



## Teaching Licensure: Biology

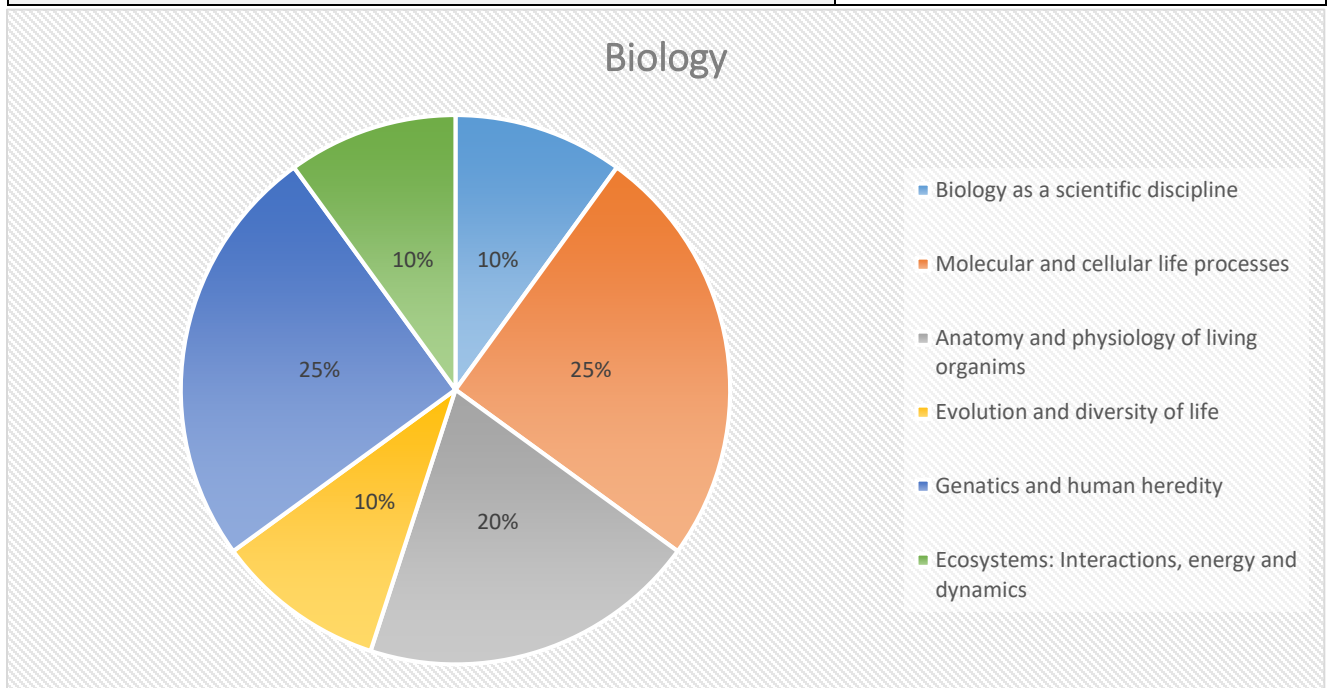
### About the test

Teacher qualification test in biology is a **2-hour** computerized test that targets teachers who teach biology in **cycle 3** schools in UAE.

The content of this test is organized into six main topics in biology: Biology as a scientific discipline, molecular and cellular life processes, anatomy and physiology of living organisms, evolution and diversity of life, genetics and human heredity, and ecosystems: Interactions, energy and dynamics.

The table below explains the information of the test.

Target candidates	Number and type of Questions	Test Duration	Format	Calculators
Cycle 3 Biology Teachers	80 MCQs	2 hours	Computerized test	Allowed
Topics			Weight	
Biology as a scientific discipline			10%	
Molecular and cellular life processes			25%	
Anatomy and physiology of living organisms			20%	
Evolution and diversity of life			10%	
Genetics and human heredity			25%	
Ecosystems: Interactions, energy and dynamics			10%	
<b>Total</b>			<b>100 %</b>	



## Content specifications in Biology

The content of the test is defined by a set of core competencies that biology teachers should meet to determine their ability to carry out their content area teaching effectively.

### Topics and core competencies

Below are the topics and related core competencies that biology teachers should be able to demonstrate, in terms of knowledge and skills, to meet the expectations of this test:

#### 1. Biology as a scientific discipline

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Manage laboratory activities and properly use lab resources and material to assure the safety of the students.

