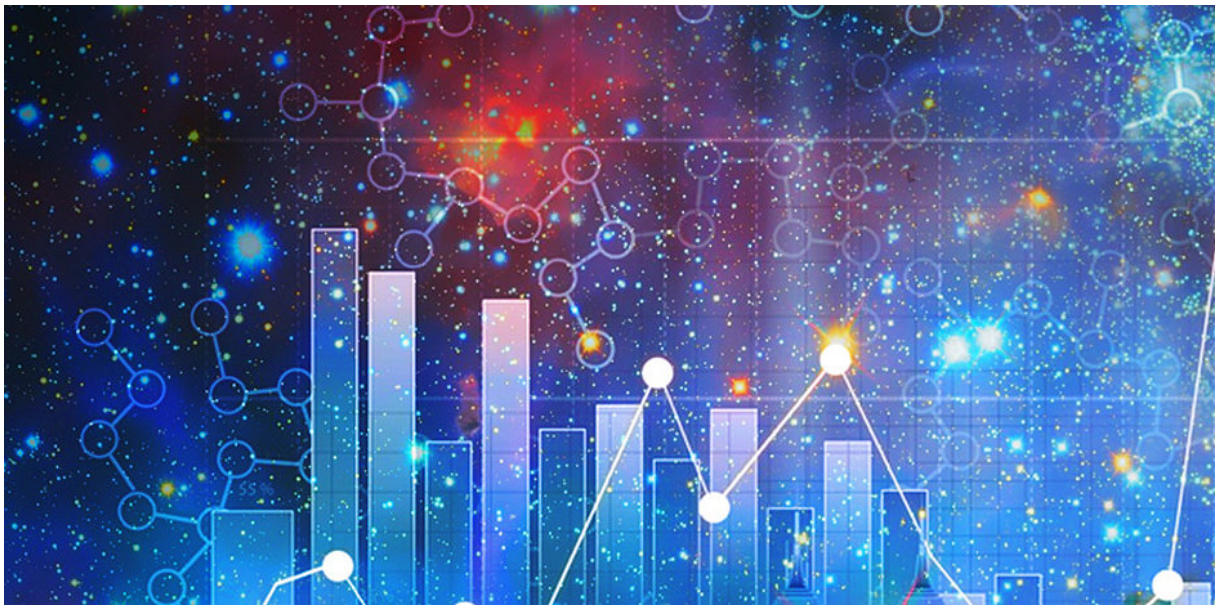
SCIENCES

SUBJECT CONTINUUM



1. *Students at TRINT learn about Science using concept-based inquiry-teaching, underpinned by the IB learner profile and IB approaches to learning.*

TRINT students learn to make transdisciplinary connections to increase their understanding of sustainable development, as well as exploring local and global culture and technology in science. Students seek to understand how technology works, and how technology is applied in the modern world.

HOW TO READ THIS DOCUMENT:

The document is sectioned into two parts; the Primary Years Programme (PYP) and the Middle Years Programme (MYP).

PRIMARY YEARS PROGRAMME,

IN THE SECTION FOR THE PYP YOU WILL FIND:

Written Curriculum for the various year levels.

Contains conceptual understandings from the International Baccalaureate PYP subject documents as well as competency targets from the Norwegian curriculum. We are obliged to teach the Norwegian curriculum, and we teach through the framework and lens of the IB. Therefore, they are written parallel to each other to show correlation.

Examples of taught curriculum

Examples of how we work with the targets above in our lessons and our units. This is not an extensive list, neither is it a representation of what is done every year. It gives insight into methods and approaches that may be used by our teachers.

Milestones

The milestones refer to skills and understandings that we believe a child will reach by the end of this age-mix. These are milestones that we are working towards, connected to the written curriculum.

How can you support your child

These are tips from our teachers on how you can support your child in the subject at home, outside of the regular homework.

PRIMARY YEARS PROGRAMME

How are science practices changing?	
Increased emphasis on:	**Decreased emphasis on:**
hands-on learning experiences to ensure that students experience and learn science process skills; high level of student involvement in a flexible learning environment	teacher demonstration and strict adherence to teacher-defined activities and direction of process
units of inquiry that lend themselves to transdisciplinary investigations	science lessons/units in isolation
challenging students to answer open-ended questions with investigations so that they can abandon/modify their misconceptions by observations, measurements or experimentation (teacher as facilitator)	the teacher as the sole authority for the correct answer or for disseminating information (teacher as expert)
a wider and responsible use of technology in all its forms as a tool for science learning	a limited use of technology as a tool for learning science or the teaching of an isolated group of skills
accepting uncertainty and ambiguity or the possibility of more than one acceptable solution/ hypothesis	finding pre-set answers
more than one approach, model or process	one scientific model to approach investigations
discussion, dialogue, elaboration and interpretation of data gathered, with students proposing explanations and conclusions	written recording of data only; collecting and recording data as the sole purpose of an activity
challenging students to find applications for, and take action on, what they have learned	simply learning science facts and skills
instruction that recognizes that process and content are interdependent	separating instruction in scientific process and scientific content
providing students with the opportunities to explore a science interest when it arises	confining science to set times
a concept-driven curriculum using a wide variety of materials and manipulatives.	a textbook-driven curriculum using a limited range of science textbooks.

