St Christopher's Academy – NSM
Science Curriculum Policy – KS4

Origins of the Curriculum

The KS4 Science curriculum for the **Next Steps Medical Pathway**, is designed in alignment with the **National Curriculum** and reflects the **unique nature of Alternative Provision (AP)**. This curriculum is intentionally structured to meet the needs of pupils on short, medium-term fractional placements, many of whom may arrive with inconsistent prior education, varying experiences, and gaps in both knowledge and confidence. The curriculum has been designed to provide a robust and flexible pathway for pupils, supporting both academic achievement and personal development.

Our curriculum draws directly from the National Curriculum but is refined to focus on **key foundational concepts** across Biology, Chemistry, and Physics. It also considers the exam specifications most likely to be encountered upon reintegration into mainstream. This ensures a smoother transition for pupils and maximises future **post-16 pathways** by supporting access to science-based qualifications and careers.

Our curriculum acknowledges the diversity of pupil experience and need within AP. As such, it adopts a **sequential and responsive approach**, building upon KS3 foundations and adapting content to support individual gaps in knowledge. Where appropriate, key concepts from earlier stages are revisited to strengthen understanding before progressing. The curriculum is organised across Biology, Chemistry and Physics, with disciplinary knowledge ("working scientifically") interwoven throughout.
Beyond meeting national expectations, the purpose of our science curriculum is to **foster curiosity**, promote **critical thinking**, and provide **real-world application** of knowledge, encouraging pupils to explore the impact of science on society and their everyday lives.

This pathway curriculum has been built to:

- Consolidate and extend **substantive knowledge** (the scientific facts, laws, theories and concepts)
- Reinforce **disciplinary knowledge** (working scientifically – enquiry, analysis, interpretation)
- Embed **practical experiences** where possible, especially as pupils may have had limited opportunities to do so in previous settings
- Prioritise **literacy and vocabulary development**, aligning with the EDI Framework to support access and engagement for all learners

Due to the **nature of placements**, our curriculum is carefully sequenced to deliver **core scientific knowledge** from the outset. Topics have been selected for their foundational value, capacity to interlink across disciplines, and alignment with mainstream expectations. The curriculum is **deliberately flexible**—enabling teachers to adapt based on pupil assessments, prior learning, or known gaps—while still ensuring coherence and progression.
By studying science, pupils learn to make sense of the world around them. They develop skills in observation, analysis, problem-solving, and evaluation, which are valuable across all areas of life and future employment. Science also provides a platform for exploring global challenges and ethical debates—such as climate change, disease, and sustainability—encouraging pupils to consider their role as informed citizens.

Content and Sequencing

The science curriculum at KS4 is structured around the three principal disciplines:

- **Biology**: Cell biology; Transport systems; Health and disease; Coordination and Control; Photosynthesis
- **Chemistry**: atomic structure, bonding, chemical changes, energy changes, the rate and extent of chemical change, organic chemistry, chemical analysis,
- **Physics**: energy, electricity, particle model of matter, atomic structure, forces, gravity

These topics represent a **strategic selection** from the national curriculum, chosen for their relevance, accessibility, and ability to act as **building blocks** for wider science learning. Wherever possible, disciplinary knowledge such as formulating hypotheses, designing investigations, and interpreting results is embedded within these topics, rather than taught as a standalone unit. **Mathematical skills** are also integrated contextually.

Scientific enquiry is integrated within each topic, enabling pupils to apply **disciplinary knowledge** alongside **substantive knowledge**. Pupils are explicitly taught to question, hypothesise, analyse and evaluate using scientific methods, supporting both conceptual understanding and the development of transferable reasoning skills.

In line with the **EDI framework**, scientific vocabulary is taught explicitly and in context. This focus enables all pupils, especially those with gaps in literacy, to access and articulate scientific understanding effectively. Content is presented in manageable sequences, with **frequent opportunities for retrieval and consolidation** to ensure knowledge "sticks."

Where omissions from the National Curriculum have been necessary, these are deliberate and based on placement length and pupil profile. For example:

- In **Working Scientifically**, we omit direct instruction on "the ways in which scientific methods and theories develop over time" and "using a variety of concepts and models to develop scientific explanations and understanding" due to limited placement durations and assessment focus.
- **Biology omissions** – Ecosystems; Evolution, Inheritance and Variation are not covered.
- **Chemistry omissions** - some aspects have been omitted due to the practical elements that are unable to be achieved eg carbon chemistry; chemical changes; Energy changes in Chemistry; some aspects of chemical analysis; Chemical and allied industries and Earth and Atmospheric Science are not covered.
- **Physics omissions** from KS3 such as relative motion or density differences, are revisited only where required to access KS4 content, based on diagnostic assessments. Further omissions include: Forces – pressure in fluids and Forces and Motion – the speed of sound is not covered. The topic of Electricity is omitted entirely.

