



CHEMISTRY

Curriculum Intent, Implementation and Impact

Intent

We aim to create the very best Scientists. We challenge students to think, act and speak like those working in the field would. We do this by using effective questioning techniques in each lesson to push our students to think beyond their first response. They are expected to carry out practical work in each topic, where it is appropriate, in a responsible manner and record data effectively in order to be able to analyse it and draw conclusions from it. Keywords are vital in Chemistry and are provided on each topic checklist in an unambiguous manner in order to allow students to recognise them. A glossary of terms is also provided to help any students who may need further clarification on the meaning of the keywords. Teachers use these words during lessons and expect verbal responses from students to include appropriate scientific language.

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 provide a lunchtime science club for the younger students, lunchtime drop-in sessions for older students, lunchtime sessions to prepare Year 12 students for the Cambridge Chemistry Challenge competition and Year 13 students for the RSC Chemistry Olympiad. We also provide personalised mock interviews for those applying to universities where interviews play an important role in the application process. Year 13 students, with the support of the Chemistry Department, provide a weekly meeting for those wishing to study Medicine at university where Year 12 students can go along and gain information about the application process from Year 13 students. 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 Chemistry forms a backbone to our ethos statement. Examples of how our curriculum supports the ethos statement are:

Enthusiastic and motivated teachers give up their own time to go above and beyond for students, from science clubs and trips, to lunchtime sessions. Creative teachers produce quizzes, logic problems, projects, videos, 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 attend events and clubs, but also, older students volunteer to help and support the younger students in lessons. Enquiring and motivated students attend sessions provided by teachers to prepare for external Chemistry competitions. The department, including the technical support staff, is co-operative and works as a team with discussions every day sharing ideas and offering each other help and advice.

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 by providing detailed checklists for each of the 34 topics we teach. The majority of lessons begin with a quick quiz, which helps the students to recall key knowledge from previous topics as well as from the previous lesson. Each student from Year 8 upwards has a login for Kerboodle where tasks are set involving interactive quizzes, crosswords, drag and drop exercises etc in order to provide low stakes memory recall opportunities.

We build the Cultural Capital of our students by including examples of the implications of the chemical changes we, as a human race, are causing in our world. Examples include global warming, the overuse of fertilisers, the fact that some raw materials are running out and that techniques for mining them have an impact on the environment. We teach a topic about reduce, reuse, recycle in Year 11 and discuss plastic pollution in Year 8.

Further rationale behind our curriculum design includes choosing to teach certain topics in an order which provides students with the opportunity to practise their skills alongside the knowledge they are gaining. Topics have been chosen to interleave practical/skill-based topics with more theoretical ones where possible. Many topics, for example acids and calculations, are taught on a spiralled curriculum throughout the year groups to make learning stick and to develop deeper knowledge on the foundations taught lower down the school. Other topics which are knowledge-based and have been identified as being ones in which questions on the content were not successfully answered in end of year examinations, for example ions tests, have been brought forward to the beginning of Year 11 in order to give teachers the opportunity to make learning stick through quick quizzes and tests, including mocks.

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 and checklists, we use knowledge organisers in all key stages. These enable us to define the core knowledge our students need to master. These crucial resources, alongside keyword glossaries, are shared on all Google classrooms as well as being provided to students in lessons.

In Chemistry we also implement our curriculum through the use of a variety of teaching approaches and tasks such as practical work, demonstrations, videos, project work, group work and whiteboard Q and A. Lagged homework is provided in the form of Kerboodle tasks, GCSEPod, Seneca and exam questions. Online platforms such as Quizlet and Kahoot, along with our own quick quizzes resources, provide the main ways we help all students to remember and recall knowledge at the beginning of lessons. These quizzes will include questions from recent lessons as well as questions from previous topics to aid long-term memory.

We have a shared calendar which provides a very specific order of lessons and assessments. Students in any one year group are given the same summative assessments and these are carried out within the same timeframe, as much as is practically possible. Specialist subject

teachers have the flexibility to use their own lesson resources or adapt and personalise the centralised resources which are readily available to all.