PYP 1 – 2 - WRITTEN CURRICULUM

PYP conceptual understandings	Norwegian curriculum
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.	Wonder, explore and make questions, and relate this to one's own or others' experiences.
Students will communicate their ideas or provide explanations using their own scientific experience.	present their findings and describe how the student arrived at them.
	Present own ideas for technological discoveries.
They will explore the way objects and phenomena function, identify parts of a system, and gain an understanding of cause and effect relationships.	Explore and describe observable properties of different objects, materials and substances and sort them by properties.
	Explore nature in the local environment and describe how some organisms are adapted to the area and to each other.
	experience nature at different seasons, reflect on how nature changes, and why the year is divided differently in Norwegian and Sami tradition.
	Plan and carry out investigations of weather and celestial phenomena and compare measurements, observations and weather signs throughout the year.
They will be aware of different perspectives and ways of organizing the world, and they will show care and respect for themselves, other living things and the environment.	Talk about how we can make environmentally conscious choices and implement local environmental measures.
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.	Explore the senses through play outside and inside and talk about how the senses are used to gather information.
	Give examples of some common diseases and talk about what can be done to protect the body against infectious diseases.
	follows principles of good hygiene in connection with cooking
	recognize tastes in food and wonder why taste is something we experience differently

EXAMPLES OF TAUGHT CURRICULUM

- Working with **living things** through exploring living things and the needs of living things, what is required to grow, change and thrive. Understand how to stay healthy through our diet and exercise. Know the body parts and some organs in the body, and the purpose of those. Explore the senses through food, cooking and exploring the local environment.
- Working with **earth and space** through exploring the seasons, weather and outdoor environment. Understanding the sun, moon and planets and how they relate to each other, and the impact this has on the weather, the calendar and the seasons.
- Working with **materials and matter** through by describing and identifying the properties of materials in the local environment.
- Working with **forces and energy** through exploring simple machines, movement and the interactions between them.

MILESTONES:

- They should be able to differentiate between living and non-living things and understand the characteristics of living things.
- They should know how to keep themselves healthy.
- They can make observations and simple predictions.
- They can describe the weather and connect it to the season

HOW YOU CAN SUPPORT YOUR CHILD

- Provide opportunities for playing with a variety of materials and in different environments.
- Explore the local environment and being outside.
- Support them with simple experiments e.g. planting something outside and describe what happens.
- Encourage discussion, questions about the world around you.

PYP 3 – 4 WRITTEN CURRICULUM

PYP conceptual understandings	Norwegian curriculum
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.	Wonder, ask questions and make hypotheses and explore these to find answers using tables and figures to organize data, make explanations based on data and present findings.
	Explore and describe how some substances can change when mixed with other substances.
	Explore observable quantities such as speed and temperature and relate them to energy.
develop their observational skills by using their senses and selected observational tools.	Compare models with observations and make conversations about why we use models in science.
explore the way objects and phenomena function, identify parts of a system, and gain an understanding of increasingly complex cause and effect relationships.	Explore technological systems composed of different parts, and describe how the parts function and work together.
	Talk about what energy is, and explore different energy chains.
examine how products and tools have been developed through the application of science concepts.	Design and make a product based on a requirements specification.
communicate their ideas or provide explanations using their own scientific experience and that of others.	Explore a nature area and discuss sustainable use of this area.
	use the senses to explore and evaluate the taste and texture of food and to explore the serving of food
	know and find out about basic tastes in foods and tell about and discuss how taste can affect food preferences and food choices
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.	Explore and compare adaptations of different animal and plant species to the environment and habitats and discuss why some species become extinct.
	Talk about similarities and differences between the sexes, about gender identity and about human reproduction
	Participate in the harvesting and use of natural resources and discuss how natural resources can be used in a sustainable way.
	Give examples of good animal welfare and reflect on how animal needs can be taken care of.

	what are the characteristics of healthy and varied food and why it is important for your health
	show connections between food groups and nutrients that are important for good health.
	use food labelling and diet models to put together a healthy, varied and sustainable diet and reflect on their choices.
	explore and present traditional Norwegian and Sami methods for preserving food and be able to tell about the raw materials that are preserved.
communicate their ideas or provide explanations using their own scientific experience and that of others.	Explore and describe the water cycle and explain why water is important for life on earth.
	Talk about what physical and mental health is, and discuss how lifestyle and well-being affect health
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.	Describe how muscles and skeletons work, and link this to movement.
	Describe functions in the body's external defences and talk about how this protects against disease

