

**HIGHER EDUCATION OF THE REPUBLIC OF UZBEKISTAN,  
MINISTRY OF SCIENCE AND INNOVATION  
KOKAND STATE UNIVERSITY**

**ZOOLOGY**

**SCIENCE CURRICULUM**

Field of Knowledge: 500000 – Natural sciences, mathematics and statistics  
Field of Study: 510000 – Biology and related sciences  
Type of Study: 60510100 – Biology

<b>Subject module code</b> ZO13410	<b>Academic year</b> 2025 -2026	<b>Semester</b> 3 - 4	<b>ECTS-Credits</b> 6 / 4		
<b>Fan / module type</b> Compulsory	<b>Language of instruction</b> Uzbek/Russian		<b>Weekly class hours</b> 4 /4		
<b>1.</b>	<b>Subject name</b>	<b>Auditory training (hours)</b>	<b>Coursework</b>	<b>Independent study (hours)</b>	<b>Total load (hours)</b>
	<b>Zoology</b>	60/60	-/30	120/30	180/120
<b>2.</b>	<p><b>I. The content of science</b></p> <p>The purpose of teaching science is to provide students with knowledge about the history of the development of zoology and living nature, to form a scientific-materialistic worldview in their minds, to instill love for the homeland and nature, to educate in an aesthetic spirit; to develop their cognitive and thinking activities, independent knowledge acquisition and self-control skills.</p> <p>The task of the subject is to introduce students to the morphology, biology, ecology, ethology, phylogenesis, systematics, and zoogeography of animals; the diversity of the animal world; methods of animal reproduction; the diversity of growth and development; and the morphological, anatomical, physiological, and ecological problems of animals.</p> <p><b>II. Main theoretical part (lectures)</b></p> <p><b>II.I. The subject includes the following topics:</b></p> <p><b>Topic 1: Introduction to Zoology - the object of study, subject, goals and objectives of zoology</b></p> <p>Introduction - objects, subject, goals and objectives of zoology. The role of zoology in the system of other sciences. The main stages in the development of the science and scientists who made a significant contribution to its formation. The development of zoological research in Uzbekistan. The division of zoology into 2 sections (invertebrates and vertebrates).</p> <p><b>2. Invertebrates. The world of single-celled animals (PROTOZOA). General definition .</b></p> <p>Animal organization. The current systematic position of animals, systematic units. Protozoology. The structure and origin of eukaryotic cells . What organisms are called invertebrates. Reconstruction of the phylogeny of invertebrates. The current systematic position of the organic world and animals in it, the main systematic units.</p> <p>Cell as a whole organism. Structure of eukaryotic cells: cell motility; absorption of substances; digestion of food; division, reproduction and sexual processes. Origin of eukaryotic cells.</p> <p><b>3: The world of unicellular animals (PROTOZOA). General definition .</b></p> <p>Structure and functions of unicellular organisms (simple animals). Multi-functionality and organelles of the simple animal cell. Reproduction and stages of development. Branching of sexual and asexual generations in the development of</p>				

unicellular organisms. Dormant state and periods of dispersal (cysts and spores). Diversity of simple animals.

Amoeboid protozoa . The structure of amoeboid protozoa and their types. The structure, function, nutrition and reproduction of protozoa. Diversity of amoebae. Pathogenic amoebae. Foraminifera and actinopoda. Classes of radiolaria, heliozoa, and acantharea. Their characteristic structural features and representatives.

Type Sarcomastigophora, Sarcodali , i.e. class Pseudopods. General structure, function, nutrition and reproduction. Diversity of amoebae. Pathogenic amoebae. Foraminifera and actinopoda. Classes Radiolaria, Heliozoa, Acantharea. Their specific structural features, representatives.

Commonalities between animals and plants in the structure of representatives of the class Mastigophora of the Sarcomastigophora phylum. Subclass Phytomastigina and subclass Zoomastigina: general structure, development, classification, and pathogenic representatives.

Phylum Sporozoa: general structural features; diversity of representatives. Class Gregarinina and class Coccidiomorpha. Structure, developmental processes, diseases caused by the causative agents of coccidiosis, toxoplasmosis, and blood sporozoites, and measures to prevent them.

Infusoria (Infusoria, ciliophora): cell structure and functions; nutrition; nuclear dimorphism; asexual and sexual reproduction; diversity of representatives. Free-living infusoria. Parasitic infusoria. Types of Myxosporidia and Microsporidia. Phylogeny of unicellular animals.

