ISZL Science Scope and Sequence

This document should be read in conjunction with supporting information in the IB Primary Years Programme Science Scope and Sequence (2008).

At ISZL, science is integrated and taught within the programme of inquiry. This scope and sequence aims to provide information about learning in the subject area of science through the transdisciplinary programme of inquiry, identifying the units of inquiry that provide authentic opportunities for science learning. The scope and sequence is a tool to support teaching, learning and assessment of science within the context of units of inquiry.

The science component of the PYP should be driven by concepts and skills rather than by content. However, schools should ensure that a breadth and balance of science content is covered through the units of inquiry. The knowledge component of science in the PYP is arranged into four strands: living things, Earth and space, materials and matter, and forces and energy. In addition to these strands, students will have the opportunity to identify and reflect on “big ideas” by making connections between the questions being asked and the concepts that drive the inquiry, both key concepts and science related concepts that provide further understanding of the subject.

(IB Primary Years Programme Science Scope and Sequence, 2008, p.3-4)

For planning purposes, at ISZL, the conceptual understandings, knowledge and skills referenced in this scope and sequence are transferred directly onto the unit of inquiry planners (Managebac), into the ‘learning goals’ section.

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Overall expectations for 3-5 year olds: Students will develop their observational skills by using their senses to gather and record information and they will use their observations to identify simple patterns, make predictions and discuss their ideas. They will explore the way objects and phenomena function, and will recognize basic cause and effect relationships. Students will examine change over varying time periods and know that different variables and conditions may affect change. They will be aware of different perspectives, and they will show care and respect for themselves, other living things and the environment. Students will communicate their ideas or provide explanations using their own scientific experience and vocabulary/

Science Strands		**Living things:** The study characteristics, systems and behaviours of humans and other animals, and of plants; the interactions and relationships between and among them, and with their environment.	**Earth and space:** The study of planet Earth and its position in the universe, particularly its relationship with the sun, the natural phenomena and systems that shape the planet and the distinctive features that identify it; the infinite and finite resources of the planet	**Materials and matter:** The study of properties, behaviours and uses of materials, both natural and human-made; the origins of human-made materials and how they are manipulated to suit a purpose.	**Forces and Energy:** The study of energy, its origins, storage and transfer, and the work it can do; the study of forces; the application of scientific understanding through inventions and machines.	**Science Skills**
Early Years 1	**Conceptual Understandings**	**WWA** Our similarities and differences help us to understand ourselves. When people change and grow they develop new skills	**HWW** A cycle is a repeated event. We can take action in response to natural cycles. Natural cycles influence patterns of behaviour.	**HWEO** Art media can be used for creative purposes.		Focus skills in **BOLD** ● **Observe carefully in order to gather data.** ● Use a variety of instruments and tools to measure data accurately. ● **Use scientific vocabulary to explain their observations and experiences.** ● **Identify or generate a question or problem to be explored.** ● Plan and carry out systematic investigations, manipulating variables as necessary. ● Make and test predictions. ● **Interpret and evaluate data gathered in order to draw conclusions.** ● Consider scientific models and applications of these models (including their limitations).
	Students will know/be able to (learning outcomes)	**WWA** Examples of physical features that can be observed. Describe physical features of themselves and others. How they have changed and grown Reflect on what they can do now that they could not do before.	**HWW** Examples of natural cycles. (day/night, seasons,) Describe observations and experiences of natural cycles using a developing vocabulary. Characteristics of natural cycles (e.g.weather, animals that we see, changes in the forest, foods that are harvested) Draw conclusions based on observations and use these to take action. Patterns can be found in everyday situations. A pattern repeats and grows Identify and describe predictable patterns in daily and seasonal cycles *(Every morning I brush my teeth… In winter it is colder)*.	**HWEO** Qualities/characteristics of different art media. Choose a specific art media to communicate their thinking		

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Early Years 2	**Conceptual Understandings**			**HWW** Objects and phenomena have properties that can be explored and manipulated. Theories can evolve and change.	**HWW** Objects and phenomena have properties that can be explored and manipulated. Theories can evolve and change. There is a relationship between the action taken and the subsequent effect.	Focus skills in **BOLD** ● **Observe carefully in order to gather data.** ● Use a variety of instruments and tools to measure data accurately. ● **Use scientific vocabulary to explain their observations and experiences.** ● **Identify or generate a question or problem to be explored.** ● Plan and carry out systematic investigations, manipulating variables as necessary. ● **Make and test predictions.** ● **Interpret and evaluate data gathered in order to draw conclusions.** ● Consider scientific models and applications of these models (including their limitations).
	Students will know/be able to (learning outcomes)			**HWW** Know scientific vocabulary to explain their observations and experiences. Know there are different ways to investigate and communicate theories. Know their knowledge can be applied and changed. Use all senses to observe and notice details in order to gather data. Identify or generate a question or problem that can be explored. Interpret and evaluate data in order to draw conclusions. Plan and carry out systematic investigations, manipulating variables as necessary. Make and test predictions.	**HWW** Know scientific vocabulary to explain their observations and experiences. Know there are different ways to investigate and communicate theories. Know their knowledge can be applied and changed. Use all senses to observe and notice details in order to gather data. Identify or generate a question or problem that can be explored. Interpret and evaluate data in order to draw conclusions. Plan and carry out systematic investigations, manipulating variables as necessary. Make and test predictions.	

