordance with the direction [profile] of the master's programme);

The main stages of research work:

Preparation of bibliography on the theme of master's thesis.

Writing a literary review.

Organizing and conducting research on the problem, collecting empirical data and discussing them.

Writing a scientific publication on the research problem.

Presentation at the scientific conference on the problem of research.

Method of research work conducting: Stationary

Unit 3. Statefinalattestation

State final attestationis a component of Unit 3 and it is mandatory for all students.

The main lines of scientific research on the "Biodiversity" programme

Identification and description of biological diversity, and its measuring by the modern methods of quantitative information processing.Study and conservation of biodiversity.Monitoring and protection of biological diversity. Protection and restoration of rare and endangered species. Environmental assessment and applied ecology. Biogeographical and evolutionary approaches to the study and conservation of biodiversity.

State final attestation is completed by awarding the qualification "Master" with successful formation of competencies:

Professionalcompetencies:

PC–1 - the ability to creatively use knowledge of the fundamental and applied sections of disciplines (modules) that determine the direction (profile) of the master's programme in scientific and industrial-technological activities;

PC–2 - the ability to plan and implement professional activities (in accordance with the direction [profile] of the master's programme);

PC–3 - the ability to apply the methodological basis for designing, performing field and laboratory biological, ecological studies, using modern equipment and computing complexes of the event (in accordance with the direction (profile) of the master's programme).

PC– 4 - Ability to generate new ideas and methodological solutions.

State final attestation includespreparation for the defense of the thesis, the defense of the master's thesis.

Facultative courses

Discipline annotation
«Changing Arctic»

«Changing Arctic»is a component of Facultative courses and it is variablediscipline (not mandatory for all the students).

Discipline is aimed at the formation of the following competencies:

General cultural competences:

GCC–2 - readiness to act in non-standard situations, to bear social and ethical responsibility for the decisions made.

General professional competence:

GPC–2 - readiness to lead a team in the sphere of their professional activity, tolerantly perceiving social, ethnic, confessional and cultural differences;

GPC–4 - the ability to independently analyze available information, identify fundamental problems, set the task and perform field, laboratory biological research in solving specific problems using modern equipment and computing facilities, be responsible for the quality of work, and the scientific reliability of the results;

Основные разделы (темы) дисциплины:

1. Introduction.
2. Landscapes and the processes of their formation.
3. Permafrost.
4. Snow.
5. Interrelation of the Earth's surface with the atmosphere.
6. Wildlife in the Arctic.
7. Life in the Arctic waters.
8. People of the North.
9. Conclusion.
10. INTERACT.

Types of educational work:

Lectures, consultations, independent work of students.