#### **Topic 4: Multicellular animal kingdom (Metazoa). Protozoa. Eometazoa. Phylum Spongiae and Spongiae.**

General definition. **Cells, tissues and skeleton** of multicellular organisms, reproduction and development. Theories of the origin of multicellular animals: E. Haeckel (1874), II Mechnikov (1886); Syncytial theory-I. Hodgkin (1943) and theories of other scientists

Large division of phagocytes. Type, structure, reproduction and development of platypuses (Placozoa).

Major divisions of Parazoa. Structure, reproduction and development of the phylum Porifera. Diversity of Porifera, freshwater Porifera. Phylogeny and significance of Porifera.

#### **Topic 5. Phylum Cnidaria.**

General definition of the type . Classification.

Cnidaria : body shape and symmetry of solitary representatives, colony shape, skeleton, musculature and movement, nervous system, cnidocytes and cnids, interstitial cells, digestive system, nutrition and internal transport, gas exchange, division, reproduction and development processes.

Class Hydrozoa. Structure, reproduction and development of freshwater hydra, diversity of hydras, colonial hydrapolyps, structure, reproduction and development of obelia colonies. Siphonophores, structure and lifestyle. Categories, representatives and phylogeny.

Class Scyphozoa, structure, reproduction and development of the Aurelia jellyfish, structure, reproduction and development of other representatives. Poisonous jellyfish. Diversity of scyphozoa jellyfish, main taxa. Phylogeny.

Class, structure and life cycle of coral polyps (Anthozoa), species diversity. Formation of reefs, importance of coral polyps. Phylogeny of the phylum Anthozoa.

Phylum Ctenophora: general description, body wall and muscles, nervous system, movement, digestive system and nutrition, reproduction and development. Ctenophora diversity: orders and representatives. Phylogeny of Ctenophora.

#### **6: Large phylum of Mesozoa. Orthonectids, Dicyemida, and Bilateria.**

##### **General definition, Classification. Phylum Platyhelminthes .**

General description and systematics of the phylum Platyhelminthes. Class Turbellaria: description, body wall, muscles, nervous system and sensory organs; parenchyma, digestive system and nutrition. Reproduction: asexual reproduction and regeneration; sexual reproduction and development. Diversity of ciliates: genera and representatives. Phylogeny of ciliates.

Class Trematoda: structure, adaptations to parasitic life, attachment organs, reproductive system, reproduction and development processes. Parasitic representatives of humans and domestic animals. Class Monogenea: body structure, reproduction, life cycles, representatives.

Class, structure, reproduction and development of tapeworms. Development and pathogenic significance of parasitic representatives in humans and domestic animals. Adaptations to parasitic life. Phylogeny of flatworms.

#### **7: Nematelminthes and Acanthocephales.**

General description of the type. Gastrotricha class: general description and diversity. Nematoda class: body shape, body wall, nervous system and sensory organs; movement, nutrition, excretory system, reproduction and development. Parasitic nematodes and their harm to humans, farm animals and plants. Nematomorpha class: general structural features and diversity. Rotatoria, Kinorhyncha , Priapulida classes . Nemertea and the specific structural features and diversity of representatives of the phylum Acanthocephales . Phylogeny of roundworms and spinyworms .

#### **8: General definition and classification of the phylum Annelida.**

General description and classification of the phylum Annelids. Subphylum Aclitellata . Class Polychaeta. Structure, reproduction, development and life cycle of Nereis. Diversity of polychaetes and their importance in water bodies.

Subphylum Clitellata. Class Oligochaeta. Structure, reproduction, development and life cycle of the earthworm. Diversity of oligochaetes, their importance in water bodies and soil formation.

Class of leeches (Euhirudinea), structure, adaptations to parasitic life, subclasses and main orders. Importance of leeches. Phylogeny of annelids.

#### **9: Phylum Mollusca.**

General description of the type of mollusk: mantle, shell, mantle cavity, gills, osphradia, foot, nutrition, coelom, nervous system and sense organs; reproduction and development. Classification.

Subphylum of the ciliates. Class of the Polyplacophora. External and internal structure; diversity.

Subphylum of bivalves. Class of monoplacophora, structural features, representatives.

The class of gastropods (Gastropoda), the structure, reproduction, development and life cycle of the snail. The diversity and importance of gastropods.