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Overall expectations for 5-7 year olds: Students will develop their observational skills by using their senses to gather and record information, and they will use their observations to identify patterns, make predictions and refine their ideas. They will explore the way objects and phenomena function, identify parts of a system, and gain an understanding of cause and effect relationships. Students will examine change over varying time periods, and will recognise that more than one variable may affect change. They will be aware of different perspectives and ways of organising the world, and they will show care and respect for themselves, other living things and the environment. Students will communicate their ideas or provide explanations using their own scientific experience.							
Science Strands		**Living things:** The study characteristics, systems and behaviours of humans and other animals, and of plants; the interactions and relationships between and among them, and with their environment.	**Earth and space:** The study of planet Earth and its position in the universe, particularly its relationship with the sun, the natural phenomena and systems that shape the planet and the distinctive features that identify it; the infinite and finite resources of the planet	**Materials and matter:** The study of properties, behaviours and uses of materials, both natural and human-made; the origins of human-made materials and how they are manipulated to suit a purpose.	**Forces and Energy:** The study of energy, its origins, storage and transfer, and the work it can do; the study of forces; the application of scientific understanding through inventions and machines.	**Science Skills**
Kinder -garten	**Conceptual Understandings**	**STP** A habitat provides for the needs of living things. People's impact on habitats can be both positive and negative. Sharing spaces is something we should do in a responsible way.	**HWW** There is an impact of choosing and using certain resources.	**HWW** The properties of materials determine how they react and change. (e.g. hardness, flexibility and temperature vs size and shape) Some kinds of materials are better than others for making a particular thing Different materials with different properties are suited to different uses. Some materials are better than others for making a particular thing Different materials with different properties are suited to different uses.		Focus skills in **BOLD** ● **Observe carefully in order to gather data.** ● **Use a variety of instruments and tools to measure data accurately.** ● **Use scientific vocabulary to explain their observations and experiences.** ● **Identify or generate a question or problem to be explored.** ● Plan and carry out systematic investigations, manipulating variables as necessary. ● **Make and test predictions.** ● **Interpret and evaluate data gathered in order to draw conclusions.** ● Consider scientific models and applications of these models (including their limitations).
	Students will know/be able to (learning outcomes)	**STP** Know examples of habitats. Know examples of positive and negative impacts on different habitats. Know how we share natural habitats in our community. Observe habitats in order to gather data. Identify, describe, sort and categorize the features of habitats. Notice and describe human impact on habitats. Develop an appreciation of	**HWW** Examples of ways to use resources in different ways	Examples of materials Distinguish different types of materials and how they can be changed. Use scientific vocabulary when working with materials Examples of how materials can be manipulated and applied to new purposes Experiment with a range of different materials		

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KG cont.		the natural environment. Take action to impact habitats in a positive way.		Communicate their ideas based on their own experience with different materials. Describe properties and/or uses of different materials Make a reasoned choice about which materials to use.		
Grade 1	**Conceptual Understandings**	**STP** Plants have different needs for growth. Without plants, the environment and life on this earth would not exist Their actions can impact the environment in positive and negative ways.	**HWW** Light is produced by a range of sources. Light can be manipulated through its interaction with objects and materials.			**HWW** Ideas or theories can be researched or tested. Some elements of a Scientific investigation (hypothesis, observation) Focus skills in **BOLD** ● **Observe carefully in order to gather data.** ● **Use a variety of instruments and tools to measure data accurately.** ● Use scientific vocabulary to explain their observations and experiences. ● Identify or generate a question or problem to be explored. ● **Plan and carry out systematic investigations, manipulating variables as necessary.** ● **Make and test predictions.** ● Interpret and evaluate data gathered in order to draw conclusions. ● Consider scientific models and applications of these models (including their limitations).
	Students will know/be able to (learning outcomes)	**STP** Give examples of the things that some plants need to survive. (e.g. sunlight, water, soil, insect life) Know some of the things that plants provide e.g. food, protection, shelter. Represent findings using pictures and models; and share findings with peers informally. Know different ways that they can care for and harm the environment. Define their own roles and responsibilities towards the environment.	**HWW** That light can come from natural or artificial sources. Light can be reflected by a mirror. Investigate the properties of materials as they interact with light.			