EXAMPLES OF TAUGHT CURRICULUM

- Working with **living things** through understanding the biodiversity and the needs of living things and how a living thing thrives.
- Working with **earth and space** through exploring ecosystems and identifying different ecosystems. Understanding the water cycle.
- Working with **materials and matter** through designing a product and considering the properties of the object they are creating. Seeing how substances change when cooked, combined and describing the chemical change. Understanding the forms of liquid, gas and solid.
- Working with **forces and energy** by exploring energy sources, renewable and non-renewable energy.

MILESTONES:

- Performing a simple experiment and write a simple report.
- Knowing the functions and locations of the vital organs of the body.
- Identifying healthy choices, recognizing sustainable ways of living and promoting animal welfare.

HOW YOU CAN SUPPORT YOUR CHILD

- Facilitate experiments and explorations of the local community and to provide opportunities for playing with a variety of materials and in different environments.
- Talking and creating awareness about bodily functions and changes.
- Encourage them to take sustainable and environmentally conscious- actions outside of school.

PYP 5 – PYP6/MYP2 WRITTEN CURRICULUM

PYP conceptual understandings	Norwegian curriculum
Students will develop their observational skills by using their senses and selected observational tools.	ask questions and make hypotheses about natural phenomena, identify variables and collect data to find answers.
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.	distinguish between observations and conclusions, organize data, use cause-effect arguments, draw conclusions, assess sources of error and present findings.
They will examine change over time, and they will recognize that change may be affected by one or more variables.	Use and evaluate models that represent phenomena that can not be observed directly, and explain why models are used in science.
	read and understand hazard labelling and reflect on the purpose of these.
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.	give examples of how scientific knowledge has developed and is continuing to develop.
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.	give examples of how traditional knowledge has contributed and contributes to scientific knowledge.
	Explore, create and program technological systems that consist of parts that work together.
	Design and create a product based on user needs.
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.	Reflect on how technology can solve challenges, create opportunities and lead to new dilemmas.
	Explore phase transitions and chemical reactions and describe what characterizes them.

	Use the particle model to explain phase transitions and the properties of solids, liquids and gases.
	Explore electrical and magnetic forces through experiments and talk about how we utilize electrical energy in daily life.
	Explain how organisms can be divided into main groups, and give examples of the special features of different organisms.
	Explain the importance of biological diversity and implement measures to preserve biological diversity in the local environment.
	Propose measures to preserve the biological diversity in the northern areas and give examples of the importance of traditional knowledge in how to manage nature.
	Explore and describe different food webs and use this to discuss interactions in nature.
	Describe and visualize how days, moon phases and seasons occur, and talk about how this affects life on earth.
	Describe the earth's preconditions for life and compare with other celestial bodies in the universe.
	Explain how the geological cycle, plate tectonics and external forces help to shape and change different landscapes.
	Describe physical and mental changes during puberty and talk about how this can affect emotions, actions and sexuality.
	Describe some of the body's organ systems and describe how the systems work together.

EXAMPLES OF TAUGHT CURRICULUM

- Working with **living things** through classifying living things into kingdoms. Understanding the body organs and systems.
- Working with **earth and space** through finding out about biomes, functions of ecosystems and how living beings interact. Finding out about symbiosis. Learning the phases of the moon, planets and solar system.
- Working with **materials and matter** through exploring physical and chemicals changes of matter.
- Working with **forces and energy** by exploring electricity and circuits. Find out about magnetism and magnetic materials.

MILESTONES:

- Making hypothesis and using observations and data to draw conclusions
- Identifying body organs and see connections between body systems
- Explaining relationships between parts of the ecosystem
- Describing and constructing simple electrical circuits and its relationship with magnetism
- Describing observed physical and chemical changes

HOW YOU CAN SUPPORT YOUR CHILD

- Providing opportunities where children can explore and talk about nature.
- Creating a safe environment where students can talk freely about their bodies, puberty, and sexuality.
- Providing materials/equipment for student to manipulate and perform experiments.

- Be curious about what they are doing in the current unit. Ask your child what they are working on, and even if you do not completely have control over the topic, you should be able to hear if the student has no idea or have at least some control of the topic.

MIDDLE *YEARS PROGRAMME,*

IN THE SECTION FOR THE MYP *YOU WILL FIND:*

Written Curriculum for the various year levels.

This section contains the competency targets from the Norwegian curriculum, and a brief outline of the four criteria used for assessment. We are obliged to teach the Norwegian curriculum, and we teach through the framework and lens of the IB.

