

# Internal School Curriculum

Subject

**Biology**  
**Grade 5+6**



Church Street 11-15,  
Windhoek.  
Windhoek

P O Box 78  
Namibia.

Tel +264 (0)61-373100  
Fax +264 (0)61-221306  
E-mail:

[verwaltung@dhps-windhoek.com](mailto:verwaltung@dhps-windhoek.com)

Home page:  
[www.dhps-windhoek.de](http://www.dhps-windhoek.de)

This school-internal curriculum is based on the 2016 education plan for the junior secondary level of general education schools of the Federal State of Baden Württemberg. As a modification to the Baden Württemberg core curriculum, biology is taught in grades 5 and 6 at the DHPS instead of BNT (biology, natural phenomena, technology).

Grades 5 and 6 biology lessons are based on natural sciences of the primary section.

Learners should become aware of the variety of forms, diversity and ecological significance of various vertebrates, selected invertebrates and different flowering plants. They realise, that the diversity is the result of evolutionary development. They develop an appreciation for nature on the basis of appropriate knowledge of species.

Learners are acquainted with basic processes of human development and reproduction and are thus prepared for the changes of their bodies during puberty.

Since no biology classes are offered at the DHPS in grade 8, the subject areas for grades 7, 9 and 10 have been adapted accordingly.

Consistent with a one-week excursion to an environmental education centre (NADEET), which is offered in grade 6 and a desert excursion to the desert research centre Gobabeb in grade 11, ecological topics are covered in grades 6 and 11.

Grades 5,6,7 and 9 have a double period once a week. As from 2018, lessons in grades 5 and 6 will be offered in English.

In the lessons, learners acquire general competencies in natural sciences in particular biological skills.

### Guiding principles for the acquisition of competence

Competences include the following characteristics:

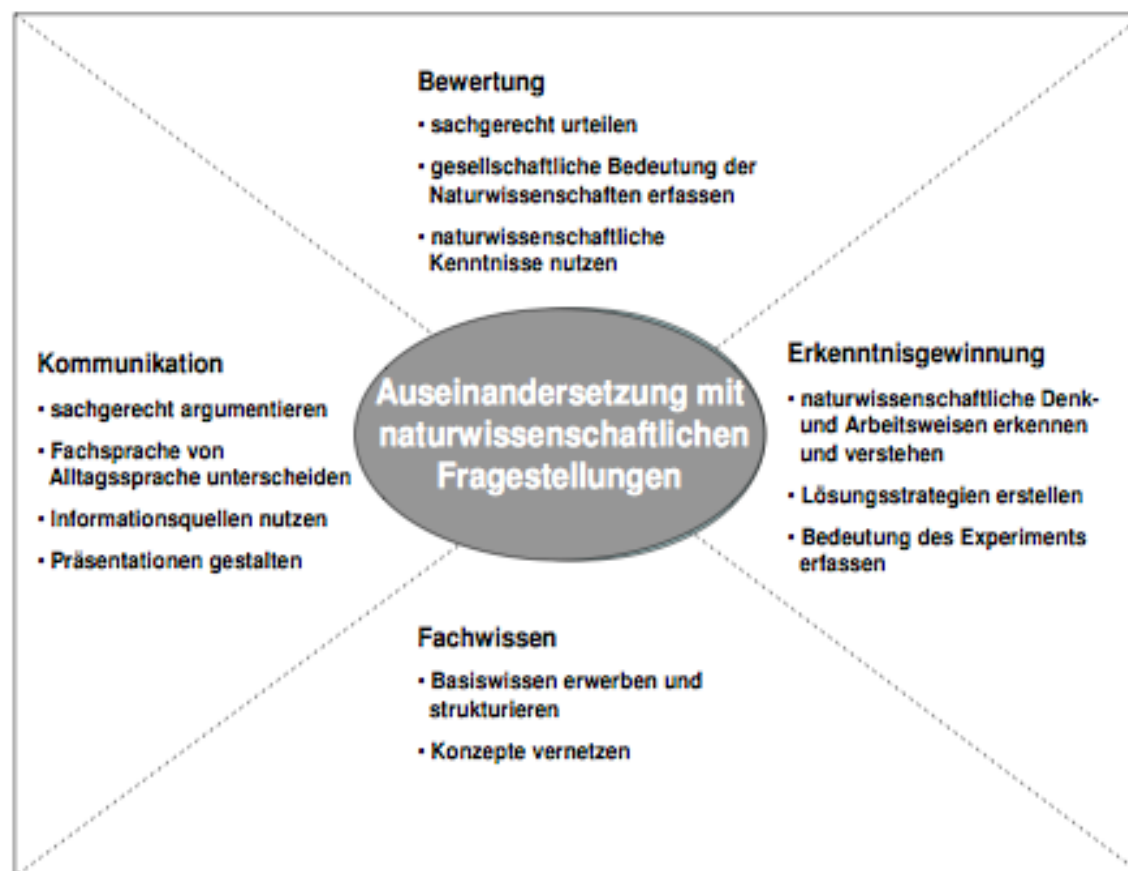
- They are aimed at successfully and responsibly solving problems and tasks.
- They interlink knowledge, skills and abilities for own actions. In order to accomplish tasks, a sound knowledge and safe command of subject-related procedures as well as the willingness and ability to apply them purposefully are required.
- They represent a target perspective for longer sections of the learning process.
- They are important for personal development and academic and professional education and enable coherent learning.

