



PHYSICS

Curriculum Intent, Implementation and Impact

Intent

We aim to create the very best Physicists. We challenge students to think, act and speak like those working in the field would. We do this by quality first teaching, which ensures that students understand the fundamental concepts of Physics can articulate them with precise use of technical terminology and can apply them to a variety of familiar and unfamiliar contexts. Students develop strong working scientifically skills so that they understand how experiments can provide evidence, can critically evaluate data and link this to theory.

Our curriculum at NHGS goes far beyond what is taught in lessons, for whilst we want students to achieve the very best examination results possible, we believe our curriculum goes beyond what is examinable. As a department, we bring the subject to life through demonstrations, experiments and real world concepts. We provide a lunchtime science club for the younger students, lunchtime drop-in sessions for older students. We provide the opportunity for our highest achieving students to enter the British Physics Olympiad. KS5 students are encouraged and supported to attend Headstart courses and master classes offered by Isaac Physics. Teams are entered annually for the international rocketry competition - one of our teams in 2019 won the national final at the Paris international air show. Sixth form students have also been given the opportunity to mentor students lower down the school and take part in lower school lessons, gaining valuable experience in communication skills and organisation.

Our curriculum in Physics forms a backbone to our ethos statement. Examples of how our curriculum supports the ethos statement are through the Physics curriculum's incremental and spiral structure, with integrated interleaving which enables students to develop confidence in the subject. Enthusiastic and motivated teachers give up their own time to go above and beyond for students, from clubs, competitions and trips to lunchtime revision sessions. Creative teachers produce quizzes, logic problems, practical sessions and interactive lessons with hands-on tasks. Confident and mannerly teachers encourage students to achieve through positive relationships in the classroom. Enthusiastic, engaged motivated and mannerly students want to engaged with enrichment sessions and revision opportunities. Students are nurtured to have an enquiring approach to understanding how the universe works. Enthusiasm is modelled by our staff and praised in our students who are engaged and motivated to do well.

As a knowledge engaged curriculum we believe that knowledge underpins and enables the application of skills; both are entwined. As a department, we define the powerful knowledge our students need and help them recall it with topic checklists and knowledge organisers. Most lessons start with a low stakes quiz, which provides students with regular spaced retrieval practice. Formative diagnostic assessments further support this. In addition to all their paper resources, students have access to further resources through the google classroom and drive. In addition, students have access to the online Kerboodle resource,

which includes self-marking quizzes that give the students instant feedback. Seneca Learning set for lagged homework to help students remember knowledge.

We build the Cultural Capital of our students by exploring with the students links to the curriculum of current scientific issues. Through our curriculum we introduce students to the narrative of some of the most influential Physicists throughout history, their discoveries and the impact their work has had on the world in which we live. We also include examples of the implications of Physics applications on our world. Examples include global warming, nuclear fission and fusion.

Further rationale behind our curriculum design includes having a carefully planned progression through our curriculum, which is a spiral structure from year 7 to 11. Key ideas are introduced, revisited and built upon. We spent a great deal of time structuring the course to help students develop their understanding of the subject incrementally and holistically. We ensure the level of challenge is high enough for the most able, with scaffold and support available for students who need it.

Implementation

Collaborative curriculum planning lies at the heart of what we do in the department. We have chosen to share groups in the Sixth Form to give students a more varied approach to their learning. Each group is taught by two specialist teachers. We are continuing the development of our schemes of work, from KS3 through to KS5. These are focussed on embedding challenge, metacognition, memory techniques and literacy into our departmental curriculum.

Alongside our schemes of work, we use checklists and knowledge organisers. This is enabling us to define the core knowledge our students need to master. These crucial resources, and others, are shared on all google classrooms. Assessment and feedback strategies include self and peer marking, multiple choice questions, and exam questions completed under test condition which are teacher marked.

In Physics we also implement our curriculum through a variety of teaching approaches and tasks such direct instruction, practical work, demonstrations, simulations, worked examples, mini research projects, problem and exam question practice, questioning and discussions including applications of concepts to the real world. Lagged homework is provided for KS4 and 5 using online platforms such as Seneca, Kerboodle and Isaac Physics. Quick quizzes, and online platforms such as Kahoot provide the main ways we help students to remember and recall knowledge at the beginning of lessons.

We have a shared calendar to provide an order of lessons and all assessments are done within the same timeframe. Specialist subject teachers have the flexibility to use their own resources or adapt and personalise the centralised resources that are available to all.

Impact

We know our curriculum is working in the Physics department through excellent exam results. Departmental quality assurance shows students feel well prepared for exams, and enjoy the way their teachers relate the subject to the real world.

By the end of KS3, students are inspired with a sense of curiosity and wonder about the nature of the universe. Students have begun to develop the skills and understanding (as opposed to surface learning of facts) they need to be scientifically literate citizens and to pursue the study of Physics at higher levels. They have learned that decisions about uses of applications of Physics can impact the environment, for example energy resources and global warming.

Clear progression has been made by the end of KS4, in which deeper understanding has been built on a secure foundation. All students will have experienced a level of demand that is aspirational but also allows an educational experience that is inclusive of all learners. Students will have developed an understanding of the universe in which they live and the physics of many everyday scenarios and technologies they encounter on a daily basis. They will understand the scientific method and will have incorporated the procedural knowledge; and skills that are core to the discipline of Physics. Beyond the subject specific content, the curriculum enables learners to develop a broader range of skills necessary for a future in science as well as a wide range of study and career options. Many students finish KS4 with the knowledge, understanding and skills to study Physics at A-Level if they wish.

Throughout KS5 pupils learn a more mathematical approach to Physics and further develop their problem-solving skills. By the end of the course they are able to analysis and explain scenarios that involve multiple areas of the course. Pupils become competent practical physicists having used a range of techniques to produce valid, accurate and precise evidence with an understanding of error analysis. Students will have been provided with the opportunity to learn skills that are useful not only for progression into further study and careers in the sciences, but also more widely. Examples of wider relevance include analytical and problem solving skills, the ability to take accurate measurements, an understanding of hazard and risk and an appreciation of application and innovation in the science. The majority of our A-level Physics students go onto undergraduate study in science or engineering based courses including at Russel group universities.