

# Modular sciences overview for years 1 and 2

The subject-group overviews show the units taught in each year in each discipline. They include the unit title, key and related concepts, global contexts, statements of inquiry, objectives, ATL skills and the content (if any).

## Year 1

Unit title and teaching hours	Key concept	Related concept(s)	Global context	Statement of inquiry	Objectives	ATL skills	Content
Movement (Physics) 15 hours	Relationships	Movement Consequences	Personal and cultural expression: the ways in which we discover and express ideas	The application of force has consequences for an objects' movement that can be expressed scientifically.	B C	Thinking: creative thinking Self-management: reflection Social: collaboration Research: information literacy Self-management: affective	Define distance, time, speed and acceleration. Define force using the relationship between cause and consequence. Plot graphs of distance against time and speed against time, based on given data. Explore real-life situations using kinematics and force concepts and the equation: speed = distance/time Use kinematics concepts and graphs to develop experimental work according to the student's level. Solve simple problems involving kinematics.
Energy (Physics) 10 hours	Change	Energy Transformation Form	Globalization and sustainability: the impact of decision-making on humankind and the environment	Humankind and the environment are affected by energy being transformed into different forms.	D	Thinking: critical thinking: Thinking: creative thinking Thinking: transfer Research: media literacy Research: information literacy	Energy as the capacity to move an object The principle of conservation of energy Kinetic energy and gravitational potential energy Frictionless systems Problems about conservation of energy in frictionless systems (according to the mathematical level of the student)
Classification and adaptation of living things (Biology) 15 hours	Systems	Form Patterns	Scientific and technical innovation: the natural world and its laws	The laws of the natural world determine the classification of organisms based on patterns found in their forms.	A	Thinking: critical thinking Thinking: creative thinking Thinking: transfer Self-management: organization	Living things (organisms) share the common qualities of movement, reproduction, sensitivity, growth, respiration, elimination and nutrition. Adaptations are the characteristics that help organisms to survive. Adaptations may be behavioural (examples include bird migration, bear hibernation or local examples) or structural (for example, leopard camouflage, stick insect, reduced size leaves on cactus).

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							<p>Classification is the grouping and naming of organisms based on their shared characteristics.</p> <p>Classification systems are practical tools for scientists to communicate with one another.</p> <p>The hierarchy of biological classification has eight main ranks: Domain, Kingdom, Phylum, Class, Order, Family, Genus, Species.</p> <p>Organisms in each rank share characteristics.</p> <p>Eukaryotes are classified into four kingdoms: <i>Animalia</i>, <i>Plantae</i>, <i>Fungi</i>, and <i>Protocista</i>. A fifth kingdom for prokaryotes is <i>Monera</i>.</p> <p>Organisms that can reproduce with one another and produce fertile offspring are members of the same species.</p> <p>Characteristics of the five groups of vertebrates are used to classify mammals, birds, amphibians, reptiles and fish.</p> <p>Binomial nomenclature involves a two-name system. Each two-word name is unique and originates from Latin, with only the genus capitalized (for example, <i>Homo sapiens</i>, <i>Ursus maritimus</i>).</p> <p>Using and constructing dichotomous keys to classify a group of organisms or objects</p>
<p>Cell structure (Biology) 15 hours</p>	<p>Relationships</p>	<p>Form Function</p>	<p>Scientific and technical innovation: how humans use their understanding of scientific principles</p>	<p>Investigating cell theory has allowed humans to understand that the structure of a cell determines its function.</p>	<p>C</p>	<p>Thinking: critical thinking Thinking: creative thinking Social: collaboration Communication: communication Self-management: organization Research: information literacy</p>	<p>All living organisms are composed of cells. The cell is the basic unit of life. Cells arise from pre-existing cells. Outline the main features of a cell as having a boundary, cytoplasm and subcellular structures. Outline the main features of a prokaryotic cell. Outline the main features of a eukaryotic cell. Outline the differences between a plant cell and an animal cell. Construct clear and accurate diagrams to correctly express the features of cells and tissues. Describe a range of cell specializations for different functions: for example, plant cells with thick cell walls for support, neurons with very long axons for communication. Describe the range of cells in a leaf section.</p>

