Linz International School Auhof

Biology Syllabus Grades 5-12

General information:

Biology is a compulsory subject for all students of all 9 grades at LISA Economics and all but 7th grade for LISA Languages. The number of lessons per week varies from grade to grade- The course is based on the Austrian syllabus. All topics of grades 9-12 are also part of the IBO Biology syllabus for the final examination at the end of year 8 (12th grade).

Biology Year 1:

- Human body: Muscles and bones, digestive system, circulatory system, reproduction
- Animals: Vertebrates, presentations

Biology Year 2

- Plant fertilisiation & germination, plant structure
- Different flowers of the spring
- Food chains and webs
- Ecosystem wood
- Tree diary
- Invertebrates

Biology Year 3

- Different ecoxystems (e.g. dessert, coral riff, tundra…)
- Evolution

Grade 5:

Different environmental aspects (e.g. conservation, environmentalism, recycling, endangered species, etc.) are being introduced at a very basic level.
Due to the language barrier which many students experience, progress in year 1 (grade 5) is slower than in regular classes. Thus it happens often that topic 3 has to be moved to grade 6 as the students' English skills have greatly improved by then.

1. You and your body

a) Humans and movement: bones, joints, muscles
b) Humans and their environment: sense organs (skin, eyes, ears,…)
c) Humans and energy: nutrition and digestion
d) Humans and reproduction :sex organs, puberty, pregnancy, birth

2. Vertebrates

a) Comparison of different groups of vertebrates (mammals, birds, reptiles, amphibia, fish)

b) Mammals: common characteristics
   Dog family
   Cat family
   Cattle
   Pigs and boars
   Horses
   Different lifestyle adaptions: hedgehogs, moles, bats, beavers
c) Birds: different ways of flying
   From egg to chick; bird reproduction
   Adaption to different lifestyles: migratory birds, birds of prey, owls, water fowl
   Birds and conservation

d) Reptiles: amphibians and fish
   Comparison blindworm-snake
   Turtles: do they make good pets?
   Adaptions to different habitats

3. Flowering Plants:

Structure of a flowering plant
Basic plant reproduction
How are plants important to us?

Grade 6:

Different environmental aspects (e.g. biotic and abiotic factors, ecological niches, homoiostasis, food chains and webs, etc.) are being introduced at a basic level

1. Ecosystem forest

a) General review and introduction of new ecological terms: food chain, food web, energy,…
b) Light and other ecological factors in forests
c) The role of trees in forests
d) Life cycle of fungi, moss and trees
e) Basic introduction to photosynthesis

2. Invertebrates

a) Earth worms and their relatives
b) Mollusks: slugs and snails (large garden snail,…)
c) Spiders: common characteristics and adaptions to different life styles
d) Insects. Common characteristics, body structure, different adaptions to different life styles:
e) Social insects: Honey bees, ants (advantages and disadvantages of social behavior, importance in ecosystems and for fruit production)

3. Invisible Life

a) Parts and function of the microscope
b) Cells: building blocks of life
c) Bacteria
d) Mocroscopic investigations of prepared and self-made specimen of pond water and hay tea
e) Amoeba, slipper animal and eye animal as representatives of protoctists
f) Dangerous one-celled organisms (bacteria and food, diseases, …)

Grade 7:

For LISA Economics only!
Different environmental aspects (e.g. ecological niches, homoiostasis, food chains and webs, etc.) are being re-introduced.
Earth science and geology of Austria are topics of the Austrian syllabus but are covered by the compulsory subject Geography.