The expected competencies are organised in competence areas, according to which the lessons are structured. The objective of the lesson is to stimulate, support and promote the learners' competence development over the long term. This also applies to the subject-overarching objectives of personality development.

In addition to content-related skills, which structure their subject expertise, learners gain competencies in the three process-related areas: "knowledge acquisition", "communication" and "evaluation".

These competences can only be acquired jointly and in contexts. In particular, process-related competences cannot be acquired or applied without linking them to contents of the content-related competence area.

This is illustrated in the accompanying figure:



## 1. Subject-related competences

Subject knowledge required for the development of subject-related competence is mainly focused on basic concepts, which are presented at the organisational levels of "cell", "organism" and "ecosystem".

<b>Basic concepts</b>	<b>Using suitable examples, learners are able to...</b>
Structure and function	<ul style="list-style-type: none"> <li>• derive structure-function relationships</li> <li>• explain the absorption, transport and release of substances in plants and animals</li> </ul>
Compartmentalisation	<ul style="list-style-type: none"> <li>• explain defined reaction areas as a prerequisite for the undisturbed process flow e.g. chemical reactions, dependency of a biocoenosis in a habitat with specific characteristics, ecological niches</li> </ul>
Reproduction	<ul style="list-style-type: none"> <li>• explain the significance of reproduction of living systems</li> <li>• describe different types of reproduction (asexual, sexual reproduction)</li> <li>• explain the significance of mitosis and meiosis</li> <li>• and apply the 2<sup>nd</sup> Mendelian Law</li> </ul>
Information and communication	<ul style="list-style-type: none"> <li>• explain the significance of the nervous and hormonal system for information and communication</li> <li>• describe the course of cellular and humoral immune response and explain the significance thereof</li> <li>• describe different communication options (e.g. by means of the stimulus reaction chains, hormones, partner search)</li> </ul>
Control and regulation	<ul style="list-style-type: none"> <li>• explain the significance of control and</li> </ul>

<b>Basic concepts</b>	<b>Using suitable examples, learners are able to...</b>
	regulation in living systems <ul style="list-style-type: none"> <li>• describe regulatory circuits and their influence (e.g. blood sugar level, control of the female menstrual cycle, predator-prey relationship)</li> </ul>
Substance and energy conversion	<ul style="list-style-type: none"> <li>• explain the significance of absorption, conversion and release of substances and energy for living systems</li> </ul>
Variability and adaption	<ul style="list-style-type: none"> <li>• describe the characteristics of different animal categories (selected invertebrates and vertebrates) and plant families (e.g. cruciferous and pine plants)</li> <li>• explain adaptations and adaptation of organism to their environment</li> </ul>
Development	<ul style="list-style-type: none"> <li>• describe the development of cells, organisms and ecosystems               <ul style="list-style-type: none"> <li>- principle of cell division and cell growth</li> <li>- development of organisms</li> <li>- temporal changes of an ecosystem</li> </ul> </li> </ul>
History and kinship	<ul style="list-style-type: none"> <li>• explain the variability of living creatures as a prerequisite and result of evolution               <ul style="list-style-type: none"> <li>- Significance of the interaction of evolutionary factors</li> </ul> </li> </ul>

## **2. Process-related competences**

### **2.1 Knowledge acquisition**

Learners deal with biological questions and are able to solve them, using experiments and other subject-specific methods and explain them by means of model representations. For this purpose, they also use extracurricular learning locations such as school grounds with the pond or school garden, school-related habitats, environmental centres and zoological gardens or natural science museums.

Learners are able to...

#### **apply biological working techniques**

1. operate a microscope, prepare and draw microscope slides;
2. examine the anatomy and morphology of living organisms and organs;
3. compare and classify living creatures according to criteria;
4. identify common species in an ecosystem with identification tools;

#### **plan, implement, and evaluate experiments**

5. formulate questions and assumptions on biological phenomena;
6. make observations and experiments and evaluate them;
7. label and handle equipment appropriately;
8. formulate hypotheses and plan experiments suitable for verification;
9. conduct, record and evaluate qualitative and simple quantitative experiments;
10. derive rules from test results and check their validity;

#### **use models**

11. use structural and functional models for illustration;
12. analyse interactions using models;
13. explain dynamic processes in ecosystems using models;
14. describe the storage and dissemination of information using appropriate models;
15. assess the informative value of models.

## **2.2 Communication**

The learners evaluate information on biological issues from different sources in a targeted manner, document and exchange views on it. They present biological facts by means of suitable presentation techniques and media. They are able to provide subject-related feedback and deal with criticism.

Learners are able to...

### **collect and process information**

1. research on biological topics in different sources;
2. evaluate and process information on biological issues in a targeted manner. For this purpose, they also use extracurricular learning venues;
3. extract information from texts, pictures, tables and graphics and present it in a meaningful way;
4. describe and explain biological facts using subject terminology;
5. establish connections between everyday situations and biological facts, while consciously translating everyday language into subject terminology;
6. document the course and results of their work;
7. illustrate biological facts using schematic drawings, graphs, diagrams
8. and models.

### **exchange information**

9. present in a target-audience oriented way.
10. perceive and respect themselves and others in their individuality;
11. take a position on biological situations and defend it in a substantiated way;
12. take responsibility for the work in the team and plan, structure and reflect together

## **2.3 Evaluation**

Learners recognise the social significance of different biological topics. Their subject knowledge allows them a multi-perspective view and enables them to evaluate the different points of view in a well-founded manner.

Learners are able to...