Class Bivalvia, structure, reproduction and development of the clam. Diversity and economic importance of bivalve mollusks. Hunted bivalves.

Class Scaphopoda: external and internal structure; reproduction and development; diversity of representatives.

Class Cephalopoda, structure and lifestyle of cuttlefish. Diversity of its representatives. Importance of cephalopods in the food industry. Phylogeny of mollusks.

### **10: Phylum Arthropoda.**

General description and classification of the phylum Arthropoda. General description of the phylum Branchiata, class Crustacea. External and internal structure of the crayfish, reproduction and development. Diversity of the class Crustaceans: General description, main orders and representatives of the classes Remipedia, Cephalocarida, Branchiopoda, Maxillopoda, Ostracoda and Malacostraca. The importance of crustaceans in water bodies and in human life.

### **11: Chelicerata phylum.**

the Chelicerae subphylum. Class, structure and life cycle of the Swordtails (Xiphosura). Class, structure and life cycle of the Giant Shields (Gigantostroma), i.e., Crab Scorpions (Eurypterida). Class, structure and life cycle of the Arachnida. Structure, reproduction, development and life cycle of the orb weaver spider. Diversity of arachnids. Main orders and important representatives: Scorpiones (Scorpiones), Uropygi, Amblypygi, Spiders (Araneae), Pseudoscorpions (Pseudoscorpiones), Solifugae, Opiliones, and Acari orders. Distribution, life cycle and importance of arachnids. Phylogeny of Chelicerae.

### **12: Subphylum Tracheata. General description and systematics of the tracheal subspecies.**

The large class Myriapoda: the main features of its structure and lifestyle. The diversity of the large class Myriapoda: the specific structure, lifestyle and significance of representatives of the classes Chilopoda, Symphyla, Pauropoda and Diplopoda.

General description of the large class Hexapoda (Hexapoda) or Insects (Insecta). The external structure of the black ants, the mouth apparatus, the structure and function of the wings. The internal structure of insects: digestion, excretion, respiration, circulation, reproductive and nervous systems, sensory organs. Reproduction and development of insects. Parthenogenesis, embryonic and postembryonic development, development through direct and indirect, incomplete metamorphosis and complete metamorphosis. Care for offspring. The

main features of insect life. Insects living in groups. Protective coloration and mimicry. The importance of insects in nature and in human activity. Pests of crops and food products. Parasitic and disease-spreading insects.

Classification of the large class Insecta (Insecta). General description and main taxa of the class Insecta - Entognatha . General description of the class Insecta - Ectognatha .

The main groups of insects that develop through incomplete metamorphosis are: moths, beetles, grasshoppers, ornithopods, termites, water bugs, dragonflies, hymenoptera, wasps, beekeepers, whiteflies, grasshoppers, lice and head.

### **Topic 13 : Large phylum Gnathifera.**

General description of the large phylum Gnathifera. Gnathostomulida phylum: general description, diversity. Phylogeny of Gnathifera. Ctenophora and Cycliophora phyla, structure, phylogeny.

### **14: Phoronida and Brachiopoda phyla:**

body shape, nutrition, structure, reproduction and development, species diversity. Bryozoa phylum: body shape, colonies, zooid polymorphism, nutrition, nervous system, reproduction and development, diversity. Chaetognatha, Tentaculata and Pogonophora phyla. Phylogeny of Lophophorata.

### **15: Large phylum Deuterostomata.**

Phylum Echinodermata (Echinodermata). General description. Development of five-ray symmetry in ontogenesis. Subphylum Eleutherozoa. Class Asterozoa: body shape, wall and skeleton; ambulacral system, nervous system, digestive system and nutrition, reproduction and development; metamorphosis; species diversity. Class Ophiurozoa, Class Echinozoa, Class Holothurozoa. Subphylum Pelmatozoa. Class Crinozoa, structure, species diversity. Phylogeny of Echinodermata.

### **Topic 16: Objects, subject, purpose, tasks and history of development of vertebrate zoology.**

Objects, subject, purpose, tasks and history of development of vertebrate zoology.

General description of the phylum Chordates: important characteristics of the phylum Chordates and their biological significance. Origin of Chordates. Classification of the phylum Chordates.

### **17: Hemichordata and Urochordata subphyla.**

A subphylum of chordates. Balanoglossus as an example of chordates The main features of the structure, distribution and species diversity of representatives of the subphylum.