Examples of taught curriculum

Here you will see examples of how we work with the targets above in our lessons and our units. This is not an extensive list, neither is it a representation of what is done every year. It gives insight into methods and approaches that may be used by our teachers.

Milestones

The milestones refer to skills and understandings that we believe a child will reach by the end of this age-mix. These are milestones that we are working towards, connected to the written curriculum.

How can you support your child

These are tips from our teachers on how you can support your child in the subject at home, outside of the regular homework.

MIDDLE YEARS PROGRAMME

MYP Science is a framework fostering conceptual knowledge rather than a pre-set progression from one single book. Each unit may have components of several areas of Scien which are relevant for the unit. The IB framework has therefore not set any pre-made targets but have listed areas that could be covered during the students' years at MYP, but with no regard to order.

In the MYP the students will have assessments leading to a final grade in the subject. In comparison to many other programmes and countries, the MYP assess students in four pre-set criteria that links to the main objectives of the subject.

Criterion A: Knowledge and understanding
Students develop scientific knowledge (facts, ideas, concepts, processes, laws, principles, models and theories) and apply it to solve problems and express scientifically supported judgements.
Criterion B: Inquiring and designing
Intellectual and practical skills are developed through designing, analysing and performing scientific investigations. Although the scientific method involves a wide variety of approaches, the MYP emphasizes experimental work and scientific inquiry.
Criterion 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 student develop analytical thinking skills, which they can use to evaluate the method and discuss possible improvements or extensions.
Criterion 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.

MYP 3-5 Written Curriculum

Norwegian competency targets

Ask questions and hypothesize about natural phenomena, identify dependent and independent variables and gather data to find answers.
Analyze and use collected data to make explanations, discuss the explanations in the light of relevant theory and consider the quality of their own and others' explorations.
Use and create models to predict or describe scientific processes and systems and explain the strengths and limitations of the models.
Participate in risk assessments related to trials and follow the safety measures.
Give examples of current research and discuss how new knowledge is generated through collaboration and a critical approach to existing knowledge.
Explore, understand and create technological systems consisting of a transmitter and a receiver.
Use programming to explore scientific phenomena.
Explore chemical reactions, explain mass conservation and explain the meanings of some combustion reactions.
Use atomic models and the periodic table to account for properties of elements and chemical compounds.
Describe the greenhouse effect and explain factors that can cause global climate change.
Give an account of energy conservation and energy quality and explore different ways of converting, transporting and storing energy.
Discuss how energy production and energy use can affect the environment locally and globally.
Describe how scientists have arrived at the theory of evolution and use this to explain the development of biological diversity.
Compare cells in different organisms and describe connections between structure and function.
Explore connections between abiotic and biotic factors in an ecosystem and discuss how energy and matter are transformed into cycles.
Give examples of and discuss current dilemmas related to the utilization of natural resources and the loss of biological diversity.
Give examples of the Sami's traditional knowledge of nature and discuss how this knowledge can contribute to sustainable management of nature.
Explain how photosynthesis and cell respiration provide energy to all living things through the carbon cycle.
Use the plate tectonics theory to explain the earth's evolution over time and give examples of observations that support the theory.
Discuss issues related to sexual and reproductive health.
Compare the nervous system and the hormonal system and describe how drugs, medicines, environmental toxins and doping affect the signalling systems.
Describe the body's immune system and how vaccines work, and explain what vaccines mean for public health.

EXAMPLES OF TAUGHT CURRICULUM

- *using the scientific method to plan experiments, identifying variables, and designing experiments and communicating science in written report.*
- *Inquiring on the different body systems through simple dissections.*
- *researching advancements in technology and environmental challenges.*
- *making models to help explore phenomena and concepts*
- *exploring chemical reactions, energy conservation and energy transfer through experimentations*
- *understanding atoms and molecules, and their properties through group discussions*
- *understanding evolution of life on Earth through films and simulations*
- *understanding and exploring different cell types through practical methods.*
- *connecting cellular respiration and photosynthesis through creation of model ecosystems.*
- *exploring human health, history, and global diseases through research*

MILESTONES:

- Can plan experiments from chosen variable and collect data that can be represented and analysed.
- Can describe phenomenon and biological systems and make a representation as models
- Can show inquiry and research in an organized written report
- Can show and explain their understanding of concepts and relationships and can apply to real-life situations

HOW YOU CAN SUPPORT YOUR CHILD:

- Be curious about what they are doing in the current unit. Ask your child what they are working on, and even if you do not completely have control over the topic, you should be able to hear if the student has no idea or have at least some control of the topic.
- Help us educators by talking about the concepts at home. We strive to show the students that Science is everywhere, and we go through topics about how knowing Science can be helpful.
- Discuss feedback on formative tasks and (especially) summative tasks. We post information about the topics for a test a minimum of two weeks prior to a summative.