### **classify biological facts**

1. recognise biological facts in their environment;
2. make reference to other subjects;
3. evaluate the expressiveness of media statements;
4. distinguish between scientific and ethical statements;
5. critically assess scientific statements;
6. evaluate the effectiveness of solution strategies.

### **evaluate biological facts ethically**

7. describe biological facts in terms of "change of perspective";
8. describe and assess biological facts under the perspective of sustainable development;
9. assess biological facts from the point of human dignity;
10. describe and assess biological facts under the perspective of sustainable development;
11. justify their own and other 's point of view;
12. assess human influence on ecosystems in view of sustainable development;
13. evaluate their own actions in view of sustainability;
14. evaluate own actions in view of a healthy lifestyle.



## Grade 5

### 5.1. CELLULAR ORGANISATION OF LIVING ORGANISMS

#### 1. Characteristics of living organisms and the cell as the basic structural unit of living organisms

Learners are able to distinguish living organisms from inanimate objects and describe and explain characteristics of living organisms. They are able to describe the cell as a structural unit of living organisms. Learners are taught how to use a microscope carefully and gain their first experiences in microscopy

**G2 – Basic level**

**M2 – Intermediate level**

**E2 – Advanced level**

Competences Learners are able to...			Contents	Time (2h)	Methods Curriculum
G2	M2	E2			
(1) name the characteristics of living organisms	(1) describe the characteristics of living organisms	(1) describe and recognise the characteristics of living organisms	Characteristics of living organisms	2.	Working with texts: Active reading (mark texts, find key words, compile simple mind maps) mouse - robot comparison)
(2) draw the structure of animal and/or plant cells on the basis of microscopic observations and name the cell parts which can be identified under the light microscope.	(2) draw the structure of animal and/or plant cells on the basis of microscopic observations and name the cell parts which can be identified under the light microscope.	(2) draw the structure of animal and/or plant cells on the basis of microscopic observations and name the cell parts which can be identified under the light microscope.	Assembling a light microscope Operating a light microscope Mounting simple translucent slides (onion epidermis, <i>Elodea</i> , mouth mucosa) Draw simple sketches Simple cell structure	5.	<ul style="list-style-type: none"> <li>• Work in stations</li> <li>• Work with models</li> <li>• Observe, monitor and investigate</li> <li>• Work with the microscope</li> <li>• Mount slides</li> <li>• Build a model</li> <li>• Biological drawings and labelling</li> <li>• Work with models</li> </ul> <p><i>For academically weaker learners use ready-made slides</i></p>
<p><b>P</b>2.1 Knowledge acquisition 2,7</p> <p><b>P</b>2.2 Communication</p>	<p><b>P</b>2.1 Knowledge acquisition 2,7</p> <p><b>P</b>2.2 Communication</p>	<p><b>P</b>2.1 Knowledge acquisition 2,7</p> <p><b>P</b>2.2 Communication</p>			

3,4,7	3,4,7	3,4,7			
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## 5.2 Vertebrates

They describe vertebrates in their diversity using selected examples. They appropriately represent their way of life and reproduction. They describe the responsible handling of pets and livestock on the basis of their knowledge. Learners know the typical characteristics of various vertebrate groups and describe the way in which vertebrates adapt to their environment. They can describe and evaluate the influence of human beings on their environment.

Competences			Contents	Time (2h)	Methods Curriculum
G2	M2	E2			
(1) describe and compare the habitude and body structure of two mammals which are kept as domestic animals or livestock (e.g. dog, cat, cattle, pig, horse)	(1) describe and compare the habitude and body structure of two mammals which are kept as domestic animals or livestock (e.g. dog, cat, cattle, pig, horse)	(1) describe and compare the habitude and body structure of two mammals which are kept as domestic animals or livestock (e.g. dog, cat, cattle, pig, horse)	Compare two species with regard to their skeleton, skull, teeth e.g. dog, horse and cow	7	<ul style="list-style-type: none"> <li><i>Animal profiles or project on species with internal differentiation</i></li> <li><i>Learning circles or station work with internal differentiation</i></li> </ul>
(2) describe the typical characteristics of mammals	(2) describe the typical characteristics of mammals	(2) describe the typical characteristics of mammals	teats, fur, placenta		
<p><b>P</b>2.1 Knowledge acquisition 8</p> <p><b>P</b>2.2 Communication 7</p>	<p><b>P</b>2.1 Knowledge acquisition 8</p> <p><b>P</b>2.2 Communication 7</p>	<p><b>P</b>2.1 Knowledge acquisition 8</p> <p><b>P</b>2.2 Communication 7</p>			
(3) describe appropriate husbandry of domestic animals using an example	(3) explain appropriate husbandry of domestic animals and livestock using an example (e.g. in terms of animal welfare)	(3) explain appropriate husbandry of domestic animals and livestock using an example (e.g. in terms of animal welfare)	Animal Welfare Act		<ul style="list-style-type: none"> <li>Significance of animal welfare</li> <li>Ball bearing</li> </ul>
(4) describe different forms of animal husbandry	(4) describe and evaluate different forms of animal husbandry (e.g. species-appropriate chicken husbandry)	(4) describe and evaluate different forms of animal husbandry (e.g. species-appropriate chicken husbandry)	e.g.: chicken husbandry: cage, barn and free range		<ul style="list-style-type: none"> <li>Round of discussions:</li> </ul>