Impact

Key Stage 3

By the end of KS3, students are inspired with a sense of curiosity and wonder about the nature of the world around them. The lower school Science Club nurtures young scientists to think outside the box. The fundamental understandings of the material world that we have developed so far have been covered in lessons and 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 chemistry at higher levels. They have learned that decisions about uses of chemistry can impact the environment, for example, the use of plastics and global warming.

Key Stage 4

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 learned that chemistry has an impact on society, and the world, by studying about climate change and pollutants; the production of fuels and plastics; and the life cycle assessments of services and products. They will have incorporated the procedural knowledge; and skills, (including practical skills), that are core to the discipline of chemistry.

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. We recognise that most learners will ultimately not work in the chemical sciences but it is crucial that every learner has a chance to become scientifically literate.

Key Stage 5

Throughout KS5, students will have experienced the approaches to reasoning and enquiry that are important in chemistry. They will have used current understanding in all three areas of chemistry (physical, inorganic and organic) to help them choose suitable processes and methods to answer new questions.

Development of competency in practical skills remains a core aim of our chemistry curriculum. Students will have finished the course having completed more than the recommended required number of practicals, and will gain all the practical competencies set out in the CPAC criteria. Students will have used a range of practical techniques to produce valid, accurate and reproducible evidence. Students' understanding of chemistry as an empirical science will have also been supported by this practical work, and they 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 the ability to take accurate measurements, an understanding of hazard and risk, and an appreciation of application and innovation in the sciences.

The A level Chemistry course empowers students to make decisions about their own lives and critically evaluate scientific developments. It equips them with the knowledge and skills to pursue further study and rewarding careers in the chemical sciences and a wide range of related fields, such as medicine, dentistry and veterinary science.

Here is a list of higher education courses accepted by our chemistry students in recent years:

Accounting and Finance with Foundation Year
Aeronautical Engineering
Aerospace Engineering
Agriculture with Animal Science
Apprenticeship - KPMG Trainee Accountant
Archaeology
Architecture
Biochemistry with a Modern Language
Biological Sciences
Biomedical Sciences
Biosciences with a Foundation Year
Bioveterinary Science
Cancer Biology and Immunology
Chemical Engineering
Chemical Engineering with Industrial Experience
Chemistry
Chemistry with Industrial Experience
Clinical Sciences/Medicine Foundation
Dental Hygiene and Dental Therapy
Dental Surgery / Oral Science
Dentistry
Dietetics
Economics and Econometrics
Economics with Study Abroad
Environmental Geoscience with Study Abroad
First Direct apprenticeship in finance
Food and Nutrition
Forensic and Analytical Science
Gap year
Genetics with Industrial Experience
Introduction to Optometry
Law
Mathematics and Statistics
Mechanical Engineering
Medicine
Medicine & Surgery
Medicine Abroad
Medicine with a Foundation Year
Microbiology
Modern Languages
Molecular Biology
Ophthalmic Dispensing
Optometry
Pharmacy with a Foundation Year
Physics
Primary Education (Accelerated Degree)
Psychology
Science Extended Degree Leading to a BSc (Hons) Degree
Science Foundation
Sport and Exercise Science
Sport, Coaching and Physical Education
Teaching and Education

Veterinary Medicine
Zoology with Professional Placement

Student Voice

Really friendly teacher and great vibe in class.

I enjoyed the weekly quiz in teams and it was good at recapping work.

I find chemistry very interesting. It is a fun and exciting subject that is very important in today's modern world. It has hard sections that are challenging but that is part of the appeal of the subject. Also there are many opportunities for experiments that are fun and exciting, especially some of the organic ones.

I have enjoyed the NMR topic, I found it rather fun, it is exciting working away at the puzzle trying to work out the structure of the molecule.

Once again, thank you for being such a brilliant teacher these past two years!!

Thank you for being such good teachers. I am very happy with my results.