Sciences Course Outline

Overview

Science classes in VIS take a holistic approach to teaching by incorporating real world activities into learning. Students will learn the importance of science and the scientific process in the local and global communities as well as how to understand and communicate this knowledge.

Students study an integrated sciences course in the form of units of work. These will include concepts and principals commonly identified as belonging to Physics, Biology, Chemistry, Earth science and Astronomy. The purpose is to develop a keen interest in and appreciation of science in the world around us. This will be achieved by: developing a thorough working knowledge of the how to carry out a scientific investigation, building upon students' scientific knowledge, developing concepts and understandings which allow students to become scientific thinkers, developing students' thinking skills in recognising variables and their values as well as the concept of systems and subsystems, familiarising students with investigation materials and procedures, building the group collaboration and teamwork skills necessary for rich and challenging learning activities.

Students will practice the IB Learner Profile traits and understand how these traits are important in the scientific community. Scientists must follow ethical and professional considerations when conducting investigations therefore scientists are principled. Scientists are open-minded and risk takers because they are open to exploring new approaches to problems. Science is dynamic and is constantly changing. Reflection is a critical component of the scientific approach. Validation of scientific knowledge comes through peer review utilizing effective communication skills and collaboration. Scientists use the scientific approach to gain knowledge. Science is inquiry.

Students will participate in many different hands on experiments and work in different group formations to seek answers to a variety of different scientific questions and situations.

The A*pproaches To Learning* are key to each unit as the final assessment task will focus on one or a set of related skills such as research for a presentation, or making observations & measurements for a lab report. Using one of the *Global Contexts* to focus each unit allows students to place learning in context and help students to develop attitudes and values based on knowledge and skills.

Aims of the Sciences Course*

The aims of the teaching and study of MYP sciences are to encourage and enable students to:

1. develop curiosity, interest and enjoyment of science and its methods of inquiry
2. understand and appreciate science and its implications
3. consider science as a human endeavour with benefits and limitations
4. acquire scientific knowledge and understanding
5. communicate scientific ideas, arguments and practical experiences effectively in a variety of ways
6. develop skills to design and perform investigations, evaluate evidence and reach conclusions
7. cultivate analytical, inquiring and flexible minds that pose questions, solve problems, construct explanations and judge arguments
8. observe safety rules and practices
9. make informed choices
10. appreciate that scientific knowledge is evolving through collaborative activity locally and internationally
11. appreciate the relationship between science and technology and their role in society
12. develop awareness of the moral, ethical, social, economic, political, cultural and environmental implications of the practice and use of science and technology
13. develop sensitivity towards the living and non-living environments
14. build an awareness of the need to effectively collaborate and communicate
15. apply language skills and knowledge in a variety of real-life contexts

The content and illustrative material used for the 'Units of Work' are taken from the Lithuanian National Curriculum materials and are matched to the MYP objectives appropriate to the age level and complexity of the material concerned;

*MYP Objectives & Interim Objectives**

A: Knowing and Understanding

Grade 6	Grade 8	Grade 10
At the end of the first year, students should be able to:	***At the end of the third year, students should be able to:***	***At the end of the fifth year, students should be able to:***
i. ***outline*** scientific knowledge	i. ***describe*** scientific knowledge	i. ***explain*** scientific knowledge
ii. ***apply*** scientific knowledge and understanding to ***solve problems*** set in familiar situations and ***suggest solutions*** to problems set in ***unfamiliar*** situations	ii. ***apply*** scientific knowledge and understanding to ***solve problems*** set in familiar ***and unfamiliar situations***	ii. ***apply*** scientific knowledge and understanding to ***solve problems*** set in familiar and ***unfamiliar situations***
iii. ***interpret*** information to make ***scientifically supported judgments***	iii. ***analyse*** information to make ***scientifically supported judgments***	iii. ***analyse*** and ***evaluate*** information to make ***scientifically supported judgments***