<p>P2.2 Communication 6 P2.3 Evaluation 2.3 P2.1 Knowledge acquisition 10</p>	<p>P2.2 Communication 6 P2.3 Evaluation 2.3 P2.1 Knowledge acquisition 10</p>	<p>P2.2 Communication 6 P2.3 Evaluation 2.3 P2.1 Knowledge acquisition 10</p>			
<p>(5) describe the body structure and habitude of another indigenous mammal in terms of adaptability to their habitat (e.g. typical indigenous examples of predators, rodents and ungulates. Oryx - adaptation to desert life, bat - ultrasonic detection, golden mole - desert, wales or dolphins - marine mammals)</p>	<p>(5) describe the body structure and habitude of another indigenous mammal in terms of adaptability to their habitat (e.g. typical indigenous examples of predators, rodents and ungulates. Oryx - adaptation to desert life, bat - ultrasonic detection, golden mole - desert, wales or dolphins - marine mammals)</p>	<p>(5) describe and explain the body structure and habitude of another indigenous mammal in terms of adaptability to their habitat (e.g. typical indigenous examples of predators, rodents and ungulates. Oryx - adaptation to desert life, bat - ultrasonic detection, golden mole - desert, wales or dolphins - marine mammals)</p>	<p>Ultra sound detection  Adaptation to habitats</p>		<ul style="list-style-type: none"> <li>• Gallery walk</li> <li>• Animation of ultrasonic detection</li> </ul>
<p>P2.1 Knowledge acquisition 8 P2.2 Communication 1.2</p>	<p>P2.1 Knowledge acquisition 8 P2.2 Communication 1.2</p>	<p>P2.1 Knowledge acquisition 8 P2.2 Communication 1.2</p>			
<p>(6) describe the habitude and physical structure of birds and their feathers</p>	<p>(6) describe and compare the habitude and physical structure of birds and their feathers</p>	<p>(6) describe and compare the habitude and physical structure of birds and their feathers</p>	<p>General characteristics of birds Structure of a feather Adaptation of the bird's body to flight Light weight structure Forces during flying</p>	<p>6</p>	<ul style="list-style-type: none"> <li>• Animal profiles or projects on species</li> <li>• Designing a poster</li> <li>• Learning circle</li> <li>• Work in stations</li> <li>• Design index cards as learning aids</li> <li>• Example feathers under the microscope</li> <li>• Visit to the bird rehabilitation centre</li> </ul>

(7) describe the adaptation of birds to different habitats	(7) describe and explain the adaptation of birds to different habitats	(7) describe, explain and compare the adaptation of birds to different habitats	Adaptation to the habitat (beak and feet)		<ul style="list-style-type: none"> <li>Examination of a chicken egg</li> </ul>
(8) Describe the reproduction and development of birds. Describe the offspring (nidicolous, precocial). Describe the fertilisation and development in chicken.	(8) Describe the reproduction and development of birds. Describe and compare the type of offspring (nidicolous, precocial). Describe the fertilisation and development in chicken.	(8) Describe the reproduction and development of birds. Describe and compare the type of offspring (nidicolous, precocial). Describe the fertilisation and development in chicken.	Nidicolous, precocial  Fertilisation and development in chicken.		
<p>■ P2.1 Knowledge acquisition 1,9,8,10</p> <p>■ P2.2 Communication 1.2</p> <p>■ P 2.3 Evaluation 1</p>	<p>■ P2.1 Knowledge acquisition 1,9,8,10</p> <p>■ P2.2 Communication 1.2</p> <p>■ P 2.3 Evaluation 1</p>	<p>■ P2.1 Knowledge acquisition 1,9,8,10</p> <p>■ P2.2 Communication 1.2</p> <p>■ P 2.3 Evaluation 1</p>			
9) describe the adaptation of reptiles to their terrestrial habitude using a concrete example (internal fertilisation, keratinised skin, lung respiration)	9) describe the adaptation of reptiles to their terrestrial habitude using a concrete example (internal fertilisation, keratinised skin, lung respiration)	9) describe the adaptation of reptiles to their terrestrial habitude using a concrete example (internal fertilisation, keratinised skin, lung respiration)	reptiles as poikilotherm animals; thermo-regulation adaptation to the habitat dinosaurs - extinct reptiles	3	<ul style="list-style-type: none"> <li><u>Work at stations internally differentiated</u></li> <li>Profiles or designing a poster</li> <li>Prepare a quiz</li> <li>Carry out experiments on heat insulation</li> </ul>
<p>■ P2.2 Communication 6</p> <p>■ P2.3 Evaluation 1,3</p>	<p>■ P2.2 Communication 6</p> <p>■ P2.3 Evaluation 1,3</p>	<p>■ P2.2 Communication 6</p> <p>■ P2.3 Evaluation 1,3</p>			
10) describe typical characteristics of amphibians using an example. (respiration, reproduction and development in water)	10) describe typical characteristics of amphibians using an example. (respiration, reproduction and development in water metamorphosis of frogs)	10) describe typical characteristics of amphibians using an example. (respiration, reproduction and development in water metamorphosis of frogs)	habitude and development of the frog metamorphosis - from branchial (gill) to pulmonary (lung) respiration endangerment	2	films models
<p>■ P2.2 Communication 6</p> <p>■ P2.3 Evaluation 1,3</p>	<p>■ P2.2 Communication 6</p> <p>■ P2.3 Evaluation 1,3</p>	<p>■ P2.2 Communication 6</p> <p>■ P2.3 Evaluation 1,3</p>			

