

Name of the Discipline	Final State Certification
Semester(s)	8
Responsible teacher	Azimova Dilnoz Ergashevna, Doctor of Philosophy (PhD) in Biological Sciences, Associate Professor Khamrayeva Nafisa Tirkashevna, Doctor of Philosophy (PhD) in Biological Sciences, Associate Professor Ortiqova Lola Soatovna, Doctor of Philosophy (PhD) in Agricultural Sciences, Associate Professor
Language of teaching/learning	Uzbek/Russian
Connection to the curriculum	Compulsory
Forms of teaching/learning	Final state certification
Academic workload (including contact hours and self-study)	Total work load: 60 hours Contact hours lecture 0 hours practical lesson 0 hours IWS 0 Practice 60 hours
ECTS	2
Prerequisites	Methodology of Teaching Biology, Zoology, Botany, Fundamentals of Genetics and Selection, Human Anatomy and Physiology, Biochemistry, Ecology and Nature Conservation, Solving Problems and Assignments in Biology
Discipline objectives / Learning Outcomes	The purpose of the final state certification (FSC) of graduates of higher educational institutions is to assess the theoretical knowledge and practical skills acquired by students during the educational process and to determine their readiness to work independently as specialists. The main tasks of FSC are: Assessment of the student's level of knowledge - to determine whether he has sufficient knowledge and skills in the subjects provided for in the educational program. Checking the level of preparation for a specialty - to assess the ability to solve professional problems, critical and analytical skills. Checking readiness for scientific and practical activities - to demonstrate the student's ability to conduct independent research through a graduation qualification work or diploma thesis. Assessment of readiness for future work - to determine the graduate's ability to be competitive in the labor market in his specialty.
Lessons' contents	<ol style="list-style-type: none"> <li>1. The development cycle of gymnosperms.</li> <li>2. The primary anatomical structure of the stem.</li> <li>3. Adaptation of photophilous plants.</li> <li>4. History of the study of the cell.</li> <li>5. Pollination.</li> <li>6. Classification of inflorescences and their significance in plant life.</li> <li>7. Cell division.</li> <li>8. Anatomical structure of the stem of woody plants.</li> <li>9. Structure and significance of chloroplasts.</li> <li>10. Vegetative reproduction and its types.</li> <li>11. Branching of generations in plants.</li> </ol>

12. The role of plants in human life.
13. Grafting and its methods.
14. Specific characteristics, reproduction and distribution of the gymnosperm (pines) department.
15. The main genera and species of the family of Radix. Their systematics, distribution.
16. The importance of the main families and species of the Soybean or Caraway family, which are systematically identified and cultivated.
17. Description of the specific features and important representatives of the Mint family.
18. Characteristics of the Cauliflower family, main representatives.
19. Scientists who contributed to the development of plant systematics.
20. Specific features of the Brassicaceae family, methods of reproduction of the main representatives.
21. Specific features of the Angiosperms or Magnoliophytes department.
22. Modern phylogenetic system and classification of the Magnoliophytes department.
23. Systematic features of the Ranunculaceae family. The distribution of the main families and species, their importance in the national economy.
24. Systematic features of the Cauliflower (Compositae) family. The peculiarity of the structure of the flower, the description of the main families and species.
25. Double fertilization in flowering plants and its essence.
26. Characteristics and main representatives of the tuberous fungi, methods of reproduction.
27. Specific systematic features of the family of tulips. Description of the main families and species.
28. General characteristics and important representatives of fungi, their importance in the national economy.
29. The main systematic features of the family of magnolias, description of common families and species.
30. Characteristics, representatives, reproduction of the class of monocotyledons.
31. Cell theory.
32. A brief history of plant physiology.
33. Diffusion, osmosis phenomena
34. Light reaction of photosynthesis
35. Control of the transpiration process
36. The influence of external factors on the photosynthesis process
37. Energy-generating membranes
38. General concept of respiration.
39. Generating tissue.
40. The influence of external environmental factors on respiration.
41. "Age" of plants, the phenomenon of guttation.
42. Resistance of plants to cold and heat
43. Natural photohormones.
44. Mechanisms of respiration.
45. Types of mineral elements.
46. Control of respiration.
47. Methods of studying plant physiology.
48. Antitranspirants.
49. Cell membrane and its functions.

