# MYP Science
## Course Outline Year 2

### Course Description:
TMS Science philosophy is a holistic approach to teaching science by making connections to other disciplines. At the core of this philosophy is inquiry based labs and activities. In addition, rigor, relevancy (through the use of Areas of Interactions), and relationships play a vital role in designing coursework and unit planning.

MYP 7th grade Science is meant to give students a chance to explore a variety of disciplines within the area of Science. This includes the following concepts: Structures and Process of Living Things, Integrations of Matter, Waves and Energy, Earth Systems and Human Activities. Within the MYP Science course students will be given opportunities to strive to meet the characteristics of the IB Learner Profile (inquirers, thinkers, knowledgeable, communicators, principled, open-minded, balanced, reflective, caring, and risk takers).

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### MYP Aims and Objectives:

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

1. develop curiosity, interest and enjoyment towards science and its methods of inquiry
2. acquire scientific knowledge and understanding
3. communicate scientific ideas, arguments and practical experiences effectively in a variety of ways
4. develop experimental and investigative skills to design and carry out scientific investigations and to evaluate evidence to draw a conclusion
5. develop critical, creative and inquiring minds that pose questions, solve problems, construct explanations, judge arguments and make informed decisions in scientific and other contexts
6. develop awareness of the possibilities and limitations of science and appreciate that scientific knowledge is evolving through collaborative activity locally and internationally
7. appreciate the relationship between science and technology and their role in society
8. develop awareness of the moral, ethical, social, economic, political, cultural and environmental implications of the practice and use of science and technology
9. observe safety rules and practices to ensure a safe working environment during scientific activities
10. engender an awareness of the need for and the value of effective collaboration during scientific activities.
### Heredity
- Inherited and Acquired Traits
- Reproduction

### Evolution
- Species Adaptation and Survival
- Relationships Amongst Organisms

### Ecosystems
- Interactions of Organisms
- Relationships of Organisms
- Biotic and Abiotic Factors
- Environmental Impacts of Organisms

### Discipline 4: Earth Science

#### Earth Systems
- Solar Energy
- Human Consequences
- Seasons
- Water Cycle

#### Solid Earth
- Soil
- Rock Formation
- Plate Tectonics
- Magnetic Field of Earth

#### Fluid Earth
- Atmosphere

#### Earth in Space and Time
- Solar System
- Solar System Motion
- Fossils
- Geologic Time

The standards for the 7th grade course follow the same standards as the 6th grade course. The second year dives deeper into concepts to allow a more concentrated and detailed understanding of each standard area.

### MYP Science Objectives

#### A One world
At the end of the course, students should be able to:
- explain the ways in which science is applied and used to address specific problems or issues
- discuss the effectiveness of science and its application in solving problems or issues
- discuss and evaluate the moral, ethical, social, economic, political, cultural and environmental implications of the use of science and its application in solving specific problems or issues.

#### B Communication in science
At the end of the course, students should be able to:
- use scientific language correctly
- use appropriate communication modes such as verbal (oral, written), visual (graphic, symbolic) and communication formats (laboratory reports, essays, presentations) to effectively communicate theories, ideas and findings in science
- acknowledge the work of others and the sources of information used by appropriately documenting them using a recognized referencing system.

#### C Knowledge and understanding of science
At the end of the course, students should be able to:
- recall scientific knowledge and use scientific understanding to construct scientific explanations
- apply scientific knowledge and understanding to solve problems set in familiar and unfamiliar situations
- critically analyze and evaluate information to make judgments supported by scientific understanding

#### D Scientific inquiry
At the end of the course, students should be able to:
- state a focused problem or research question to be tested by a scientific investigation
- formulate a testable hypothesis and explain it using scientific reasoning
- design and carry out scientific investigations that include variables and controls, material and/or equipment needed, a method to be followed and the way in which the data is to be collected and processed
- evaluate the validity and reliability of the method
- judge the validity of a hypothesis based on the outcome of the investigation
- suggest improvements to the method or further inquiry, when relevant

**E Processing data**
At the end of the course, students should be able to:
- collect and record data using units of measurement as and when appropriate
- organize, transform and present data using numerical and visual forms
- analyze and interpret data
- draw conclusions consistent with the data and supported by scientific reasoning.

**F Attitudes in science**
During the course, students should be able to:
- work safely and use material and equipment competently
- work responsibly with regards to the living and non-living environment
- work effectively as individuals and as part of a group by collaborating with others.

**Areas of Interaction in MYP:** The Areas of Interactions are used as lenses to view course material and content standards. Using a unit/guiding question as a focus for each unit in Science, students are forced to engage with both the significant concepts as well as the Area of Interaction to better recognize the relevancy and connection between content areas and their lives outside of the classroom. A single AoI is chosen for each unit to allow students and teachers to explore the depot of an AoI rather than just gaining a surface-level understanding. As in all courses at TMS, relevancy is an important aspect of MYP Sciences. The Area of Interaction has assisted in the planning of units and will help students make connections to their lives and to the wide variety of courses they are taking.

**Text and Resources:**
Text: *Science and Technology* by Holt

**Additional Resources:** Interactive Science by Pearson, Science Kits, Super Science, Scholastic News, Discovery Education United Streaming, Smart Board Technologies, Brain Pop, Consumers Energy, Bay City State Park and Recreation Area, Science Fair Projects, Science Olympiad Competition, Detroit and Toledo Zoo

**Methodologies:** Laboratories, Science Fair, Formative and Summative Assessments, Discovery Based Learning, Cooperative Grouping, Center Based Learning, Kagan Strategies, Student Engagement Strategies, Instructional Strategies, Marzano’s Nine, Vocabulary Strategies, Literacy and Writing Strategies, Higher Order Thinking Questions, Differentiated Instruction, and Backward Design

**Course Units:**
**Unit 1: Fluid Earth Systems and Human Activities (Earth Science)**
- **Question:**
How does the sun's warming relate to weather, climate, seasons, and the water cycle? How do human interactions and the use of natural resources affect the environment?