(11) describe the habitude and physical structure of fish	(11) describe the habitude and physical structure of fish	(11) describe and compare the habitude and physical structure of fish	Presentation of an example		<ul style="list-style-type: none"> <li>• Learning circle</li> <li>• <u>Stationwork with internal differentiation</u></li> <li>• Examination of a fish</li> <li>• Film</li> <li>• Model of gills</li> </ul>
12) describe the adaptation of fish their aquatic life using a concrete example. (locomotion, respiration and fertilisation)	12) describe the adaptation of fish their aquatic life using a concrete example. (locomotion, respiration and fertilisation)	12) describe the adaptation of fish their aquatic life using a concrete example. (locomotion, respiration and fertilisation)	Presentation of an example: habitude adaptation to the habitat	2	
<p><b>P</b>2.1 Knowledge acquisition 1,9,8,10</p> <p><b>P</b>2.2 Communication 1.2</p> <p><b>P</b> 2.3 Evaluation 1</p>	<p><b>P</b>2.1 Knowledge acquisition 1,9,8,10</p> <p><b>P</b>2.2 Communication 1.2</p> <p><b>P</b> 2.3 Evaluation 1</p>	<p><b>P</b>2.1 Knowledge acquisition 1,9,8,10</p> <p><b>P</b>2.2 Communication 1.2</p> <p><b>P</b> 2.3 Evaluation 1</p>			
13) describe the reproduction and development of fish, amphibians, reptiles, birds and mammals.	13) describe and compare the reproduction and development of fish, amphibians, reptiles, birds and mammals.	13) describe and compare the reproduction and development of fish, amphibians, reptiles, birds and mammals.	Comparison between different groups of vertebrates	3	
14) explain typical characteristics of vertebrate groups and assign species to the five vertebrate groups	14) explain typical characteristics of vertebrate groups and assign species to the five vertebrate groups	14) explain typical characteristics of vertebrate groups, assign species to the five vertebrate groups and provide reasons for the categorisation	Comparison between different groups of vertebrates		Animal quiz: Learners present animals to each other and let their peers categorise them Domino
<p><b>P</b>2.1 Knowledge acquisition 8</p> <p><b>P</b>2.2 Communication 3</p>	<p><b>P</b>2.1 Knowledge acquisition 8</p> <p><b>P</b>2.2 Communication 3</p>	<p><b>P</b>2.1 Knowledge acquisition 8</p> <p><b>P</b>2.2 Communication 3</p>			

## Grade 6

### 6.1. Plants

Learners describe plants as living organisms with their typical organs. They recognise the multitude of forms and the variety. They are able to characterise the structural and functional similarities and differences between different plants and plant families. They describe and explain the development of different forms of reproduction.

#### G2 – Basic level

#### M2 – Intermediate level

#### E2 – Advanced level

#### Learners are able to...

Competences			Contents	Time (2h)	Methods Curriculum
G2	M2	E2			
(1) name the typical organs of a flowering plant and describe their functions	(1) name the typical organs of a flowering plant and describe their functions	(1) name the typical organs of a flowering plant and describe their functions	Structure of flowering plants, also important examples of indigenous plants, plant organs, especially leaf function with overview photosynthesis	3	Working with magnifying glass and binocular Leaf characteristics for identification Visit to the botanical gardens
(2) plan, carry out and evaluate germination experiments	(2) plan, carry out and evaluate germination experiments	(2) plan, carry out and evaluate germination experiments	Germination experiment using a bean	2	Germination experiments: Light, heat and water
(3) examine the structure of a flower	(3) examine the structure of a flower	(3) examine the structure of a flower	Structure of a flower	2	Model of a flower <i>Create flower diagrams</i>
<p>2.1 Knowledge acquisition 1.6</p> <p>2.2 Communication 6</p>	<p>2.1 Knowledge acquisition 1.6</p> <p>2.2 Communication 6</p>	<p>2.1 Knowledge acquisition 1.6</p> <p>2.2 Communication 6</p>			
(4) describe sexual reproduction in plants (pollination, fertilisation, fruit development) and compare with asexual reproduction	(4) describe sexual reproduction in plants (pollination, fertilisation, fruit development) and compare with asexual reproduction	(4) describe sexual reproduction in plants (pollination, fertilisation, fruit development) and compare with asexual reproduction	From pollination to fruit offshoots, cuttings	3	Film Plant cuttings

P2.1 Knowledge acquisition 8	P2.1 Knowledge acquisition 8	P2.1 Knowledge acquisition 8			
(5) describe different ways of dispersal of seed and fruit carry out, record and evaluate experiments on this topic	(5) describe different ways of dispersal of seed and fruit carry out, record and evaluate experiments on this topic	(5) describe different ways of dispersal of seed and fruit carry out, record and evaluate experiments on this topic	Pollination, fertilisation and seed formation	1	<u>Learning circle on seed, fruit, wind and animals</u>
P2.1 Knowledge acquisition 1.3 P2.2 Communication 2	P2.1 Knowledge acquisition 1.3 P2.2 Communication 2	P2.1 Knowledge acquisition 1.3 P2.2 Communication 2			

## 6.2 Invertebrates

Learners present structural and functional similarities and differences within the group of invertebrates. They can describe their development. They describe and explain the adaptability of invertebrates using selected examples. Learners recognise the differences between the exoskeleton and the endoskeleton when comparing invertebrates with vertebrates. They get to know the diversity of invertebrates and use simple determination aids. Using insects as an example, they recognise their dependence on plants and animals and can estimate the consequences of disturbance by humans.