50. The influence of external conditions on the photosynthesis process.
1. Objects of study of zoology
51. General characteristics of the phylum Coelenterata.
52. Phylogeny of annelids.
53. Morphology and systematics of the class Coccidia.
54. Characteristics of the phylum Nematelminthes.
55. History of the development of zoology.
56. Systematics of the phylum Coelenterata.
57. General characteristics of the phylum Mollusca.
58. Structure of the class Trematoda.
59. Reproduction and development of the class Scaphopoda.
60. Initial studies in the field of zoology in the countries of Central Asia.
61. Systematics of the class Hydrozoa.
62. Internal and external structure of typical representatives of the Amphineura subphylum.
63. Classification of millipedes.
64. Structure of the head of the class Insecta.
65. Type and structure of animal cells.
66. Structure and ecology of the class Scyphozoa.
67. Reproduction and development of the Amphineura subphylum.
68. Thorax of the class Insecta.
69. Control of pests and parasitic insects
70. Types and structural structure of animal tissues.
71. Phylogeny of cnidarians
72. External and internal structure of the class Monoplacophora.
73. Morphology and systematics of the class Coccidioides.
74. Characteristics of the phylum Nematelminthes.
75. Give information about the body symmetry of animals.
76. Systematics of the phylum Ctenophora.
77. External and internal structure of the class Gastropoda.
78. Abdominal section of the class Insecta.
79. Classification of insects.
80. Describe the main features of animal life.
81. General characteristics of the phylum Plathelminthes.
82. Reproduction and development of the class Gastropoda.
83. Wings of insects.
84. Representatives of the class Tardigrades.
85. Describe how many types of animal reproduction there are and which animals belong to them.
86. The skin-muscle sac of the class Turbellaria.
87. The origin of asymmetry in gastropod mollusks.
88. The body cover of insects.
89. The phylogeny of the phylum Arthropoda.
90. Explain the individual development of animals.
91. Anatomy of the class Turbellaria.
92. Systematics of the class Gastropoda.
93. The respiratory system of insects.
94. Morphology of the class Ophiuroidea.
95. The sequence of taxonomic units in the systematics of animals.
96. The class Turbellaria, reproduction and development.
97. Characteristics of the class Lamellibranchia, i.e. Bivalvia.
98. Circulatory system of insects.

- |  |
|--|
| <ol style="list-style-type: none"><li>99. Characteristics of the phylum Onychophora.</li><li>100. Describe the methods of studying anatomy.</li><li>101. Explain the structure of the internal environment.</li><li>102. Describe the structure of the bones of the upper arm.</li><li>103. Describe the development of bones.</li><li>104. Explain the structure of the first cervical vertebra.</li><li>105. Describe the structure of the palatine bone (Os Pallatinum).</li><li>106. Explain the epithelial tissue and its types.</li><li>107. Describe the structure of the thoracic vertebrae.</li><li>108. Describe the structure of the facial muscles of the head.</li><li>109. Describe the structure of the Columna Vertebrales.</li><li>110. Explain the structure of the Ventriculus seu gaster.</li><li>111. Describe the structure of the Ren.</li><li>112. Explain the structure of the Pons.</li><li>113. Describe the structure of the sacral vertebrae.</li><li>114. Describe the structure of the os frontale.</li><li>115. Explain the structure of the os ischii.</li><li>116. Describe asthenic physique.</li><li>117. Explain the structure of the sternum.</li><li>118. Describe the structure of the digestive organs.</li><li>119. Describe the structure of the nephron.</li><li>120. Explain the difference between venous blood vessels and arterial blood vessels.</li><li>121. Describe the structure of neurons.</li><li>122. Describe the meninges.</li><li>123. Describe the eyeball.</li><li>124. Explain the structure of the external and middle ear.</li><li>125. Describe the structure of the lungs.</li><li>126. Explain the internal and external structure of the kidney.</li><li>127. Describe the structure of the bones of the hand and paw.</li><li>128. Describe the structure of the skull and occipital bones.</li><li>129. Explain the structure of the oral cavity and esophagus.</li><li>130. Describe the structure of the small intestine.</li><li>131. Describe the structure of the larynx and trachea.</li><li>132. Describe the topography and structure of the heart.</li><li>133. Explain the structure of the lymphatic vessels.</li><li>134. Describe the membranes of the spinal cord.</li><li>135. Describe the medulla oblongata.</li><li>136. Explain the structure of the cerebellum.</li><li>137. Describe the cytoarchitectonics of the cerebral cortex (6 layers of cells).</li><li>138. Describe the choroid and retina of the eye.</li><li>139. Describe the structure of the pre-palm bones.</li><li>140. Explain the edges and external structure of the iliac bone.</li><li>141. Describe the lumbar vertebrae.</li><li>142. Explain muscle tissue.</li><li>143. Describe the structure of nervous tissue.</li><li>144. Organs and organ systems of the human body.</li><li>145. Describe the structure of a cell.</li><li>146. Describe the glands of internal and external secretion.</li><li>147. Explain the structure and types of connective tissue.</li><li>148. What is meant by growth and development.</li><li>149. Describe the chemical composition of bones.</li></ol> |
|--|