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Overall expectations for 7--9 year olds: Students will develop their observational skills by using their senses and selected observations tools. They will gather and record observed information in a number of ways, and they will reflect on these findings to identify patterns or connections, make predictions, and test and refine their ideas with increasing accuracy. Students will explore the way objects and phenomena funcion, identify parts of a system, and gain an understanding of increasingly complex cause and effect relationships. They will examine how products and tools have been developed through the application of science concepts. They will be aware of different perspectives and ways of organizing the world, and they will be able to consider how these views and customs may have been formulated. Students will consider ethical issues in science-related contexts and use their learning in science to plan thoughtful and realistic action in order to improve their welfare and that of other living things and the environment. Students will communicate their ideas or provide explanations using their own scientific experience and that of others.

Science Strands		**Living things:** The study characteristics, systems and behaviours of humans and other animals, and of plants; the interactions and relationships between and among them, and with their environment.	**Earth and space:** The study of planet Earth and its position in the universe, particularly its relationship with the sun, the natural phenomena and systems that shape the planet and the distinctive features that identify it; the infinite and finite resources of the planet	**Materials and matter:** The study of properties, behaviours and uses of materials, both natural and human-made; the origins of human-made materials and how they are manipulated to suit a purpose.	**Forces and Energy:** The study of energy, its origins, storage and transfer, and the work it can do; the study of forces; the application of scientific understanding through inventions and machines.	**Science Skills**
Grade 2	**Conceptual Understandings**	**WWA** A balanced lifestyle is made up of various elements. Personal choices impact health ⇒***Links with PSPE***	**STP** Water is a finite resource and the amount of clean/usable water is not evenly spread around the world. **WWAPT** Different physical environments influence culture in distinct ways.	**STP** Water can be a liquid or a solid and can be made to change from one form to the other. **HWW** That building and structures are dependent on a number of factors		Focus skills in **BOLD** ● **Observe carefully in order to gather data.** ● **Use a variety of instruments and tools to measure data accurately.** ● **Use scientific vocabulary to explain their observations and experiences.** ● **Identify or generate a question or problem to be explored.** ● Plan and carry out systematic investigations, manipulating variables as necessary. ● Make and test predictions. ● **Interpret and evaluate data gathered in order to draw conclusions.** ● **Consider scientific models and applications of these models (including their limitations).**
	Students will know/be able to **(learning outcomes)**	**WWA** Different ways to be healthy. Recognise what is healthy in their own life. Examples of healthy choices. Identify ways to make your own healthy choices. ⇒***Links with PSPE***	**STP** Stages of the water cycle. Distribution of water on Earth changes (time and place) How much usable water there is and where it can be found. What water is used for. Some ways to conserve water. Explain how water affects people and the environment. Collect data about climate and compare results **WWAPT** Local and global environments have distinctive features and examples of these. Show curiosity or ask questions about the natural or physical environment.	**HWW** Materials, weather, forces, cost, physical environment & workforce are factors to consider when building a structure.		

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Grade 3	**Conceptual Understandings**		**HWW** Energy is all around us and is used to drive all systems.		**HWW** Energy is all around us and is used to drive all systems. Energy is neither created nor destroyed, it can only be transformed from one form to another. Energy can be transferred in a system to be used for human purposes.	**HWW** **Students understand:** Scientists use a variety of methods to answers questions/solve problems about the natural world **Students know:** There is a scientific process.that can be followed to investigate questions or a hypothesis. **Students are able to:** Follow a scientific process to plan and carry out their own investigations Focus skills in **BOLD** ● **Observe carefully in order to gather data.** ● **Use a variety of instruments and tools to measure data accurately.** ● **Use scientific vocabulary to explain their observations and experiences.** ● **Identify or generate a question or problem to be explored.** ● **Plan and carry out systematic investigations, manipulating variables as necessary.** ● **Make and test predictions.** ● **Interpret and evaluate data gathered in order to draw conclusions.** ● Consider scientific models and applications of these models (including their limitations).
	Students will know/be able to **(learning outcomes)**		**HWW** Different sources of energy such as solar, hydro, biofuel, nuclear, geothermal - renewable or nonrenewable, clean energy		**HWW** Different types of energy (kinetic and potential) Different forms of energy (light, heat, chemical, mechanical, electrical). Ways energy can be transformed from one form to another (e.g. mechanical -- heat -- sound) Identify and describe different sources and forms of energy Identify examples and explain how energy can be transformed and transferred for use within a system.	