General description and systematics of the larval chordate subtype. Main features of the structure and systematics of the subtype representatives. Ascidiacea ( Ascidiacea) Structure, life, reproduction and development of representatives of the class Salpae. Biology of representatives of the class Salpae : solitary and colonial species . Structure and development. Metagenesis and its biological significance. Appendicularia ( Appendicularia) class **The structure, reproduction and development** of representatives of the genus . Ideas about the origin and evolution

of larval chordates. The idea of the Neogene (Garstrang), the views of AN Seversov and NA Livanov.

**18: Acrania (Acrania) subtype. The main features and systematics of the structure of cephalopods.**

Class Cephalochordata: structure, reproduction, lifestyle, systematics. Origin and significance of cephalochordates.

The importance of AO Kovalevsky's research in understanding the evolution of chordates.

**19: Craniata or Vertebrata subtype.**

of craniosynostosis : axial skeleton, skull skeleton, limb skeletons, digestive, respiratory, excretory and circulatory systems. Nervous system and sense organs. The complexity of the structure, the development of organs - the main condition for the progressive evolution of vertebrates. The origin of vertebrates. Systematics of the phylum Vertebrata (Vertebrata).

**20: Division Agnatha. Round-mouthed animals *The structure of representatives of the class (Cyclostomata)* .**

Myxini and Distribution and lifestyle of representatives of the order Lampreys (Petromyzontida) . The practical importance of round-mouthed snails.

**21: Jaw-mouthed animals (Gnathostomata) department. Fish (Pisces) is a large class.**

Fish as primary aquatic vertebrates. Biological and morphological description of the superclass Pisces. Systematics of the superclass Pisces.

Chondrichthyes class. Main structural features : Primitive and progressive features. Features of reproduction and development. Systematics of the class of elasmobranchs. Subclass of elasmobranchs (Elasmobranchil): families of sharks and rays. Subclass of holocephali, i.e. chimaeras (Holocephali). Practical significance of elasmobranchs.

**22: Class Osteichthyes.**

General description and systematics of the class of bony fish. The structure of bony fish on the example of carp.

Chondrostei, subclass, systematics, family of ostriches and shovelnose dolphins.

General description, systematics, and major orders of the subclass Actinopterygii: ganoids, polychaetes, bony fishes. The major orders of bony fishes are herrings, carp, cod, bream, flounder, and flounder.

General description, systematics, and structural features of the subclass Crossopterygii and the subclass Dipnoi. Ecology and phylogeny of fish. Economic importance of fish. The main fish species caught in Central Asia, including Uzbekistan. Rare and endangered fish.

**Topic 23 : Four-legged Animals (Tetrapoda) senior class.**

the large class of tetrapods. General description of the class of amphibians (Amphibia) . External and internal structure and biological characteristics of representatives of the class of amphibians using the example of a pond frog .

**Topic 24: Amphibia class.**

Systematics of the class of aquatic and terrestrial animals. The orders of caudate, legless and arachnids, the main families and their species. Ecology, origin and importance of aquatic and terrestrial animals.

### **25: General definition of the class Reptiles (Reptilia).**

Anamnia and amniotes. The external structure of a representative of the reptile class, skin. The internal structure of reptiles: skeleton, muscles, digestive, excretory, respiratory, circulatory and nervous systems, sensory organs, reproduction and development. Systematics of the reptile class: Rhynchocephalia, Squamata, Crocodilia and Chelonia. Ecology of reptiles. Specific representatives of the herpetofauna of Central Asia. Types of poisonous snakes, their habitat and conservation. Origin and importance of reptiles. Reptile representatives listed in the Red Book.

### **Topic 26: Birds (Aves) class.**

Birds general Description. External structure, skin and feathers. Internal structure of birds: skeleton, muscles, digestive, excretory, respiratory, circulatory and nervous systems, sensory organs, reproduction and development. Systematics of the class of birds. Large orders of penguins, ostriches and ptarmigans.

The largest order of birds is the order of the following: Lapwings, terns, petrels, cormorants, storks, anseriformes, flamingos, falcons (diurnal predators), swallows, cormorants, cranes, kingfishers, pigeons, ospreys, parrots, finches, sparrows, and other orders.