150. Explain the structure and functions of nucleic acids.
151. Write in detail about modern concepts of genes and gene structures.
152. Explain the concepts of genetic code, codon, and anticodon and their functions.
153. Explain the properties of the genetic code.
154. Explain the stages of protein biosynthesis.
155. Provide information on processing and splicing processes.
156. Distinguish between promoter, initiation, elongation, and termination processes and their differences.
157. What are terminator codons and their significance.
158. Explain and explain the concepts of muton, recon, gene, and operon.
159. Explain how matrix synthesis reactions occur in prokaryotic and eukaryotic organisms.
160. Write information about genetic symbols and their use.
161. Explain the information about the genotypes of the organism and their reading and give examples.
162. Give information about the procedure for obtaining gametes?
163. Mendel's I law. Explain with examples.
164. Mendel's II law. Explain with examples.
165. Mendel's III law. Explain with examples.
166. Explain what the gamete purity hypothesis is and what is its significance in genetics.
167. Backcrossing and its significance. Give examples of analytical crossing in dihybrid inheritance?
168. Explain allelic genes and their interaction.
169. What is complete dominance? Explain with examples.
170. Explain intermediate inheritance with examples.
171. What is complete dominance?
172. What is codominant? Explain with blood groups.
173. How does the phenomenon of multiple allelism occur and in which organisms is it observed.
174. What do you understand by the multifaceted effect of genes? Give examples
175. Explain the role of the concepts of phenotype and genotype in genetics.
176. Give information about didybrid and polyhybrid crosses.
177. Show the phenotypic separation of generations in trihybrid crosses.
178. Show the genotypic separation of generations in trihybrid crosses.
179. Explain the types of interaction of nonallelic genes.
180. What genes are called complementary genes? Explain their differences from other nonallelic genes.
181. What phenotypic separations occur in the F<sub>2</sub> generation in complementary inheritance.
182. What genes are called epistatic genes? Explain how they differ from other non-allelic genes.
183. What phenotypic separation occurs in the F<sub>2</sub> generation in epistatic inheritance?
184. What types of polymeric genes are there? What genes are called cumulative genes?
185. What genes are called non-cumulative genes? In which organisms does it occur?
186. Interaction of non-allelic genes. Give an example of polymerization.
187. What type of inheritance is the color of a sweet pea flower? Justify.

	<p>188. What type of inheritance is the color of chicken feathers? Justify.</p> <p>189. How is human height inherited? Explain.</p> <p>190. What type of inheritance is the color of feathers in parrots? Explain.</p> <p>191. What type of inheritance is the color of a pumpkin? Explain.</p> <p>192. What types of sex determination are there?</p> <p>193. Explain sex-linked inheritance in the fruit fly <i>Drosophila</i>.</p> <p>194. Explain sex-linked inheritance in humans.</p> <p>195. What is reciprocal crossing? Explain.</p> <p>196. Explain inheritance linked to the sex X chromosome.</p> <p>197. Indicate the diseases inherited through autosomes and what types of them occur.</p> <p>198. Analyze how genes linked to the autosome are transmitted to offspring in gametes.</p> <p>199. Explain inheritance linked to the sex Y chromosome.</p>
The exam format	Final state certification and graduation thesis
Teaching/learning and examination requirements	<p>The State Attestation in the specialty sciences is conducted in the form of a written test.</p> <p>The written test option includes 5 questions from the subjects “Anatomy and Morphology of Plants”, “Land Plants”, “Higher Plants”, “Physiology of Plants”, 1 question from the subjects “Zoology of Vertebrates”, “Zoology of Invertebrates”, 1 question from the subject “Human Anatomy and Physiology” and 2 questions from the subject “Genetics”.</p> <p>The written test options are composed of three groups of questions on the subjects “Anatomy and Morphology of Plants”, “Land Plants”, “Higher Plants”, “Physiology of Plants”:</p> <ul style="list-style-type: none"> <li>- the first group of questions is about the anatomical and morphological structure of plants;</li> <li>- the second group of questions is about the department of land plants;</li> <li>- the third group of questions covers information about the department of higher plants.</li> </ul> <p>“Zoology of Vertebrates” is composed of three groups of questions on the subject “Zoology of Invertebrates”:</p> <ul style="list-style-type: none"> <li>- the first group of questions on the history of the study of animals;</li> <li>- the second group of questions on the structure and development of invertebrates;</li> <li>- the third group of questions covers information on the structure and development of vertebrates.</li> </ul> <p>In the subjects “Human Anatomy and Physiology” and “Genetics”, based mainly on the curriculum, reasonable answers are given to questions related to the teaching of subjects.</p> <p>For each correct and complete answer given in the written work options, the student will be given all the block questions, if the correct and complete answer to the given question is written, the terms are explained with their full names, the content and essence of the question are explained correctly and consistently, as well as if a creative approach is taken, and logical integrity is achieved in the answer. These characteristics serve as the basis for assessment.</p>
Bibliography	<p>1. Fayzullayev S.S. «Odam genetikasi» Toshkent, 2018 y “Barkamol fayz media”</p> <p>2. Жимулёв И.Ф. «Общая и молекулярная генетика» Новосибирск, «Сиб. Унив.», 2003й.</p> <p>3. Fayzullayev S.S., G'ofurov A.T., Matchonov B.E. «Odam genetikasi»</p>