Competences			Contents	Time (2h)	Methods Curriculum
G2	M2	E2			
(1) name various invertebrates and assign them to an invertebrate group	(1) name various invertebrates and assign them to an invertebrate group	(1) name various invertebrates and assign them to an invertebrate group	Invertebrate phyla Classification of invertebrates on the basis of their skeleton exemplary arthropods (insects) arachnids, crustaceans, molluscs <b>Focus on insects</b>	3	Group puzzle Create a quartet
P2.1 Knowledge acquisition 8.9	P2.1 Knowledge acquisition 8.9	P2.1 Knowledge acquisition 8.9			
(2) describe the body structure of insects using an example (e.g. bees, ants, chafer beetle)	(2) describe the body structure of insects using an example (e.g. bees, ants, chafer beetle)	(2) describe the body structure of insects using an example (e.g. bees, ants, chafer beetle)	Structure of an insect - internal and external structure	1	<i>Profile of Namibian insects</i> Examination of an insect Film
(3)	(3)	(3) compare the body structure and the internal organs (e.g. respiratory system, circulatory system) of insects and vertebrates		1	
P2.1 Knowledge acquisition 1, 8	P2.1 Knowledge acquisition 1, 8	P2.1 Knowledge acquisition 1, 8			



(4) describe the complete transformation in insects	(4) describe the complete and incomplete transformation and explain metamorphosis as an adaptation	(4) describe the complete and incomplete transformation and explain metamorphosis as an adaptation	Development of insects (complete and incomplete metamorphosis)	2	Examination of an insect larva with the stereoscopic magnifier Roll play Poster creation Gallery walk
P2.1 Knowledge acquisition 1.8 P2.2 Communication 6	P2.1 Knowledge acquisition 1.8 P2.2 Communication 6	P2.1 Knowledge acquisition 1.8 P2.2 Communication 6			
(5) describe the adaption of insects (e.g. insect legs, mouth parts, flight muscles, state formation)	(5) describe the adaption of insects (e.g. insect legs, mouth parts, flight muscles, state formation)	(5) describe the adaption of insects (e.g. insect legs, mouth parts, flight muscles, state formation)	Locomotion and adaption of insect legs Insects are nutrition specialists - adaption of the mouth parts Honey bee and bee state Or termite as a state-building insect	4	<u>Work in stations</u> Practical examinations  Film/presentation Visit to a beekeeping (apiculture)
(6) explain the significance of insects for plant pollination and vice versa the dependence of insects on plants	(6) explain the significance of insects for plant pollination and vice versa the dependence of insects on plants	(6) explain the significance of insects for plant pollination and vice versa the dependence of insects on plants	Insects as pollinators	1	Presentation
P2.3 Evaluation 2.3	P2.3 Evaluation 2.3	P2.3 Evaluation 2.3			
(7)	(7) name four groups of invertebrates, assign local examples and justify.	(7) name four groups of invertebrates, assign local examples and justify.		1	<u>Draw up an identification key</u>
P2.1 Knowledge acquisition 8, 9	P2.1 Knowledge acquisition 8, 9	P2.1 Knowledge acquisition 8, 9			

### 6.3 Ecology

Learners examine a habitat. They can describe the interactions between organisms and describe and explain the adaption of selected organisms to the environment.

Learners are able to...

Competences			Contents	Time (2h)	Methods Curriculum
G2	M2	E2			
(1) identify some typical organisms of an indigenous outdoors habitat (desert) by means of a simple identification aid and group them.	(1) identify some typical organisms of an indigenous outdoors habitat (desert) by means of a simple identification aid and group them.	(1) identify some typical organisms of an indigenous outdoors habitat (desert) by means of a simple identification aid and group them.		1	
(2) ... name the composition and structure of an ecosystem with the diverse relationships between its inhabitants, using the Namib Desert as an example	(2) ... describe and explain the composition and structure of an ecosystem with the diverse relationships between its inhabitants, using the Namib Desert as an example	(2) ... describe and explain the composition and structure of an ecosystem with the diverse relationships between its inhabitants, using the Namib Desert as an example	Overview of the components of an ecosystem Characteristics of the life forms regarding adaption to the desert habitat - environmental factors Indigenous desert plants - adaption, Indigenous desert animals - adaption,	1	<b>one-week excursion to NADEET</b> (Environmental education centre in the desert)
(3) create a food chain in the desert	(3) create a food chain and a food web in the desert	(3) create and analyse a food chain and a food web in the desert	Food chain Food web	2	
<b>P</b> 2.1 Knowledge acquisition 1,6,8,9 <b>P</b> 2.2 Communication 6	<b>P</b> 2.1 Knowledge acquisition 1,6,8,9 <b>P</b> 2.2 Communication 6	<b>P</b> 2.1 Knowledge acquisition 1,6,8,9 <b>P</b> 2.2 Communication 6			

## 6.4 Human development

Learners can describe the individual development of the human being. They can describe the primary sexual organs of men and women and can describe the reproduction of humans. They describe and explain the physical and psychological changes during puberty.