### **27: Bird ecology. Natural groups of birds.**

Steppe, forest, mountain, grove, water and riverine birds. The origin and evolution of birds. The importance of birds in nature and human activity. Diversity and main representatives of the avifauna of Central Asia. Hunting birds. Poultry. Birds listed in the Red Book of Uzbekistan and their protection

### **Topic 28: Class Mammalia .**

General description of mammals. External structure of mammals, skin. Internal structure of mammals, skeleton and muscles, reproduction and development. Systematics of the class Mammals. Egg-laying animals (Prototheria) Definition of a subclass.

True mammals, that is, viviparous animals (Theria), are a subclass. Terrestrial mammals (Metatheria) and *Brief description of the main taxa of the infraclass Placentalia.*

### **29: Ecology of mammals.**

The role of mammals in human life, agricultural pests and disease-spreading mammals. Mammal diversity of Central Asia. Hunted, endangered and protected species.

Mammal species included in the Red Book of Uzbekistan and their distribution. Problems of theriology and the main directions of the study of mammals in Uzbekistan. Origin of mammals and practical importance.

## **III. Practical training instructions and recommendations.**



1. Optical instruments used in the study of animals: microscopes and binoculars, the structure and use of magnifying glasses. The structure of optical instruments.
2. Protozoa (Protozoa) subkingdom. Type of Sarcomastigophora. Class Sarcodidae , Class Rhizopoda: Structure , asexual and sexual reproduction of Amoeba proteus, Arcella vulgaris , Diffugia pyriformis.
3. Phylum Infusoria. Study of the structure of the ciliate Paramecium caudatum.
4. Multicellular animal kingdom (METAZOA). Subphylum multicellular. Phylum Spongiae (Spongia). Structure of the bodyyaga (Spongilla lacustris) cloud
5. Phylum Coelenterata (or Cnidaria). Structure of the freshwater hydrolyp Obelia.
6. Phylum Plathelminthes. Class Ciliates. External and internal structure of the white planaria
7. Roundworms, a type of primary body cavity worms (Nemathelminthes). From nematodes and phytonematodes - the structure and development of the root-knot nematode.
8. Mollusca phylum, Gastropoda class - External and internal structure, movement of freshwater snails or clams.
9. The external structure of a crayfish, body segments, legs, and body covering, is a representative of the phylum Arthropoda, subphylum Crustacea, class Higher Crustaceans, order Decapoda.
10. External and internal structure of the orb weaver spider, a representative of the phylum Chelicerata, class Arachnida.
11. Study the main structural features of the representatives of the phylum Chordata, phylum Hemichordata, class Enteropneusta, using the example of the balanoglossus (Balanoglossus gigas)
12. External and internal structure of a cephalopod , a subtype of acrania , a representative of the Chordata class.
13. Cyclostomata . External and internal structure of minnows and hagfish .
14. Fish ( Pisces) large class, Chondrichthyes ( Chondrichthyes) class - External structure and skeleton of the spiny shark. Chondrichthyes class . Internal structure of the shark. Systematics of chondrichthyes. Diversity of the chondrichthyes class, study of representatives based on identifiers.
15. of the external structure and skeleton of the amphibian class (Amphibia) - the common frog - through wet preparations and bone collections. Study of the external and internal structure by dissecting a living common frog . Reproduction and development of amphibians and reptiles. Study of individual representatives based on identification.
16. of the external structure and plumage of the blue pigeon, a representative of the class of birds (Aves) , through wet preparations and collections of bones and feathers. Study of the external and internal structure of a live blue pigeon by dissecting it. Structure and diversity of quail eggs. Study of individual bird species based on identifiers.

17. Mammals Study the external structure and skin of a rabbit or dog, using wet preparations and bone collections. Study the external and internal structure of a live rabbit by dissecting it. Identify some species of mammals using detectors.
18. Studying representatives of the reptile class, the order of the cobras, using identifiers. Compiling a list of cobras distributed in Uzbekistan, identifying poisonous and non-poisonous snakes
19. Class of birds. Breeding, nesting, and brooding of birds: study of brooding and brooding birds. Study of representatives of the order of the crested birds using identifiers. Compilation of a list of birds common in Uzbekistan. Compilation of a list of birds of hunting importance
20. Write a systematics of the class Mammalia and compile a list of representatives distributed in Uzbekistan based on the descriptors. Mammals that are of hunting importance.