Teachers use a responsive approach to **identify and close knowledge gaps**, ensuring that pupils can access the content appropriate to their stage.

Sequencing Rationale

- **Fundamental first**: Topics such as cells, atomic structure, and forces are introduced early, as they underpin later concepts and are most frequently revisited across specifications.
- **Sequential design with concentric elements**: The curriculum revisits key scientific skills throughout, allowing pupils multiple opportunities to practice core enquiry skills.
- **Spiral approach**: Prior learning is constantly revisited and reinforced through low-stakes assessments, warm-up tasks, and retrieval practice.
- **Gaps addressed**: Lessons are designed to identify and close gaps in both knowledge and confidence, using baseline assessments, prior learning recall and responsive teaching.

The curriculum allows pupils to build progressively on KS3 learning. However, recognising that many pupils will arrive with incomplete KS3 experiences, lessons begin with activating **prior knowledge** and teaching essential prerequisite content. Teachers use diagnostic questioning and short assessment tasks to personalise learning and **address gaps efficiently**.

Assessment and Outcomes

Assessment in KS4 science supports both **learning and progression**, not merely qualification attainment. Pupils are assessed in multiple ways to:

- Check understanding
- Diagnose misconceptions
- Inform future teaching
- Build long-term retention

Formative assessment is used continuously to identify misconceptions and shape responsive teaching. This includes retrieval quizzes, hinge questions and questioning. Teachers use low-stakes assessments to inform gaps in both substantive and disciplinary knowledge.
Assessment as learning is prioritised through structured retrieval practice. Pupils are encouraged to recall and apply knowledge regularly, supported by feedback. Techniques such as guided recall and concept maps are used to reinforce long-term memory.
Summative assessment is aligned to our taught curriculum and are used to evaluate readiness for next steps.
Intended outcomes of the curriculum include:

- Mastery of key scientific concepts in biology, chemistry and physics
- Ability to apply scientific knowledge to real-life scenarios
- Secure understanding of scientific processes and working scientifically
- Readiness for further study or career pathways in science-related fields

Students RAG rate each lesson on a lesson feedback form, along with teacher assessment. These are then recorded on our progress trackers to inform next steps and areas where revisiting may be needed.

What Makes a High-Quality Science Lesson?
Aligned with the **EDI framework**, high-quality science lessons at KS4 feature:

- Clear **Know and Do** objectives
- Activation of **prior knowledge**
- **Explicit vocabulary instruction** and language scaffolding
- **Modelling and guided practice** using worked examples
- Frequent **checking for understanding** and responsive teaching
- **Independent application** and problem-solving opportunities
- **Reflection and discussion** to consolidate learning
- Relevance to **real-world contexts** and interdisciplinary connections

Literacy within Science
Literacy and communication cover a variety of skills, including taking and making notes, summarising information, presenting ideas/data, persuasive writing, and arguments. It also covers the 'spoken language' component of the National Curriculum. Teachers will incorporate metacognition and dialogue in the classroom, use activities to engage pupils with reading scientific text (helping them to comprehend it) and support pupils to develop their scientific writing skills. Technical vocabulary forms a key part of scientific learning, and it will form a part of every lesson. Key vocabulary will be explicitly defined for pupils to identify, absorb, and use as part of the wider lesson.

Science and the wider curriculum
Cultural Capital, Moral Development and Global Awareness in Science
Science at the Raedwald Trust provides more than academic development; it offers a gateway to future careers in fields such as healthcare, engineering, environmental science, and digital technology. Our curriculum is designed to promote **scientific literacy**, **informed decision-making**, and **transferable skills** to support life beyond education.

We recognise that **modern culture is deeply influenced by scientific discovery**, and as such, our teaching reflects the global and diverse nature of science. We actively explore and celebrate scientific contributions from a wide range of cultures—both historic and contemporary—moving beyond a Eurocentric focus to build awareness of **culturally diverse scientists** and their impact.

Pupils are encouraged to reflect on the **moral and ethical implications** of science and technology in everyday life—such as road safety, medical ethics, or environmental sustainability. We promote the development of a **moral compass**, helping pupils become open-minded, critical thinkers who can engage with complex issues thoughtfully and responsibly.

Collaboration is also central to scientific progress, and we mirror this in our approach. Pupils work together on investigations, learning to share data, evaluate findings, and improve reliability—reflecting the cooperative spirit of the scientific method.

Our curriculum remains responsive and inclusive, acknowledging outdated or controversial ideas where necessary, and striving to connect learning to the lived experiences of our pupils. In doing so, we build **cultural awareness**, broaden perspectives, and support every learner in understanding their place in a diverse and rapidly evolving world.