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Overall expectations for 9-12 year olds: Students will develop their observational skills by using all their senses and selected observational tools. They will gather and record observed information in a number of ways, and they will reflect on these findings to identify patterns or connections, make predictions, and test and refine their ideas with increasing accuracy. Students will explore the way objects and phenomena function, identify parts of a system, and gain an understanding of increasingly complex cause and effect relationships. They will examine change over time, and they will recognise that change may be affected by one or more variables. Students will reflect on the impact that the application of science, including advances in technology, has had on themselves, society and the environment. They will be aware of different perspectives and ways of organizing the world, and they will be able to consider how these views and customs may have been formulated. Students will examine ethical and social issues in science-related contexts and express their responses appropriately. They will use their learning in science to plan thoughtful and realistic action in order to improve their welfare and that of other living things and the environment. Students will communicate their ideas or provide explanations using their own scientific experience and that of others.

Science Strands		**Living things:** The study characteristics, systems and behaviours of humans and other animals, and of plants; the interactions and relationships between and among them, and with their environment.	**Earth and space:** The study of planet Earth and its position in the universe, particularly its relationship with the sun, the natural phenomena and systems that shape the planet and the distinctive features that identify it; the infinite and finite resources of the planet	**Materials and matter:** The study of properties, behaviours and uses of materials, both natural and human-made; the origins of human-made materials and how they are manipulated to suit a purpose.	**Forces and Energy:** The study of energy, its origins, storage and transfer, and the work it can do; the study of forces; the application of scientific understanding through inventions and machines.	**Science Skills**
Grade 4	**Conceptual Understandings**	**STP** The ways in which living things have adapted and why The ways in which living things have adapted to change (human & environmental) and why How human action and environmental factors can impact interdependence.			**HWW** When a force is applied to an object it either speeds up, slows down or goes in a different direction.	Focus skills in **BOLD** • **Observe carefully in order to gather data.** • **Use a variety of instruments and tools to measure data accurately.** • **Use scientific vocabulary to explain their observations and experiences.** • **Identify or generate a question or problem to be explored.** • **Plan and carry out systematic investigations, manipulating variables as necessary.** • **Make and test predictions.** • **Interpret and evaluate data gathered in order to draw conclusions.** • **Consider scientific models and**
	Students will know/be able to (learning outcomes)	**STP** Examples of physical adaptations that organisms have (e.g. webbed feet, hair) Examples of social adaptations/behaviour that organisms have (e.g. hunting in packs) Different biomes of the world Observe changes in living things, objects and events over a period of time Human & Environmental cause and effect			**HWW** That a force is a push, a pull or a twist. Observe and manipulate objects by using all senses as appropriate Record observations is a systematic way Use scientific ideas to explain how principles influence the design of machines. Apply their understanding of forces to create a prototype for an invent Make connections between the properties of forces and motion that simple machines employ.	

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		(Deforestation, global warming, pollution such as plastic) Making one change in a biome affects everything else			Explain how simple machines are used to create compound machines	**applications of these models (including their limitations).**
Grade 5	**Conceptual Understandings**	**WWA** How/why the human body changes at different developmental stages throughout life.		**HWW** Materials can be changed through different processes. Some materials are better suited than others for particular uses.		Focus skills in **BOLD** ● **Observe carefully in order to gather data.** ● **Use a variety of instruments and tools to measure data accurately.** ● **Use scientific vocabulary to explain their observations and experiences.** ● **Identify or generate a question or problem to be explored.** ● **Plan and carry out systematic investigations, manipulating variables as necessary.** ● **Make and test predictions.** ● **Interpret and evaluate data gathered in order to draw conclusions.** ● **Consider scientific models and applications of these models (including their limitations).**
	Students will know/be able to (learning outcomes)	**WWA** Examples and the possible impacts of physical changes from different life stages, with emphasis on puberty. Use scientific vocabulary to explain their observations and experiences. Describe how our bodies change as we grow and develop, and how this impacts individuals	**HWW** Materials are finite and how we use them has an impact. There are physical, ethical, and environmental challenges to using different materials. Make responsible choices regarding their use of materials.	**HWW** The ways materials can be changed through different processes (natural, synthetic, chemical). Observe and describe the processes materials have undergone. Use scientific vocabulary to describe changes in the properties (inc. states) of materials. The factors that determine the use of materials in a variety of settings. Explain the relationship between the properties of different materials and the uses to which they are put.		

*Scope and sequence last updated February 2022