**The Nottingham Emmanuel School – ScienceCurriculum Map (2022-2023)**

**YEAR 7**

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| Intent statement | The science curriculum at Emmanuel will provide students with the new knowledge needed to navigate the modern world. This will allow our students to develop their scientific literacy which will enable them to make informed decisions. This will empower and equip our students to be good role models, who are mindful of the word around them and give them the skills to make meaningful contributions to society. We aim to remove barriers to learning through raising aspirations via an inclusive and diverse curriculum for all students. |
| Diversity across the curriculum | Our curriculum represents the diversity of our students by promoting science as accessible to all. We will use inclusive language, images and texts and promote scientific role models that represent the diversity of our school community. We will deliver the science curriculum with an awareness of the different religious beliefs of our students whilst being mindful of any unconscious bias. |
|  |  | **AUT 1** | **AUT 2** | **SPR 1** | **SPR 2** | **SUM 1** | **SUM 2** |
| ear 7 | Title and objectives | **Cells** | **Particle Model and Properties of Matter** | **Energy Stores** | **Reproduction** | **Elements and Compounds** | **Contact Forces** | **Life Diversity** | **Chemical Reactions** | **Gravity, Space and Our Solar System** |
| Core knowledge | * Cell theory
* Advances in microscopy
* Observing cells
* Eukaryotic cells and organelle function
* Specialised cells
* Unicellular organisms and diffusion
* Cell division, differentiation and stem cells
 | * Solids, liquids and gases
* Investigating properties of states of matter
* Particle theory and model
* Changes of state
* Use of melting and boiling point to determine state
* Diffusion
* Density
 | * Food and fuels
* Energy stores
* Transferring energy
* Energy and power
* Work, energy and machines
* Energy resources
* Generating electricity
* Domestic fuel bills, fuel uses and costs
* Renewable energy
 | * Reproductive organs
* Gametes
* Fertilisation and implantation
* Gestation and birth
* Maternal lifestyle
* Menstrual cycle (not including hormones)
 | * Elements, compounds and mixtures
* Chemical symbols and formulae
* Making compounds
 | * Contact forces
* Force arrows
* Scalars, vectors and measuring forces
* Drag and friction
* Balanced and unbalanced forces
* Investigating squashing and stretching
* Hooke’s law
 | * Genetics
* Chromosomes genes and DNA
* History of DNA discovery
* Variation between species and individuals
* Variation driving natural selection
* Maintaining biodiversity
 | * Chemical and physical changes
* Rearrangement of atoms in chemical reactions
* Word equations
* Balanced symbol equations
* Conservation of mass
* Acids and Alkalis
* Neutralisation
* Metal reactivity series
* Displacement reactions
* Testing for carbon dioxide, hydrogen and oxygen
 | * The Earth
* The night sky
* Seasons
* Solar system
* The Sun
* Gravity, mass and weight
 |
| Skills | * Using a light Microscopes
* Making microscope slides
 | * Line graphs
* Using thermometers
* Negative numbers
* Practical laboratory skills
* Experiment design
 | * Using formula
 | * Interpreting data
 | * Chemical equations
* Using Bunsen burners
 | * Simple calculations
* Resultant forces
* Graph drawing
 | * Data analysis
* Graphical display of collected data
* Survey design and bias
 | * Balancing equations
* Making observations from practical investigation
 | * Formulas
* Handling large numbers
 |
| Covid recovery | Focus on practical skills as students have missed a key part of their development in this area |
| Careers | Context of units linked to employment opportunities.Colour Chemistry – Newcastle University – Presentation in the hall. Links learning to everyday applications of chemistry.Urban nature trip to Wollaton. Pond dipping and ecology.  |