*It would be ideal to synchronise biology lessons in the time table, so that, if necessary, the learning groups can be taught in separate groups according to gender.*

Competences			Contents	Time (2h)	Methods Curriculum
G2	M2	E2			
(1) name the human sexual organs using specialist terminology and describe their function	(1) name the human sexual organs using specialist terminology and describe their function	(1) name the human sexual organs using specialist terminology and describe their function	Sexual organs in men and women	2	Use models
P2.1 Knowledge acquisition 8 P2.2 Communication 6,7	P2.1 Knowledge acquisition 8 P2.2 Communication 6,7	P2.1 Knowledge acquisition 8 P2.2 Communication 6,7			
(2) name the physical and psychological changes during puberty	(2) describe the physical and psychological changes during puberty	(2) describe the physical and psychological changes during puberty and name the sex hormones as the cause for the changes.	Psychological and physical changes during puberty	1	
P2.1 Knowledge acquisition 1.8 P2.2 Communication 4	P2.1 Knowledge acquisition 1.8 P2.2 Communication 4	P2.1 Knowledge acquisition 1.8 P2.2 Communication 4			
(3) name the basics of human sexual reproduction (gametes, procreation, fertilisation, pregnancy, birth)	(3) describe the basics of human sexual reproduction (gametes, procreation, fertilisation, pregnancy, birth)	(3) describe the basics of human sexual reproduction (gametes, procreation, fertilisation, pregnancy, birth)	Development of primary and secondary sexual characteristics under consideration of hormonal influences	1	films
P2.1 Knowledge acquisition 1 P2.2 Communication 7	P2.1 Knowledge acquisition 1 P2.2 Communication 7	P2.1 Knowledge acquisition 1 P2.2 Communication 7			

(4) describe the course and periodic intervals of the menstrual cycle	(4) describe the course and periodic intervals of the menstrual cycle	(4) describe the course and periodic intervals of the menstrual cycle	Menstrual cycle and the consequences	1	Tablet: Menstrual calendar Introduction of an app for smart devices
P2.2 Communication 4, 7	P2.2 Communication 4, 7	P2.2 Communication 4, 7			
(5) Name and justify measures of intimate hygiene	(5) Name and justify measures of intimate hygiene	(5) Name and justify measures of intimate hygiene	Intimate hygiene in men and women	1	Allocation of learners into learning groups
P2.2 Communication 4 P2.3 Evaluation 2.3	P2.2 Communication 4 P2.3 Evaluation 2.3	P2.2 Communication 4 P2.3 Evaluation 2.3			

**Commands in Biology, Physical Sciences and Chemistry**Source: [http://www.kmk.org/fileadmin/pdf/Bildung/Auslandsschulwesen/Kerncurriculum/Bio-Ch-Ph\\_Operatorenliste\\_Januar\\_2012.pdf](http://www.kmk.org/fileadmin/pdf/Bildung/Auslandsschulwesen/Kerncurriculum/Bio-Ch-Ph_Operatorenliste_Januar_2012.pdf)

<b>Operator</b>	<b>Beschreiben der erwarteten Leistung</b>	<b>AFB</b>
ableiten	auf der Grundlage von Erkenntnissen sachgerechte Schlüsse ziehen	II
abschätzen	durch begründete Überlegungen Größenordnungen angeben	II
analysieren	systematisches Untersuchen eines Sachverhaltes, bei dem Bestandteile, dessen Merkmale und ihre Beziehungen zueinander erfasst und dargestellt werden	II
anwenden	einen bekannten Zusammenhang oder eine bekannte Methode auf einen anderen Sachverhalt beziehen	II
aufstellen von Hypothesen	eine begründete Vermutung formulieren	III
auswerten	Daten, Einzelergebnisse oder andere Elemente in einen Zusammenhang stellen, gegebenenfalls zu einer Gesamtaussage zusammenführen und Schlussfolgerungen ziehen	III
begründen	Sachverhalte auf Regeln, Gesetzmäßigkeiten bzw. kausale Zusammenhänge zurückführen	III
benennen	Begriffe und Sachverhalte einer vorgegebene Struktur zuordnen	I
berechnen	rechnerische Generierung eines Ergebnisses	II
beschreiben	Sachverhalte wie Objekte und Prozesse nach Ordnungsprinzipien strukturiert unter Verwendung der Fachsprache wiedergeben	II
bestimmen	rechnerische, grafische oder inhaltliche Generierung eines Ergebnisses	I
beurteilen, bewerten	zu einem Sachverhalt eine selbstständige Einschätzung nach fachwissenschaftlichen und fachmethodischen Kriterien formulieren	III
beweisen	mit Hilfe von sachlichen Argumenten durch logisches Herleiten eine Behauptung/Aussage belegen bzw. widerlegen	III
darstellen	Sachverhalte, Zusammenhänge, Methoden, Ergebnisse etc. strukturiert wiedergeben	I
definieren	die Bedeutung eines Begriffs unter Angabe eines Oberbegriffs und invarianter (wesentlicher, spezifischer) Merkmale bestimmen	III