1. Ecosystems/Biomes

a) General review and introduction of new ecological terms: pyramid of numbers, food web, energy, nutrient cycles,…
b) Light and other ecological factors
c) General overview of world biomes (seas, mountains, deserts, temperate, boreal and rain forests, tundra, …)
d) Some of the above mentioned biomes are studied in detail (internet/library research and student presentations)

2. Man-made ecosystems

a) Meadows. Do they only consist of grasses?
b) Different types of meadows
c) Secondary ecosystems: gravel pits, road construction sites, …
d) Ponds

3. Soil

a) Soil as ecosystem: soil life
b) Soil formation and soil types and profiles
c) Investigating different soil types
d) Dangers to soil: erosion and possible actions against erosion
e) Ecological importance of soil

Grade 8:

1. The human body

a) Our body in motion: Is sport healthy? Physiology of movement and energy
b) Health and your body:
   Nutrition, digestion, excretion, respiration, circulatory system, immune system
c) Stimulus and response: sense organs, transfer and coordination of information (the nervous system)
d) Sexuality and reproduction: human sexuality, sex organs and their fumction, pregnancy and birth

2. Introduction to Genetics

a) What is genetics?
b) Basic principles of heredity
c) How is genetics useful to humans?

3. Evolution

a) What is evolution?
b) Fossils and why and where they exist
c) Evolution of modern horses
d) Evolution of humans

4. Ecosystem City

a) ecological niches in cities
b) abiotic factors in city ecosystems (climate, soil, water;…)

5. Ecosystem Ocean/Sea

(only for LISA Languages! Was already covered in grade 7 in LISA Economics classes!)

a) Diversity of life in oceans
b) Different ecological niches in ocean ecosystems (coastal areas, deep sea, …)
c) Reefs as special ecosystems
d) Dangers to marine ecosystems (overfishing, pollution, extinction,…)

Grade 9:

1. Cytology

a) Characteristics of organisms
b) Cells as basic units of life
c) Microstructure of cells: electron micrographs, membranes, organelles, ...
d) Transport in cells: diffusion, osmosis, active and passive transport, endo-and exocytosis
e) Prokaryots and eukaryots: blue algae, bacteria, protoctists
f) Biodiversity of microorganisms

2. Energy and metabolism

a) Enzymes and cellular metabolism: proteins, enzymes, molecules of life
b) Energy and cells: homoiostasis, ATP...
c) Plant metabolism: plants and water, roots, transport in plants, plants and temperature, plants and soil, plants and light (baic introduction of photosynthesis)

3. Animal metabolism

a) Forms of nutrition in animals and humans
b) Digestion and absorption of mutrients
c) Parasites
d) Blood and circulatory systems in animals: invertebrates, vertebrates, humans
e) Respiration: gills, lungs, tracheal system in insects, breathing in molluscs, crustacea and spiders
f) Excretion: invertebrate excretion, human kidney

4. Biotechnology and food production

a) Fermentation: alcoholic and lactic acid fermentation in food production
b) Acetic acid fermentation
c) Antibiotics
d) Cell cultures
e) Enzyme technology
f) Composting
g) Water treatment plants

5. Humans and Health

a) Nutrition: different forms of nutrition (vegan, vegetarian, ...)
b) Health problems related to nutrition: gout, diabetes, adipositas, eating disorders,...)

Grade 10:

1. Sexuality- a biological phenomenon

a) Meiosis, fertilisation and embryo development in different animal species
b) Sexual and asexual reproduction, gamete formation

2. Human Sexuality

a) Hormonal control
b) Gamete formation, fertilisation, embryo development, pregnancy and birth
c) Contraception and abortion

3. Defense system

a) Pathogen: viruses, bacteria, protoctists, worms, fungi...
b) Ways of protection: nonspecific and specific response; antibody formation
c) The lymphatic system
d) Blood groups
e) Autoimmune reactions
f) Allergies
g) Sexually transmitted diseases: HIV/AIDS; syphilis, ...

4. Drugs and drug dependence

a) Biological and synthetic drugs
b) Smoking and health risks
c) Alcohol and health risks
d) Endorphine mechanism
e) Drug use and dependence

Grade 11:

In grades 11 and 12 Biology is taught in the form of a course system (4 teaching lessons for 1 third of the school year). Thus it is not possible to choose Biology as a subject for the Austrian final exam (Matura) without also signing up for Biology Standard or Higher Level courses.