- **Topics:**
  - Solar Energy, Human Consequences, Weather, Climate, Water cycle, Atmosphere

**Unit 2: Physical and Chemical Properties and Changes in Matter (Physical Science)**

- **Question:**
  - How does matter change?

- **Topics:**
  - Physical properties, Chemical properties, Elements and compounds, Chemical Changes, States of matter

**Unit 3: Waves and Energy (Physical Science)**

- **Question:**
  - What are the forms of energy and how can energy be transferred?

- **Topics:**

**Unit 4: Structures and Processes of Living Things (Life Science)**

- **Question:**
  - How are plants and animals classified? What are living organisms composed of?

- **Topics:**
  - Cell Functions, Growth and Development, Energy Transfer, Photosynthesis, Reproduction

**Assessment Criteria:**

**A. One World**

*The objective refers to enabling students to gain a better understanding of the role of science in society. Students should be aware that science is a global endeavour and that its development and applications can have consequences for our lives.*

- Give examples and make comments on the ways in which science is applied and used to address specific problems or issues
- Give examples on the ways in which science is used to address specific problems or issues
- Make comments on the ways in which science is applied
- Make comments on the ways in which science is used to address specific problems or issues
- Make comments on the effectiveness of science and its application
- Make comments on the effectiveness of science in solving problems or issues
- Make comments on how science and its application interact with life, society and the world

**B. Communication in Science**

*This objective refers to enabling students to become competent and confident when communicating information in science. Students should be able to use scientific language correctly and a variety of communication modes and formats as appropriate. Students should be aware of the importance of acknowledging and appropriately referencing the work of others when communicating in science.*

- Use scientific language correctly, consistent with the level of complexity of the units of work covered
- With guidance, use appropriate communication modes, such as verbal (oral, written), consistent with the level of complexity of the units of work covered
- With guidance, use appropriate communication modes, such as visual (graphic, symbolic) consistent with the level of complexity of the units of work covered
- With guidance, use appropriate communication modes, such as communication formats (laboratory reports, essays, presentations) consistent with the level of complexity of the units of work covered.
- With guidance, acknowledge the work of others and the sources of information used by documenting them using a recognized referencing system

**C. Knowledge and Understanding of Science**
This objective refers to enabling students to understand scientific knowledge and to apply it to construct scientific explanations, solve problems, and formulate scientifically supported arguments.

- with guidance, recall scientific knowledge and use scientific understanding to construct scientific explanations, consistent with the level of complexity of the units of work covered
- with guidance, apply scientific knowledge and understanding to solve problems in familiar and, with guidance, in unfamiliar situations, consistent with the level of complexity of the units of work covered
- with guidance, analyse scientific information by identifying components, relationships and patterns and, with guidance, make comments on the validity and quality of the information

D. Scientific Inquiry

With the scientific method may take on a wide variety of approaches, it is the emphasis on experimental work that characterizes MYP scientific inquiry. This objective refers to enabling students to develop intellectual and practical skills to design and carry out scientific investigations independently and to evaluate the experimental design (method).

- with guidance, articulate the problem or research question to be tested by a scientific investigation, consistent with the level of complexity of the units of work covered
- ask questions of the type: “What will happen if?”, “Why does this happen when?” and make predictions (“If I do this, then this will happen …”), consistent with the level of complexity of the units of work covered
- with guidance, carry out investigations, consistent with the level of complexity of the units of work covered
- with guidance, identify the dependent, independent, and controlled variables
- with guidance, identify materials and/or equipment needed
- with guidance, make comments on the method of the data collected
- with guidance, make comments on the quality of the data collected
- ask questions of the type: “Is the method effective/workable/feasible?”, “Is the data accurate/reliable?”
- with guidance, make comments on how the outcome of the investigation helps to answer the research question
- ask questions of the type: “Is my hypothesis/research question supported by the data?”, “Does the outcome of the investigation support the research question?”
- with guidance, suggest improvements to the method, consistent with the level of complexity of the units of work covered

E. Processing Data

This objective refers to enabling students to collect, process, and interpret sufficient qualitative and/or quantitative data to draw appropriate conclusions. Students are expected to develop analytical thinking skills to interpret data and judge the reliability of the data.

- with guidance, collect data using units of measurement
- with guidance, record data using units of measurement
- with guidance, organize, transform and present data using simple numerical forms (including mathematical calculations) and visual forms (tables, graphs and charts)
- with guidance, analyse data/information to identify trends, patterns and relationships
- with guidance, use the data to convey understanding and interpretation
- with guidance, draw conclusions based on the analysis and interpretation of the data
- ask questions of the type: “What might have caused…?”, “How can we explain what happened using what we know about science…?”

F. Attitudes in Science

This objective refers to encouraging students to develop safe, responsible, and collaborative working practices in practical science.

- Work safely and use material and equipment competently
- Work responsibly with regard to the living and non-living environment
- Work effectively as individuals and as part of a group by collaborating with others
**Grading:** All IB MYP teachers at TMS assess student work using the MYP criteria for their subject area in order to support, engage, and provide feedback on the learning process. A broad range of assessment strategies and tasks will allow students multiple opportunities to demonstrate their knowledge, skills, and attitudes in each subject.

The majority of grades this year will be assessed by using rubrics that align with the Common Core State Standards and IB criteria in MYP Science. Students scoring on the rubric will then be converted to a numeric grading system. Students will be evaluated on IB criteria that measures the competency of the aims and objectives listed above. Please be patient as we transition to using standards to measure students’ progress.