#### **IV. Laboratory exercises instructions and recommendations.**

1. The sub-world of unicellular organisms (PROTOZOA). Phylum Euglenozoa , class Euglenoidea: Euglena viridis or Structure and reproduction of Euglena gracilis.
2. Phylum Coelenterata (or Cnidaria). Structure of freshwater hydra.
3. External and internal structure of a medical leech - a representative of the class of leeches (Hirudinea).
4. The external structure of a crayfish, body segments, legs, and body covering, is a representative of the phylum Arthropoda, subphylum Crustacea, class Higher Crustaceans, order Decapoda.
5. The external and internal structure of the black shrike - a member of the phylum Tracheata, the large class Hexapoda or Insecta, the class Insecta-Ectognatha , and the family Shrike.
6. General structural features of representatives of the phylum Chordata. Larval Chordate subspecies, external and internal structure of Ascidia.
7. General description of the class Osteichthyes. Study of the external structure and skeleton of bony fish through wet preparations and bone collections. Study of the internal structure of a living bony fish by dissecting it.
8. Study the external and internal structure of a living frog by dissecting it  
Reproduction and development of aquatic and terrestrial organisms. Study of individual representatives based on identification.
9. Study the external and internal structure of a living lizard by dissecting it.
10. Study the external and internal structure of a live blue pigeon by dissecting it.

#### **V. Independent learning and independent work**

##### **Recommended independent study topics:**

1. Main habitats and adaptations of animals to them.
2. The structure and development conditions of cells and tissues of the animal organism.

3. Phylum Chlorophyta. Colony-living algae.
  1. 4. Phylum Choanoflagellata, Retortamonada, and Achostylata.
4. Structure, development and distribution of Opalinae (Opalinata).
5. Myxosporidia phylum: structure, life cycle and significance.
6. Microsporidia type: parasites and their pathological significance .
7. The main theories about the origin of multicellular organisms.
8. Marine hydroid polyps, structure of an obelia colony.
9. Structural features and ecology of siphonophores (Siphonophora).
10. Phylum Ctenophora.
11. General description and phylogeny of representatives of the Mesozoic, Orthonectida, Disimida, and Gnathostomulid phyla.
12. Class Scaphopoda.
  11. The structure and lifestyle of representatives of the primitive annelid class.
  12. Echiura and Sipuncula types.
13. Phylum Onychophora and Tardigrada.
14. Sea spiders (Pycnogonida) class.
15. Priapulida , Loricifera , and Kinorhyncha .
16. Gnathifera . General description and diversity of the phylum Gnathostomulida. Phylogeny of the Gnathifera.
17. Rotifera, Ctenophora, and Cycliophora phyla: body shape, structure, organ function, diversity, and phylogeny.
  2. 17 Large phylum Lophophorata. Phoronida and Brachiopoda : body shape, structure, reproduction and development, species diversity.
18. Bryozoa and Chaetognatha phyla : structure, reproduction and development. Species diversity.
19. The phyla Tentaculata and Pogonophora: body shape, reproduction, and development. Phylogeny of the Lophophorata .
20. Paleontological ideas about the origin and evolutionary development of vertebrates.
21. Vertebrate central nervous system the structure and function of the system.
22. Vertebrate sensory organs, sensor (reception) mechanisms.
23. Reproduction and development of vertebrates.
24. The role of chordates in the biosphere.
25. Fishing, its economic importance.
26. Life and economic importance of acclimatized fish in the water bodies of Uzbekistan.
27. Fish caught in the reservoirs of Uzbekistan.
28. Rare and endangered fish of Uzbekistan's water bodies.
29. The life and importance of aquatic and terrestrial animals found in the fauna of Uzbekistan.
30. Poisonous snakes of Uzbekistan, their distribution and importance.