B: Inquiring and Designing

Grade 6	Grade 8	Grade 10
At the end of the first year, students should be able to:	***At the end of the third year, students should be able to:***	***At the end of the fifth year, students should be able to:***
i. ***outline*** an appropriate problem or research question to be tested by a ***scientific investigation***	i. ***describe*** a problem or question to be tested by a ***scientific investigation***	i. ***explain*** a problem or question to be tested by a ***scientific investigation***
ii. ***outline*** a ***testable prediction*** using scientific ***reasoning***	ii. ***outline*** a testable ***hypothesis*** and ***explain*** it using scientific ***reasoning***	ii. ***formulate*** a testable ***hypothesis*** and ***explain*** it using scientific reasoning
iii. ***outline*** how to ***manipulate the variables***, and ***outline*** how data will be collected	iii. ***describe*** how to ***manipulate the variables***, and ***describe*** how data will be collected	iii. ***explain*** how to ***manipulate the variables***, and ***explain*** how data will be collected
iv. ***design*** scientific investigations	iv. ***design*** scientific investigations	iv. ***design*** scientific investigations

C: Processing and Evaluating

Grade 6	Grade 8	Grade 10
At the end of the first year, students should be able to:	***At the end of the third year, students should be able to:***	***At the end of the fifth year, students should be able to:***
i. ***present*** collected and transformed data .	i. ***present*** collected and transformed data	i. ***present*** collected and transformed data
ii. ***interpret*** data and ***outline*** results using scientific reasoning	ii. ***interpret*** data and ***describe*** results using scientific reasoning	ii. ***interpret*** data and ***explain*** results using scientific reasoning
iii. ***discuss*** the validity of a prediction based on the outcome of the scientific investigation	iii. ***discuss*** the validity of a hypothesis based on the outcome of the scientific investigation	iii. ***evaluate*** the validity of a hypothesis based on the outcome of the scientific investigation
iv. ***discuss*** the validity of the method	iv. ***discuss*** the validity of the method	iv. ***evaluate*** the validity of the method
v. ***describe*** improvements or extensions to the method	v. ***describe*** improvements or extensions to the method	v. ***explain*** improvements or extensions to the method

D: Reflecting on the Impact of Science		
Grade 6	**Grade 8**	**Grade 10**
At the end of the first year, students should be able to:	***At the end of the third year, students should be able to:***	***At the end of the fifth year, students should be able to:***
i. ***summarize*** the ways in which science is applied and used to address a specific problem or issue	i. ***describe*** the ways in which science is applied and used to address a specific problem or issue	i. ***explain*** the ways in which science is applied and used to address a specific problem or issue
ii. ***describe*** and ***summarize*** the various implications of the use of science and its application in solving a specific problem or issue	ii. ***discuss*** and ***analyse*** the various implications of the use of science and its application in solving a specific problem or issue	ii. ***discuss*** and ***evaluate*** the various implications of the use of science and its application in solving a specific problem or issue
iii. ***apply*** scientific language ***effectively***	iii. ***apply*** scientific language ***effectively***	iii. ***apply*** scientific language ***effectively***
iv. ***document*** the work of others and sources of information used.	iv. ***document*** the work of others and sources of information used.	iv. ***document*** the work of others and sources of information used.

Grade 6 science topics include:

- *Our senses*
- *Cells, microscopes and body systems*
- *Ecosystems, food chains, food webs, water cycle*
- *Interdependence & Adaptation*
- *Elements, states of matter and changing state*
- *Properties of materials, simple acids and bases*
- *Investigations and measurement*
- *Earth science*
- *Volcanoes and earthquakes*
- *Introduction to forces*
- *Variables and values*
- *Systems and subsystems*

Grade 7 science topics include:

- *Solar system cycles and the universe*
- *Scale modelling*
- *Patterns in the periodic table*
- *Molecules, mixtures and compounds*
- *Behaviour of particles and gas laws*
- *Electricity and simple electromagnetism*
- *Waves, light and reflection*
- *Photosynthesis*