	<p>Toshkent, «Ijod dunyosi», 2003y.</p> <p>4. Olimxo'jaeva P.R., Inog'omova D.R. «Tibbiyot genetikasi». Toshkent,</p> <p>5. «Abu Ali Ibn Sino», 2002y.</p> <p>6. Севченко В.А., Топорнина Н.А., Стволинская Н.С. «Генетика человека» М., «Владос», 2002й.</p> <p>7. Топорнина Н.А., Стволинская Н.С. «Генетика человека». (практикум). - М., Владос, 2001й.</p> <p>8. G'ofurov A.T., Fayzullayev S.S., Xolmatov X. «Genetikadan masala va mashqlar».-T.: o'qituvchi, 2010y.</p> <p>9. А.А.Сазанов «Генетика» Санкт-Петербург 2011г</p> <p>1. A.F. Axmedov. Odam anatomiyasi. Toshkent 2007.</p> <p>2. F. N. Baxodirov. Odam anatomiyasi. O'zbekiston. Toshkent. 2006.</p> <p>3. D.M. Mamatqulov, M. Mannopova. Odam anatomiyasi va fiziologiyasi (10.Labaratoriya mashg'uloti). Darslik. Toshkent 2012.</p> <p>1. E. Nuriddinov. Odam fiziologiyasi. Darslik. Toshkent. Aloqachi 2005.</p> <p>2. A. F. Axmedov. Odam anatomiyasi. Amaliy mashg'ulot. Toshkent 2003.</p> <p>3. T.A. Sagatov, O'. M. Mirsharipov. Odam anatomiyasi. Tafakkur -Bo'ston. 11.Toshkent- 2011.</p> <p>1. K.T.Almatov, Sh.I. Allamuradov, Odam va hayvonlar fiziologiyasi. 12.Toshkent. 2004.</p> <p>13.A.Fahn. Plant Anatomy. USA NewYork. 2011. (darslik)</p> <p>14. Prator O'. Shamsuvalieva L. va boshqalar. «Botanika» T.: «Ta'lim nashriyoti», 2010. (darslik)</p> <p>3. Mustafayev S.M. «Botanika» T.: «O'zbekiston» 2002. (darslik)</p> <p>4. Тухтаев А.С. «O'simliklar anatomiyasi va morfologiyasi» T.: «ТДПУ» 2001. (ma'ruza matni)</p> <p>15.Toshmuxamedov R.I. «O'simliklar sistematikasidan amaliy mashg'ulotlar» – 16.T.«O'zbekiston» 2006. (o'quv qo'llanma)</p> <p>6. Xo'jayev J. «O'simliklar fiziologiyasi» T.: «O'qituvchi» 2004. (darslik)</p> <p>7. Mustaqimov G.D. «O'simliklar fiziologiyasi va mikrobiologiyasi asoslari» - T.O'qituvchi,, 1995. (o'quv qo'llanma)</p>
<p>Evaluation of the State Attestation in Specialized Subjects</p> <p>C R E T I N E</p>	<p>60110900 - Procedure and evaluation criteria for the written State certification of students graduating from the Biology education program in specialized subjects</p> <p>The time allotted for the written tests of the State Attestation of the State Examination is 1 hour and 30 minutes.</p> <p>The overall mastery index for the State Attestation in specialized subjects is estimated from 60 to 100 points.</p> <p>There are 5 questions in one option, and a maximum of 20 points are awarded for each correct answer.</p> <p>Each written answer in the State Attestation is evaluated based on the following criteria:</p> <ul style="list-style-type: none"> <li>- if the correct and complete answer to the given question is written, the content and essence of the question are correctly and consistently covered, as well as if the approach is creative, and the logical integrity of the answer is achieved, the mastery index is evaluated in the range of 17.1 - 20 points;</li> <li>- if the correct answer to the given question is written, the content of the question is fully covered, the mastery index is evaluated in the range of 14.1 - 17 points;</li> <li>- if the oral answer to the given question is incorrect or superficial, but the</li> </ul>