#### **VI . Instructions and recommendations for preparing coursework.**

1. The diversity of invertebrates and their adaptations to living in different environmental conditions.

2. Phylogenetic relationships of invertebrates.
3. Theories of the origin of multicellular animals.
4. Soil invertebrates and their practical importance.
5. Parasitic worms in humans and farm animals and measures to prevent them.
6. Protozoa that parasitize humans and farm animals and measures to prevent them.
7. In fish Common parasites and their prevention measures.
8. The structure, biological characteristics of parasitic mammals in humans and livestock , and measures to prevent them.
9. The structure, biological characteristics of tapeworms that parasitize humans and livestock , and measures to prevent them.
10. Nematodes that parasitize human biological characteristics, diseases they cause and measures to prevent them.
11. terrestrial gastropod molluscs in the development stages of livestock helminths in Uzbekistan .
12. of freshwater gastropods as intermediate hosts in the development stages of livestock helminths in Uzbekistan.
13. Systematic status, distribution and importance of beneficial mollusks.
14. Biological characteristics of helminths parasitic in the lungs of livestock in Uzbekistan, diseases they cause and measures to prevent them.
15. Biological characteristics of helminths parasitic in the liver of livestock in Uzbekistan, the diseases they cause, and measures to prevent them.
16. Cyst nematodes parasitic on agricultural crops in Uzbekistan : structure, reproduction, biological characteristics, distribution and measures to prevent them.
17. Parasitic mites, their structure, development and disease importance in distribution.
18. Livestock helminths transmitted by dipterans in Uzbekistan and measures to prevent them.
19. Dipterans: structure, species composition, distribution, biological characteristics and importance.
20. Bees, their structure, biological properties and importance.
21. Termite family: structure, species composition, biological characteristics and significance.
22. Storage pests: structure, distribution, biological characteristics and damage caused by the main species.
23. Structure, distribution, biological properties of parasitic hymenoptera and their use in plant pest control .
24. Insects that damage wheat and measures to combat them.
25. Insects that damage apples and measures to combat them.
26. The structure, reproduction, development of plant lice and measures to combat them.
27. The specific structure, reproduction, and significance of the main species in nature of representatives of the order Beshiktervatar.

28. The structure, reproduction, life cycle and significance of representatives of the dragonfly family in nature.
29. The history of the development of medical parasitology in Uzbekistan.
30. History of the development of general parasitology in Uzbekistan.
31. The history of the development of veterinary parasitology in Uzbekistan.
32. The history of the development of phytohelminthology in Uzbekistan.
33. The structure, biological characteristics, harm and measures to combat representatives of the order of the right winged insects distributed in different regions of Uzbekistan.
34. The specific structure, biological characteristics, distribution, harm, and control measures of cicadas.
35. Harmful beetles common in Uzbekistan and measures to combat them.
36. The structure, distribution, biological characteristics of representatives of the order of the Candles and measures to combat them.
37. Species composition, structure, biological characteristics, damage and measures to combat them of nightshade butterflies.
38. The structure, biological characteristics, harm and measures to combat the occurrence of butterflies in Uzbekistan.
39. Insects that damage plants and measures to combat them.
40. Insects damaging cereal crops in Uzbekistan and measures to combat them.
41. Insects that damage fruit trees and measures to combat them.
42. Intestinal parasitic infectious diseases in humans and measures to prevent them.
43. Infectious diseases that parasitize the human respiratory tract and measures to prevent them.
44. Infectious diseases that parasitize people in the blood and their treatment.
45. Common infectious diseases for humans and animals and measures to prevent them.
46. Infectious diseases that parasitize the outer skin of humans and measures to prevent them.
47. Poisonous invertebrates living in the seas and protection against them.
48. The main rodent pests of cotton and measures to combat them.
49. Biological and ecological characteristics of the plant-damaging insect pest, the scythe.
50. The main sucking pests of cotton and measures to combat them.
51. Breeding entomophages in biolaboratories and their use in pest control.
52. Hunted mollusks, economic importance of the main species.
53. Hunted short - tailed shrews and their economic importance.
54. Storage pests, life cycle of the main species.
55. Scorpion family: structure, reproduction, distribution and importance.
56. The diversity of annelids distributed in Uzbekistan, their structure, distribution, biological properties and practical importance.
57. Beetles that damage plants in our republic: structure, species composition, biological characteristics and significance.
58. Ants, their life and importance in nature.