Grade 8 science topics include:

- *Waves, sound and applications of echolocation*
- *How systems communicate and homeostasis*
- *Motion, speed and measurement*
- *Designing experiments*
- *The language of chemistry*
- *Communicating in science*
- *Understanding visual information*
- *Density applications*

Grade 9 science topics include:

- *Genetics, DNA & Mendel*
- *Oxygen, carbon and nitrogen cycles*
- *Biotech and genetic modification of food, plants and animal*
- *Common chemical reactions*
- *Energy*
- *Resistivity & Ohm's law*

Grade 10 science topics include:

- *Reactivity series in metals*
- *Power generation and electromagnetism*
- *Heat and thermal effects*
- *Evloution and biodiversity*
- *Newtons Laws of motion*
- *Microorganisms and disease*

*Assessment**

A variety of assessment methodologies are used within MYP Science. Included in the list of age-appropriate strategies, employed in age-appropriate ways, depending upon the topics being studied, are the following:

- Examinations, written essay work, and the processing and analysis of raw data
- Practical assignments: case studies, field studies, and other opportunities for students to make scientifically supported judgements.
- Presentations: debates and research projects
- Teacher observation of students working individually and in groups
- Investigations: open-ended investigations, online investigations, thinking skills activities, data gathering/ processing and presentation
- Modelling scientific concepts

Overall student achievement in Science is assessed against the following six criteria (modified to suit the complexity of the task and age group of the students):

A. Knowing & Understanding: Tests or exams must be assessed using this objective. To reach the highest level students must make scientifically supported judgments about the validity and/or quality of the information presented to them. Assessment tasks could include questions dealing with "scientific claims" presented in media articles, or the results and conclusions from experiments carried out by others, or any question that challenges students to analyse and examine the information and allows them to outline arguments about its validity and/or quality using their knowledge and understanding of science

B. Inquiring and Designing: When students design a scientific investigation they should develop a method that will allow them to collect sufficient data so that the problem or question can be answered. To enable students to design scientific investigations independently, teachers must provide an open-ended problem to investigate. An open-ended problem is one that has several independent variables appropriate for the investigation and has sufficient scope to identify both independent and controlled variables. In order to achieve the highest level for the strand in which students are asked to design a logical, complete and safe method, the student would include only the relevant information, correctly sequenced.

C. Processing and Evaluating: Students collect, process and interpret qualitative and/or quantitative data, and explain conclusions that have been appropriately reached. MYP sciences helps students to develop analytical thinking skills, which they can use to evaluate the method and discuss possible improvements or extensions.

D. Reflecting on the Impacts of Science: Students gain global understanding of science by evaluating the implications of scientific developments and their applications to a specific problem or issue. Varied scientific language will be applied in order to demonstrate understanding. Students are expected to become aware of the importance of documenting the work of others when communicating in science.

Students must reflect on the implications of using science, interacting with one of the following factors: moral, ethical, social, economic, political, cultural or environmental, as appropriate to the task. The student's chosen factor may be interrelated with other factors.

Students achieve a level from 1-8 in each criterion (A-D) and these are added together (max. 32 points) to calculate the Final Achievement Level using the following table.

MYP Final achievement Level	***1***	***2***	***3***	***4***	***5***	***6***	***7***
Total mark/32	***1-5***	***6-9***	***10-14***	***15-18***	***19-23***	***24-27***	***28-32***

In order for parents and students to appreciate grades in familiar contexts please see the tables below.

MYP Final achievement Level	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Lithuanian system grades /10	***1-2***	***3***	***4-5***	***6***	***7-8***	***9***	***10***

MYP Final achievement Level	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Letter grades	***F***	***E***	***D***	***C-C+***	***B-B+***	***A***	***A+***

* ***All information is taken from the IB MYP Sciences Guide for 2014***