<b>Operator</b>	<b>Beschreiben der erwarteten Leistung</b>	<b>AFB</b>
diskutieren	Argumente zu einer Aussage oder These einander gegenüberstellen und abwägen	III
dokumentieren	alle notwendigen Erklärungen, Herleitungen und Skizzen darstellen	I
entwerfen/planen (Experimente)	zu einem vorgegebenen Problem eine Experimentieranordnung finden und eine Experimentieranleitung erstellen	III
erklären	Strukturen, Prozesse, Zusammenhänge, usw. des Sachverhaltes erfassen und auf allgemeine Aussagen/Gesetze zurückführen	II
erläutern	wesentliche Seiten eines Sachverhalts/Gegenstands/Vorgangs an Beispielen oder durch zusätzliche Informationen verständlich machen	II
herleiten	aus Größengleichungen durch mathematische Operationen eine physikalische Größe freistellen und dabei wesentliche Lösungsschritte kommentieren	II
interpretieren/deuten	Sachverhalte, Zusammenhänge in Hinblick auf Erklärungsmöglichkeiten untersuchen und abwägend herausstellen	III
klassifizieren,ordnen	Begriffe, Gegenstände etc. auf der Grundlage bestimmter Merkmale systematisch einteilen	II
nennen	Elemente, Sachverhalte, Begriffe, Daten, Fakten ohne Erläuterung wiedergeben	I
protokollieren	Ablauf, Beobachtungen und Ergebnisse sowie ggf. Auswertung (Ergebnisprotokoll, Verlaufsprotokoll) in fachtypischer Weise wiedergeben	I
skizzieren	Sachverhalte, Objekte, Strukturen oder Ergebnisse auf das Wesentliche reduziert (vereinfacht) übersichtlich darstellen	I
untersuchen	Sachverhalte/Objekte erkunden, Merkmale und Zusammenhänge herausarbeiten	II
verallgemeinern	aus einem erkannten Sachverhalt eine erweiterte Aussage formulieren	II
vergleichen	Gemeinsamkeiten und Unterschiede von Sachverhalten, Objekten, Lebewesen und Vorgängen ermitteln	II
zeichnen	eine exakte Darstellung beobachtbarer oder gegebener Strukturen anfertigen	I
zusammenfassen	das Wesentliche in konzentrierter Form darstellen	II

## **Assessment criteria:**

### **Performance assessment in biology at German schools abroad in Southern Africa**

Methodologically new, competence- and action-oriented teaching necessarily requires a new understanding of the concept of learning and new forms of performance evaluation. This includes, for example, observation sheets such as learner self-assessments, presentation assessments (by learners and teachers).

In addition to conventional performance assessment (class tests, short tests, presentations, oral participation, projects), it is therefore important to consider the following aspects:

#### **Assessment of work processes**

Process assessment included:

- observation of working and learning attitude
- observation of group processes

#### **Assessment of presentations**

This includes e.g.

- projects
- presentations
- learner acts as the teacher

#### **Evaluation of learning and work results**

Examples include:

- written documentation of presentations
- creating posters/models
- compiling reports on experiments

For transparent performance assessment, it is advisable to develop assessment criteria together with the learners, or at least introduce them in an understandable way.

Work quality should be assessed according to criteria such as openness and flexibility in preparing a presentation or learning product and the communicative character and reflexivity of the learner.

## **Evaluation standards and indicators for verification of learning outcomes**

Evaluation standards for biology in grades 5 to 9 are based on different areas of competence. These include methodological competence, interpretation and analytic skills, as well as judgment and orientation skills.

Differentiated assessment of the learner's performance is ensured by developing uniform standards for performance assessment and transparent criteria. Work processes are evaluated (e.g. by observing the learning behaviour in group sessions), as well as written and oral class performance in class tests, short tests, projects, oral participation and presentations. Individual learning processes of learners are also taken into account in performance assessment. Proficiency in the subject language and compliance and compliance with linguistic norms and formal aspects are also included in the performance assessment.

Evaluation of methodological competence includes teamwork, appropriate problem awareness, methodological skills, acquisition and processing of information, independence and presentation of results. Important aspects of interpretation and analysis competence are differentiation, perspective and appropriateness of content, as well as completeness and classification. Furthermore, learners should be able to pass a reflected judgment. Justification and multi-perspectivity or controversy in argumentation plays a decisive role in this regard.

Written performance in the junior secondary section (grades 5 to 9) is assessed by means of class tests. Presentation and quality of homework are evaluated to determine oral performance, in particular the quality of collaboration in class (including group and project work) (see above). Grades 5 to 9 write at least one class test per semester. The written mark counts 50% of the overall mark.

The following aspects are particularly important for determining the oral and written mark:

- correctness in relation to the subject
- knowledge of subject language and methods
- logical consistency and linkage of statements
- degree of complexity, multi-perspectivity or controversy in argumentation
- scope of independence
- conceptual clarity
- compliance with standard norms and formal aspects

Due to different time tables, proposed times are approximate for each topic.



## Internal differentiation

Not only the two co-existing school degrees NSSC and DIA require differentiated teaching, but also the high number of different mother tongues and ethnicities at our school. There is no grade, no class and almost no course at DHPS at which the same conditions can be expected for learners, therefore internal differentiation is the minimum requirement to meet our learner's needs.

Of course, biology is no exception. The linguistic standard of the official language English offers a wide spectrum, so that the learning requirements among the learners of our school are sufficiently homogeneous.

All these factors contribute to the fact that DHPS teachers must have a broad repertoire of internally differentiated methods, in order to meet the daily challenges.

The following table from the DIA guidelines can be used as an assessment grid:

100 -95%	94 -90%	89 -85%	84 -80%	79 -75%	74 -70%	69 -65%	64 -60%	59 -55%	54 -50%	49 -45%	44 -40%	39 -34%	33 -27%	26 -20%	19 -0%
1		2			3			4			5			6	

### List of commands:

[https://www.kmk.org/fileadmin/Dateien/pdf/Bildung/Auslandsschulwesen/Kerncurriculum/engl\\_Operatoren\\_Ph\\_Ch\\_Bio\\_25\\_Maerz\\_2014.pdf](https://www.kmk.org/fileadmin/Dateien/pdf/Bildung/Auslandsschulwesen/Kerncurriculum/engl_Operatoren_Ph_Ch_Bio_25_Maerz_2014.pdf)