59. Blood parasites that infect livestock and humans and measures to prevent them.
60. Fish species composition in a zoo aquarium and their breeding in captivity.
61. Sharks, structural features, distribution and importance.
62. Scats, structure, lifespan and importance.
63. Rare and endangered fish of Uzbekistan's water bodies .
64. and significance of aquatic and terrestrial organisms found in the fauna of Uzbekistan .
65. found in Uzbekistan , their structure and main features of their lifestyle.
66. Poisonous snakes found in Uzbekistan and the properties of their venom.
67. Lizards distributed in Uzbekistan, their lifestyle and importance.
68. Crocodiles: structure and lifestyle, main species, distribution.
69. The main features of the structure of turtles, their types, and distribution.
70. Species composition and lifestyle of birds of prey kept in captivity at the Tashkent Zoo.
71. Migratory birds, main species and their life.
72. Sedentary birds, life of the main species.
73. Migratory or migratory birds, life of the main species.
74. The diversity of sparrows found in Uzbekistan, their distribution, biological characteristics and practical importance.
75. The diversity of pigeons distributed in Uzbekistan, their distribution, biological characteristics and practical importance.
76. The main characteristics of the structure and lifestyle of the main species of chickens distributed in Uzbekistan .
77. The main characteristics of the structure and lifestyle of the main species of the goose family, distributed in Uzbekistan .
78. Birds of prey common in Uzbekistan and their importance as natural sanitarians.
79. distributed in Uzbekistan , their structure and lifestyle.
80. Rare and endangered birds in Uzbekistan and their protection.

3.	<p><b>VII. Learning outcomes/Professional competencies</b></p> <p>As a result of learning a subject, the student:</p> <p>Zoology and all its branches: morphological, anatomical, physiological and ecological aspects of animals; classification of animals; important representatives and their importance; knowledge and <i>understanding of animal reproduction methods has to be</i>;</p> <p>A student who has mastered zoology <i>will have skills</i> in the growth and development of animals, the role of science in solving problems in the national economy, agriculture, and medicine ;</p> <p>In teaching zoology, educational technologies, electronic posters, handouts, electronic textbooks and manuals, virtual laboratories, Internet information, various collections of information on the local network for the control of scientific knowledge are used. The science is taught using pedagogical methods such as independent learning, brainstorming, solving situational problems, discussion, role-playing games, writing abstracts, and the use of necessary equipment for identifying, studying, and conducting observations of animals; collecting, observing, and studying the internal and external structure of various animals; preserving and rationally using rare animals; identifying representatives of the animal world to the species <i>level must have</i> .</p>
4	<p><b>VIII. Educational technologies and methods:</b></p> <ul style="list-style-type: none"> <li>• lecture;</li> <li>• case study;</li> <li>• making presentations;</li> <li>• working in groups;</li> <li>• teamwork and protection.</li> </ul>
5	<p><b>IX. To receive credits, students must:</b></p> <p>Fully master the theoretical and methodological concepts of the subject, be able to correctly reflect the results of the analysis, conduct independent observations of the processes and concepts being studied, and complete the tasks and assignments given in the current and intermediate control forms, and pass the final control test.</p>
6	<p><b>Main literature :</b></p> <ol style="list-style-type: none"> <li>1. Dadayev S., Saparov K. Vertebrate Zoology. Textbook “Cholpon” T – 2006</li> <li>2. Dadayev S., Saparov K. Zoology (chordates, part 2 ). “Cholpon Publishing House”. Tashkent. 2011.</li> <li>3. Dadayev S., Saparov K. Zoology (chordates). "ECONOMY - FINANCE" Tashkent. 200 8 .</li> <li>4. Ochil Movlonov, Shukur Khurramov, Zafar Norboev. Invertebrate Zoology. " Uzbekistan". Tashkent 2002.</li> <li>5. Abdinazarov XX Zoology (Part 1 Laboratory exercises in invertebrate zoology). 5110400-Biology teaching methodology textbook for students</li> </ol>

studying in the undergraduate program. Fergana. Fergana Publishing House. 2021.

6. Madumarov MJ Zoology (Vertebrate Zoology). Textbook for students of Biology. Tashkent. Science and Technology. 2023.

7. Dadayev S., "Parasitology" textbook "Uzbekistan" T – 2006

**Additional literature:**

1. Dadaev S., Saparov K. Laboratory exercises in the subject of invertebrate zoology. textbook. Tashkent . Navruz Publishing House. 2020.

2. Lakhanov JL. Vertebrate animal identifier of Uzbekistan. Textbook. Tashkent. 2013.

3. Muminov BA Eshova HS Rakhimov M.Sh. Zoology (Part 1 Laboratory exercises in invertebrate zoology). Tashkent. 2019.

4. Naumov SP Zoology of vertebrates. Textbook for students of pedagogical institutes studying biology. Teacher. Tashkent 1995.

5. Ravmonova LA Sadiqova SA Zoology (Part 2 Practical exercises in vertebrate zoology). Tashkent. "Go To Print" 2020

6. Toshmatova Sh. Laboratory exercises in invertebrate zoology. textbook. Tashkent. 2019.

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