

Sciences Department Curriculum Statement



Intent

In science we aim to:

- develop inquiring minds and curiosity about science and the natural world
- acquire knowledge, conceptual understanding and skills to solve problems and make informed decisions in scientific and other contexts
- develop skills of scientific inquiry to design and carry out scientific investigations and evaluate scientific evidence to draw conclusions
- communicate scientific ideas, arguments and practical experiences accurately in a variety of ways
- think analytically, critically and creatively to solve problems, judge arguments and make decisions in scientific and other contexts

The curricula we offer not only underpins the IB learner, but that of the schools values of Intellect, Empathy and Courage.

We aim to equip the citizens, and the scientists of the future with the knowledge, and skills to make informed decisions, that will enable them to contribute to the advancement and benefit of humanity's scientific exploration, that has formed and continues to shape the way in which we view the world. Identifying the underpinning principles of the biological, chemical and physical world has allowed humans to invent and create technologies that have changed the face of the planet. The modern world is increasingly technologically complex, and thus the need for a sound understanding of such principles has never been in more demand.

Implementation

a) Content & Skills

Planned sequencing, and progression through the Key stage curricula are linked below. KS3 SOW contains scientific Investigation work, and an emphasis on practical skills, also included are higher order questions in assessments, and examinations. Students are assessed in a KS2- KS3 transition test, on entry to year 7. In 2021- 2022 a new scheme has been introduced titled 'Exploring Science' which focuses on the skills mentioned, and on disciplinary literacy.

[KS3 Curriculum Rationale](#)

[KS3 Sequencing](#)

The KS3 curriculum lays the foundation of science, not only for progression to KS4 separate sciences, in Biology, Chemistry and Physics, but also for the Internal Assessment (IA) component of the International Baccalaureate.

Year 7 Curriculum

Chemistry Topic	Biology Topic	Physics Topic
Safety	Cells, Tissues, Organs & Systems	Energy
Mixtures and Separation	Sexual Reproduction	Electricity
Acids & Alkalis	Muscles & Bones	Sound
Particle model		
Atoms, Elements & Compounds		

Year 8 Curriculum

Chemistry Topic	Biology Topic	Physics Topic
Metals	Food	Heat
Atoms	Respiration	Pressure
	Microbes	Sound & Light
	Human Impact on the Environment	
	Ecology	

In KS4 students follow the OCR 9-1 Gateway Separate Science Award specification. Below is the link for the rationale for teaching order of Chemistry, Biology and Physics.
[KS4 Rationale for Teaching Link](#)

GCSE Separate Science Specification

Chemistry topic	Biology Topic	Physics Topic
C1 Particles	B1 Cell-Level Systems	P1 Matter
C2 Elements, Compounds & Mixtures	B2 Scaling Up	P2 Forces
C3 Chemical Reactions	B3 Organism - Level Systems	P3 Electricity
C4 Predicting & Identifying reactions & products	B4 Community - Level Systems	P4 Magnetism & Magnetic Fields
C5 Monitoring & Controlling Chemical Reactions	B5 Genes, Inheritance, & Selection	P5 Waves in Matter
C6 Global Challenges	B6 Global Challenges	P6 Radioactivity
C7 Practical skills	B7 Practical Skills	P7 Energy
		P8 Global Challenges
		P9 Practical Skills

In the sixth form the IB the following courses are offered at Higher level: Biology, Chemistry and Physics. At Standard Level the following courses are offered; Biology, and Environmental Systems and Societies. Higher level students take a KS4-KS5 Transition test early in the first term. A new IB specification will be introduced in the Sciences in 2023. A rationale for teaching order for the KS5 sciences is linked below.
[KS5 Rationale for Teaching](#)

b) Learning environment

In KS3 students are taught in form groups. In year 9, they are taught groups A-I (2021-2022). Year 10 and 11 students are grouped, consisting of 8 parallel teaching groups X1, X2, X3, X4, & Y1, Y2, Y3, Y4.

In the 2021-2022 Y12 IB cohort there are the following number of students: 39 Biology Higher students; 20 Biology Standard; 43 Chemistry Higher students; 53 Physics Higher students, and 55 Environmental Systems and Society students. In the 2021-2022 Y13 IB cohort there are the following number of students: 53 Biology Higher students; 20 Biology Standard; 40 Chemistry Higher students; 46 Physics Higher students, 10 Physics standard students, and 65 Environmental Systems and Society students.