1. Neurobiology

a) Neurobiology: structure and function of motor and sensor neurones
b) Structure and function of the human eye
c) Structure and function of the human ear
d) Neurotransmitters and synapses

2. Behavior

a) Forms of behavior: innate, learned,…
b) Social organisation: honey bee colonies, social behavior in vertebrates,…

3. Ecology

a) Communities and ecosystems
b) The greenhouse effect
c) Populations
d) Human impact on ecosystems

Grade 12:

See grade 11!

1. Genetics

a) Chromosomes, genes, alleles and mutations
b) Meiosis
c) Theoretical genetics
d) Genetic engineering and biotechnology
e) Mutations

2. Evolution

a) origin or life on Earth
b) theories of evolition
c) natural selection
d) Evidence for evolution
e) Human evolution

The International Baccalaureate (IB) Diploma Program

The syllabus for the Diploma Programme biology course is divided into three parts: the core, the additional higher level material (AHL) and the options. A syllabus overview is provided below.

Core : 80 Teaching hours

Topic 1: Statistical analysis 2
Topic 2: Cells 12
2.1 Cell theory 3
2.2 Prokaryotic cells 1
2.3 Eukaryotic cells 3

2.4 Membranes 3
2.5 Cell division 2
Topic 3: The chemistry of life 15
3.1 Chemical elements and water 2
3.2 Carbohydrates, lipids and proteins 2
3.3 DNA structure 1
3.4 DNA replication 1
3.5 Transcription and translation 2
3.6 Enzymes 2
3.7 Cell respiration 2
3.8 Photosynthesis 3
Topic 4: Genetics 15
4.1 Chromosomes, genes, alleles and mutations 2
4.2 Meiosis 3
4.3 Theoretical genetics 5
4.4 Genetic engineering and biotechnology 5
Topic 5: Ecology and evolution 16
5.1 Communities and ecosystems 5
5.2 The greenhouse effect 3
5.3 Populations 2
5.4 Evolution 3
5.5 Classification 3
Topic 6: Human health and physiology 20
6.1 Digestion 3
6.2 The transport system 3
6.3 Defence against infectious disease 3
6.4 Gas exchange 2
6.5 Nerves, hormones and homeostasis 6
6.6 Reproduction 3

AHL: 55 **Teaching hours**

Topic 7: Nucleic acids and proteins 11
7.1 DNA structure 2
7.2 DNA replication 2
7.3 Transcription 2
7.4 Translation 2
7.5 Proteins 1
7.6 Enzymes 2
Topic 8: Cell respiration and photosynthesis 10
8.1 Cell respiration 5
8.2 Photosynthesis 5
Topic 9: Plant science 11
9.1 Plant structure and growth 4
9.2 Transport in angiospermophytes 4
9.3 Reproduction in angiospermophytes 3
Topic 10: Genetics 6
10.1 Meiosis 2
10.2 Dihybrid crosses and gene linkage 3
10.3 Polygenic inheritance 1

Topic 11: Human health and physiology 17
11.1 Defence against infectious disease 4
11.2 Muscles and movement 4
11.3 The kidney 4
11.4 Reproduction 5

Standard Level (SL)Options SL

Option A: Human nutrition and health (15 Teaching hours)

A1 Components of the human diet 5
A2 Energy in human diets 4
A3 Special issues in human nutrition 6

Option E: Neurobiology and behaviour (15 Teaching hours)

E1 Stimulus and response 2
E2 Perception of stimuli 4
E3 Innate and learned behaviour 4
E4 Neurotransmitters and synapses 5

Higher Level (HL) Options

Option E: Neurobiology and behaviour (22 Teaching hours)

E1 Stimulus and response 2
E2 Perception of stimuli 4
E3 Innate and learned behaviour 4
E4 Neurotransmitters and synapses 5
E5 The human brain 4
E6 Further studies of behaviour 3

Option H: Further human physiology (22 Teaching hours)

H1 Hormonal control 3
H2 Digestion 4
H3 Absorption of digested foods 2
H4 Functions of the liver 3
H5 The transport system 5
H6 Gas exchange 5