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Use the scientific method principles and procedures for designing and conducting scientific investigations.

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Appropriately select and use a variety of tools, techniques and procedures to gather data and perform the correct calculations.

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Analyze the impact of science and its interaction with technology in terms of making informed decisions about personal and societal issues.

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#### 2. Molecular and cellular life processes

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Relate the properties of chemical bonds to specific important processes in the body including homeostasis and energy production.

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Relate the structure and properties of water to major life processes in living organisms.

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Identify the structure and function of biological molecules in the cells.

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Explain the role of enzymes in chemical reactions and identify the factors that could affect their production and functions.

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Relate the level of organization to cellular differentiation and specialization in different living organisms.

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Compare and contrast prokaryotic and eukaryotic cells in terms of structure and function.

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Explain the function of cell organelles in relation to their structure.

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Explain the transportation of water and other materials through the cell membrane.

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Explain photosynthesis and analyze the electron and energy (ATP) flow during light dependent and dark reactions (Calvin Cycle).

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Explain the types of cellular respiration and discuss the functions of anaerobic cellular respiration.

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Differentiate the main cellular events during the cellular cycle and compare the mechanisms of mitosis and meiosis.

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### **3. Anatomy and physiology of living organisms**

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Relate the structure of major body systems in multicellular organisms, including humans, to their specific functions and their interaction with each other to maintain homeostasis.

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Examine specific features and behavior of prokaryotes, to identify their effects on living organisms.

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### **4. Evolution and diversity of life**

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Explain the evolutionary mechanisms (e.g. natural selection and genetic drift), and provide example on each mechanism.

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Analyze the effects of evolutionary mechanisms on evolution in populations.

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Describe the main types of evidence to evolution (e.g. comparative anatomy, comparative embryology, and molecular biology), and analyze evolutionary trees and cladograms to determine descendant relationships to their ancestors.

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Describe how living organisms are classified, and categorize them according to specific structural and functional characteristics.

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### **5. Genetics and human heredity**

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Distinguish between the structure and function of DNA and RNA, and sequence the main events of protein synthesis in the cell.

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Use the genetic code rules to read the DNA sequence, and identify the amino acids in the polypeptide chain.

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Compare gene expression regulation in prokaryotes and eukaryotes, and identify the type and possible causes of mutation that might happen during this process.

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Apply Mendel's laws of dominance, segregation and independent assortment and variations (e.g. sex-linked, codominance, and multiple alleles) to predict the probable outcomes of offspring.

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Describe the process of genetic engineering and analyze their use in different domains of life.

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## **6. Ecosystems: Interactions, energy and dynamics**

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Distinguish between different ecological concepts (e.g. Biomes, ecosystem, communities, habitats and niches) and give examples of interactions among different organisms.

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Evaluate the effect of human- activities, i.e. Density dependent factors and density independent factors on carrying capacity and changing ecosystems dynamics.

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Interpret food chains and food webs in terms of interaction of organisms through different trophic levels and flow of energy, and analyze the effects of biotic and abiotic factors on ecosystems dynamics.

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## Crosscutting concepts and related competencies

The main topics of biology are coupled with several crosscutting concepts and practices in other disciplines of science. Biology teachers are expected to display knowledge and skills in the following crosscutting concepts as identified in related competencies below, to meet the expectations of the test:

1. **Scientific investigations:** Planning and carrying out investigations based on scientific knowledge and valid evidence.
2. **Analyzing and interpreting data:** Making decisions based on interpreted data obtained from diagrams including graphs to construct explanations for real world problems and explore relationships between variables.
3. **The use of mathematics:** Applying concepts of probability and computations to examine given information, explain medical conditions, and find solutions.
4. **Patterns:** Using scientific theories and mechanisms to analyze and explain observed natural phenomena based on facts and evidence.
5. **Cause and effect:** Examining and interpreting scientific data to predict the effect that a change in one variable could cause on another.
6. **Stability and change:** Providing evidence-based examples of stability and change taking place in living organisms and environmental systems.
7. **Energy and matter:** Constructing an explanation that energy cannot be created or destroyed, rather it flows within and between different systems.
8. **Structure and function:** Connecting properties of different materials/objects to the structure and functions of their components.