**Year 8**

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| Year 8 | Title and objectives | **Working scientifically and solutions****Electricity (series and parallel)**  | **Chemical reactions including endo + exo****Plants as organisms** | **Acids and Alkalis****Magnetism** | **Science of reproduction (including plants)****Forces** | **Earth & atmosphere****Speed and motion** | **Heat transfers****Variation and evolution** |
| Core knowledge | * Pure and impure substances
* Mixtures, including dissolving
* Diffusion in terms of the particle model
* Separating mixtures: filtration, evaporation, distillation and chromatography
* Identification of pure substances
* electric current, in circuits, series and parallel circuits,
* potential difference, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current
* differences in resistance between conducting and insulating components (quantitative)
 | * chemical reactions as the rearrangement of atoms
* representing chemical reactions using formulae and equations
* combustion, thermal decomposition, oxidation and displacement reactions
* energy changes on changes of state (qualitative)
* exothermic and endothermic chemical reactions (qualitative).
* the reactants and products of, photosynthesis,
* Word equation for photosynthesis
* Dependence of almost all life on Earth on photosynthetic organisms,
* Adaptations of leaves for photosynthesis.
 | * Defining acids and alkalis in terms of neutralisation reactions
* The pH scale
* Indicators
* Reactions of acids with metals to produce a salt plus hydrogen
* Reactions of acids with alkalis to produce a salt plus water
* What catalysts do.
* Magnetic poles, attraction and repulsion
* magnetic fields by plotting with compass, representation by field lines
* Earth’s magnetism, compass and navigation
* Magnetic effect of a current, electromagnets, D.C. motors (principles only).
 | * Structure and function of the male and female reproductive systems,
* menstrual cycle (without details of hormones),
* gametes, fertilisation,
* gestation and birth,
* effect of maternal lifestyle on the foetus through the placenta
* reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal,
* forces as pushes or pulls,
* using force arrows, adding forces in one dimension,
* balanced and unbalanced forces
* moments
* forces: associated with deforming objects;
* forces measured in Newtons,
* force-extension linear relation; Hooke’s Law
* work done and energy changes on deformation
* non-contact forces: gravity, magnets, static electricity
 | * the composition of the Earth
* the structure of the Earth
* the rock cycle and the formation of igneous, sedimentary and metamorphic rocks
* Earth as a source of limited resources and the efficacy of recycling
* the carbon cycle
* the composition of the atmosphere
* the production of carbon dioxide by human activity and the impact on climate
* speed and the quantitative relationship between average speed, distance and time (speed = distance ÷ time)
* the representation of a journey on a distance-time graph
* relative motion: trains and cars passing one another
 | * heating and thermal equilibrium:
* Conduction
* Insulators
* energy transfer:
* genetic information is transmitted from one generation to the next
* chromosomes, genes and DNA in heredity,
* differences between species
* the variation between individuals within a species being continuous or discontinuous,
* Variation driving natural selection
* extinction
* maintaining biodiversity including gene banks
 |
| Skills | * Practical skills – separation techniques, circuits
* Variables
* Experiment design
 | * Practical skills – measuring temperature, chemical reactions
 | * Practical skills – Chemical reactions, gas tests, pH scale
 | * Practical skills – Measuring forces
* Maths – using and manipulating formulas
 | * Maths – using and manipulating formulas, graph analysis
 | * Practical skills – measuring temperature
 |
| Covid recovery | * Focus on practical skills as students have missed a key part of their development in this area
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| Careers | Context of units linked to employment opportunities.Trip to Wollaton to study ecology. Talk from an ecologist on how the skills carried out link to employment. Pond dipping and ecology. Army – STEM ambassadors from the Army focussing on communication and leadership skills in s STEM context. |

**Year 9**

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| Year 9 | Title and objectives | **Cell Biology** | **Atomic Structure** | **Heating** | **Organisation 1**  | **Periodic Table**  | **Light and Sound** | **Organisation 2**  | **Bonding and Structures**  | **Electricity** |
| Core knowledge | * Eukaryotes and prokaryotes
* Animal and plant cells
* Cell specialisation
* Cell differentiation
* Microscopy RP1
* Culturing Microorganisms (Biology only) RP2
* Chromosomes
* Mitosis and the cell cycle
* Stem cells
* Diffusion
* Osmosis RP3
* Active Transport
 | * Atoms and elements
* Atomic structure (sub-atomic particles, size and mass of atoms)
* Isotopes
* Electronic structure
* History of the atom
* Compounds and mixtures