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							<p>Interpret microscope slides of cells.</p> <p>Interpret microscope slides or micrograms of cells.</p> <p>Understand that cell size is limited.</p> <p>Learn to use and care for a light microscope safely and properly.</p>
<p>Everyday materials (Chemistry)</p> <p>25 hours</p>	Relationships	<p>Form</p> <p>Function</p> <p>Interaction</p>	<p>Scientific and technological innovation: the interaction between people and the natural world</p>	<p>Through interacting with the natural world, people have developed materials based on the interaction between the function and form of their constituent particles.</p>	<p>A</p> <p>B</p> <p>C</p> <p>D</p>	<p>Thinking: critical thinking</p> <p>Thinking: transfer</p> <p>Communication: communication</p> <p>Research: information literacy</p> <p>Research: media literacy</p>	<p>Difference between elements and compounds</p> <p>Relationship of energy to states of matter</p> <p>Particle theory of matter</p> <p>Difference between a pure substance and a mixture</p> <p>Interpretation of the word "purity" (scientific meaning compared to everyday meaning)</p> <p>Solutions, solutes and solvents</p> <p>Solubility of different substances</p> <p>Practising the techniques of decanting, filtration, evaporation, distillation, crystallization and chromatography.</p> <p>Comparing the properties of stainless steel, wood, glass and plastic with their everyday uses.</p> <p>Conductors and insulators of electricity (materials used in a kettle)</p> <p>Making observations, recording information accurately and making inferences</p> <p>Properties of solids, liquids and gases</p> <p>The arrangement of particles in solids, liquids and gases and how this is connected with their behaviour</p> <p>Demonstration on the use of different solvents (removing graffiti with acetone, alcohol, water or oil; the use of detergents)</p> <p>Melting, boiling, cooling, evaporation and condensation</p> <p>Effects of heating and cooling on materials such as metals</p> <p>Classification of elements as metals and non-metals</p> <p>Properties of metals and non-metals</p> <p>Alloys</p> <p>Uses of metals and non-metals in industry</p>

**Year 2**

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Interactions (Physics) 10 hours	Relationships	Interactions Consequences Movement	Scientific and technical innovation: how humans use their understanding of scientific principles	Understanding that motion is a consequence of the interactions between particles has allowed humans to predict how movements will occur.	A B	Thinking: critical thinking Social: collaboration Communication: communication	Force as a relationship between cause and consequence that can be represented by an arrow Situations involving parallel forces Contact and non-contact interactions. Friction as an everyday interaction
Communication (Physics) 10 hours	Systems	Transformation Energy Communication	Globalization and sustainability: reflecting on the opportunities and tensions provided by the interconnected nature of the world	The interconnectedness of the world, which arises from energy transformations being used to transmit or communicate data, provides opportunities and tensions.	D	Thinking: critical thinking Thinking: creative thinking Communication: communication Self-management: reflection Research: media literacy	Information written as a code Define analogue and digital signals. Establish differences between analogue and digital signals. Light as an electromagnetic wave (explaining the difference between mechanical waves and electromagnetic waves) Applications involving analogue and digital signals
Infectious diseases (Biology) 15 hours	Change	Consequences Interaction	Scientific and technical innovation: the interaction between people and the natural world	Changes to health are a consequence of humans interacting with microbial life.	D	Thinking: critical thinking Thinking: creative thinking Communication: communication Research: information literacy Self-management: organization Self-management: affective	Definition of the terms “disease”, “infectious”/ “communicable”, “micro-organism” and “pathogen” Differentiating between illness caused by bodily malfunction and illness caused by pathogens Identification of fungi, bacteria and viruses as pathogenic microorganisms Understanding that the key to the success of fungi, bacteria and viruses is their ability to rapidly multiply and change their nature Graphing data, identifying patterns and making conclusions Main biological and structural differences between fungi, bacteria and viruses Scientific drawing skills How microbes are transmitted by infection through the air (sneezing and coughing), water (sewage) and contact (skin and body fluids) How the body defends itself against microbial attack with specific reference to the skin, mucous, antiseptic chemicals in