content of the given question is not fully explained, the mastery indicator is evaluated in the range of 11-14.1 points;  
 - if the answer to the given question is incorrect or superficial, but the essence of the problem is not fully explained, the mastery indicator is evaluated in the range of 0 - 10.9 points. (17.1-20 points - excellent, 14-17 points - good, 11-14.1 points - satisfactory, 0-10.9 points - unsatisfactory).

5 stars	100 points		Evaluation criteria
5	90-100	Excellent	When a student is considered to be able to make independent conclusions and decisions, think creatively, observe independently, apply the knowledge he has gained in practice, understand, know, express, and narrate the essence of the subject (subject), and have an idea about the subject (subject)
4	70-89,9	Good	When the student is considered to be able to observe independently, apply the knowledge he has gained in practice, understand, know, express, and narrate the essence of the subject (subject), and has an idea about the subject (subject)
3	60-69,9	Satisfactory	When the student is found to be able to apply the knowledge he has gained in practice, understands, knows, can express, and narrate the essence of the subject (subject), and has an idea about the subject (subject)
2	0-59,9	Unsatisfactory	When it is determined that the student has not mastered the science program, does not understand the essence of the science (subject), and does not have an idea about the science (subject)

NOTE: Graduates who are dissatisfied with the grade given during the final state attestation process have the right to appeal to the appeal commission within 24 hours from the date of announcement of the final state attestation scores. Any problems that may arise between the final state attestation commission and the student regarding the assessment scores will be considered by a special appeal commission and concluded in agreement with the chairman of the SAC.

Evaluation criteria for the final qualification work

The volume and formalization of the BMI in terms of requirements (norm: natural areas - no less than 50 pages, social areas - no less than 70 pages): meets the requirements - 10 points, partially meets the requirements - 7 points, there are deviations from the requirements - 4 points.  
 2. The topic was selected on the basis of state and institute grant projects or on current problems: included in the state program - 8 points, according to the grant project - 7 points, according to the institute program - 6 points, according to current problems - 5 points.  
 3. The relevance of the topic: sufficiently justified - 5 points, insufficiently justified - 3 points, unclear - 2 points.  
 4. The clear expression of goals and objectives: clear - 7 points, not completely clear - 5 points, unclear - 3 points.

	<p>5. The degree of use of scientific research methods in the implementation of the BMI: full - 7 points, partial - 5 points, insufficient - 3 points.</p> <p>6. The degree of novelty and reliability of the results obtained: the result is new - 8 points, previously obtained - 6 points, not fully reliable - 3 points.</p> <p>7. The presence of recommendations for production in the conclusion of the BMI: there is a recommendation for direct production - 6 points, recommended for use in the social sphere (education, environmental protection, spiritual and educational ...) - 5 points, no recommendation - 3 points.</p> <p>8. The degree of critical assessment of the graduate's results on the topic: clear - 8 points, not completely clear - 6 points, not critically assessed - 4 points.</p> <p>9. The scientific nature of the work: based on scientific research - 8 points, in a mixed form - 5 points, in a referential nature - 3 points.</p> <p>10. Level of use of literature: full use of scientific and practical journals, monographs, works of leading scientists - 8 points, limited use of scientific literature - 6 points, only textbooks, lecture notes, manuals and reference books - 4 points.</p> <p>11. Grading of the graduate's report: excellent - 10 points, good - 7 points, satisfactory - 6 points.</p> <p>12. Answers to the questions: complete - 8 points, average - 6 points, satisfactory - 4 points.</p> <p>13. Assessment of the BMI by an external reviewer: excellent - 7 points, good - 6 points, satisfactory - 5 points.</p> <p>14. The final score assigned to the BMI is _____ points.</p>
--	---