Separation techniques (filtration, crystallisation, distillation and chromatography). | * Heat and Temperature
* Changes of State
* Investigating Density
* Energy transfers by conduction
* Energy transfers by convection
* Energy Transfers by infrared radiation
* Practically investigate surfaces emitting heat by infrared radiation
* Insulators in the home
* Practical investigating insulators
* Practical Specific Heat Capacity
 | * Cells, tissues, organs, organ systems
* The digestive system
* Carbohydrates, lipids, proteins
* Enzymes
 | * Development of the periodic table
* Modern periodic table
* Metals and Non-metals
* Group 1 elements
* Group 7 elements
* Group 0 elements

*Transition metals* | * Light
* Reflection
* Reflected Images
* Refraction
* The eye and the camera
* Colour
 | * Blood and blood vessels
* The Heart
* Cardiovascular disease
* The lungs
* Health and disease
* Cancer
* Plant tissues, organs and organ systems
* Transpiration
 | * States of matter
* Changing state
* Formation of ions
* Ionic bonding
* Ionic compounds
* Covalent bonding
* Simple molecular substances
* Polymers
* Giant covalent structures
* Allotropes of carbon
* Metallic bonding
* *Nanoparticles*

*Uses of nanoparticles* | * Recap series and parallel circuits
* Symbols and current
* current and charge
* potential difference
* resistance
* Length and resistance RPA
* ohm’s law
* Non ohmic conductors RPA
* resistors in series and parallel RPA
 |
| Skills | Use appropriate apparatus to record length and area.Use a microscope to make observations of biological specimens and produce labelled scientific drawings.Carry out calculations using the magnification formulaMake order of magnitude calculations and use standard form – Maths and graph skills | • Use the periodic table to identify elements• Recording observation• Practical skills (filtration, crystallisation, distillation and chromatography) | * Measuring temperature using a thermometer
* Use scientific theories and explanations to develop hypotheses
* Writing conclusions:
* Planning investigations to prove or disprove a hypothesis
* Use SI units
* Take and record measurements
* Present observations and other data using appropriate methods
* Method writing
 | Interpret graphs Calculate rates of reaction using raw data and graphs. Use appropriate apparatus to record the volumes of liquids, time and pH.Use of qualitative reagents (colour change) to identify biological molecules. | • Writing word and balanced symbol equations• Graph skills – describing patterns in trends•Recording observations | * Drawing ray diagrams
* Using a protractor
* Interpreting oscilloscope traces
* Method writing
* Use scientific theories and explanations to develop hypotheses
* Writing conclusions:
* Planning investigations to prove or disprove a hypothesis
* Use SI units
* Take and record measurements
* Present observations and other data using appropriate methods
 | Heart dissectionPractical skills Stomata count on upper and lower surfaceEvaluate risks related to use of blood products.Carry out rate calculations for blood flowMeasure the rate of transpiration. | * Use of data to make predictions
* Graph skills – analysing melting and boiling point data
* Draw diagrams for the formation of ions
* Drawing dot and cross diagrams
* Calculate the surface area to volume ratio.
* Unit conversions
* Writing in standard form
 | * Set up simple circuits from circuit diagrams.
* Manipulation of equations.
* Correct use of significant figures and standard form
* Set up simple circuits from circuit diagrams
* Manipulation of equations.
* Correct use of significant figures and standard form
* Use scientific theories and explanations to develop hypotheses
* Take and record measurements
* Plot an appropriate graph
* Record your data to an appropriate number of significant figures
* Set up circuits from a diagram
* Carry out practical work & obtain results
* Writing conclusions: Explain the results of practical work and connect them to
* Ohm’s Law.
* Analysing graphs using gradients
* Carry out practical correctly, safely and accurately
* Make and record observations using a range of apparatus and methods
* Present observations and other data using appropriate methods
* Use SI units
 |
| Covid recovery |  |  | Skills focus through spaced retrieval to catch up. |  |  | Skills focus through spaced retrieval to catch up. |  |  | Skills focus through spaced retrieval to catch up. |
| Careers | Context of units linked to employment opportunities.Nottingham University STEM – Students go to the University where they take part in workshops showcasing career opportunities in the SETM subjects |