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							<p>saliva, tears and ear wax, and the immune system and white blood cells</p> <p>Infectious diseases and the problems they cause with specific reference to:</p> <ul style="list-style-type: none"> <li>• fungal diseases (for example, athlete's foot, ringworm)</li> <li>• bacterial diseases (for example, salmonella, MRSA)</li> <li>• viral diseases (for example, HIV, avian flu (H5N1))</li> </ul> <p>The use of soaps, detergents, disinfectants, antibiotics and antivirals in preventing and curing infectious disease</p> <p>The scientific basis of healthy habits to prevent infection</p> <p>An understanding of micro-organisms that are helpful to humans and describing how they help us with specific reference to:</p> <ul style="list-style-type: none"> <li>• penicillin in the discovery and manufacture of antibiotics</li> <li>• viruses as vectors in genetic engineering</li> </ul> <p>The role of micro-organisms in shaping human history (for example, the bubonic plague)</p> <p>How the global issue of infectious diseases can be addressed through scientific understanding and the application of micro-organisms</p>
<p>Cell functions (Biology)</p> <p>15 hours</p>	<p>Relationships</p>	<p>Form Function</p>	<p>Scientific and technical innovation: the natural world and its laws</p>	<p>Cells perform specialized functions related to their specific forms.</p>	<p>B C</p>	<p>Thinking: Critical thinking</p> <p>Thinking: creative thinking</p> <p>Communication: communication</p> <p>Research: information literacy</p>	<p>Outline the key functions of a cell as the production of energy and division/replication.</p> <p>Recognize organelles from diagrams and micrograms and describe their associated functions.</p> <ul style="list-style-type: none"> <li>• Nucleus—cell division</li> <li>• Centrioles—cell division</li> <li>• Chloroplast—photosynthesis</li> <li>• Mitochondrion—cell respiration</li> <li>• Endoplasmic reticulum, Golgi apparatus and vesicles—synthesis, storage and transport of molecules</li> <li>• Ribosomes—protein synthesis</li> <li>• Plasma membrane—</li> </ul>

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							<p>controlling uptake and release of substances</p> <ul style="list-style-type: none"> <li>Cell wall—support</li> <li>Sap vacuoles—support and storage</li> </ul>
<p>Periodic table (Chemistry)</p> <p>15 hours</p>	Systems	<p>Function</p> <p>Patterns</p>	Personal and cultural expression: the ways in which we discover and express ideas	The function of the periodic table is to express patterns of physical and chemical properties.	A	<p>Thinking: critical thinking</p> <p>Thinking: transfer</p> <p>Communication: communication</p> <p>Self-management: organization</p>	<p>History of the periodic table</p> <p>Patterns in the following in the groups and periods of the periodic table: atomic number and mass, physical states, acid/base nature, metals, non-metals and metalloids, and general reactivity with air and water</p> <p>Symbols of the elements</p> <p>Practising the skills of observation, comparing and contrasting, recording data accurately and making inferences and conclusions</p> <p>Family names of and uses for the elements in the main groups</p> <p>The transition metals and their uses</p> <p>Historically predictive nature of the periodic table's design</p>
<p>Atoms and their structure (Chemistry)</p> <p>15 hours</p>	Systems	<p>Development</p> <p>Models</p> <p>Evidence</p>	Orientation in space and time: discoveries	Models are developed, challenged and modified based on newly discovered evidence.	C	<p>Thinking: critical thinking</p> <p>Social: collaboration</p> <p>Communication: communication</p> <p>Self-management: organization</p> <p>Research: media literacy</p> <p>Research: information literacy</p>	<p>Matter is made up of atoms.</p> <p>Different models of the atom—timeline (Dalton, Thompson, Rutherford and Bohr models)</p> <p>Sub atomic particles: protons, neutrons and electrons</p> <p>Define, and compare and contrast, atoms, molecules, elements and compounds.</p> <p>Define atomic number and mass number.</p> <p>Isotopes and their uses</p> <p>Formation of ions</p> <p>Writing chemical formulas given a list of polyatomic ions</p>