The department is very well resourced, and supported by a team of laboratory technicians, led by a senior technician. There are 12 laboratories which are in general arranged for specialist teaching at KS5. Interactive whiteboards are installed in all science labs, and students are able to access networked science software during lessons. Data-logging is used to investigate concepts introduced during courses, and class sets of laptops, chromebooks or tablets, are used to ensure that all students can take part in these activities. Expectations of behaviour in laboratories are reinforced through the department code of conduct, and safety rules. In addition to the schools' non-negotiables which are displayed in all laboratories. Students throughout the key stages take part in extracurricular activities. Details of these activities can be found in the last section of this document.

c) Assessment & Feedback

Assessment:

At all Key Stages, formative and summative feedback is given to science students. Targeted, personalised comments, written or verbally are given by the teacher and student responses are reviewed to ensure the students have achieved their targets. Verbal feedback is a feature of all science lessons, and is key to assessing student work, and improving their understanding. Student record sheets are also used to assess progress, and suggest areas for improvement, with students and teachers setting relevant targets to help improve their work.

Teachers use Assessment for Learning strategies by going through questions on interim/end of module tests, correcting, writing other options, and setting specific targets in student books related to a task set. Included in the variety of methods used to assess at all Key Stage are retrieval, and Google quizzes, and online resources. At Key Stage 5 teachers use a variety of techniques to explain questions/calculations, including self and peer assessment. Google Classroom is also used to help students work through commonly made mistakes. This method is also used to help students work through their IBDP Internal Assessments. Progress is routinely tracked through summative and formative assessments, with books regularly checked and marked. End of topic tests are in place for all subjects and homework is regularly set to check understanding. Teachers monitor improvement over time and, where required, scaffold tasks appropriately, including the use of re-tests where students are encouraged to retry assessments and learn from their mistakes.

Feedback:

Students in KS3 are given progress trackers, which are updated with grades and targets based on areas for improvement, this allows them to reflect after mini topic tests, subject tests, and end of year examinations. These sheets are to be found at the front of their exercise books. The same system is used in KS4 & KS5, where they are then called record sheets, and electronic sheets respectively. Students are encouraged to identify their weak areas in order to rectify them through targeted review, and revision. At all key stages student progress is tracked through assessment marks, and grades recorded on a database on Google drive. In addition to individual support by class teachers, students are selected using this data for intervention clinics.

d) Covid catch up

We include retrieval practice activities into our lessons in order to assess all students, and particularly those students who had been adversely affected by the periods of remote learning. We continue to carry out a review of topic areas in GCSE years, using a variety of resources. Careful monitoring of data, through summative and formative assessment also indicates those students in need of support. Individual teachers, ensure personalisation in class to support those students.

In Year 10 in the second half of summer term, a small group of 50 students were invited to attend 'catch up' sessions. Twenty four students were selected to attend hour-long sessions in biology, chemistry, and physics for a period of 4 weeks. These sessions were led by specialist science teachers.

Through analysis of historical data, and current class data, weak areas in the IB syllabus for the Sciences and Environmental Systems and Societies, identified these topics to be reviewed in classes; Intervention clinics continue to be held, and personalisation strategies were used for individual students.

The same process was followed for KS3, Intervention clinics are held in the autumn and spring terms where science prefects support targeted students to mentor and support those students identified by their subject teachers. This, in addition to personalisation strategies to be used in class by their subject teacher.

In terms of Y11, using data from the Y11 mock examinations, and the end Y10 end of year examination, students are selected to attend intervention clinics, supported by trained science prefects. This, in addition to personalisation strategies to be used in class by their subject teacher.

Impact

Learning walks are carried out in the department, during which a sample of work scrutiny is carried out by the Leaders of the department. During the academic year 2021-2022 department members will carry out learning walks to observe their peers, and a program of work scrutiny will be undertaken.

Strategies for personalised learning are detailed in context sheets. Those students who are the most able are stretched and challenged through extension work, through material to

'read around' the subject, and through extra curricular activities such as science and STEM clubs and through visits, lectures and competitions such as the sixth form Olympiads, and the KS3 Salters Chemistry Festival competition. Through lesson observations, learning walks, and through analysis of data, teachers, HoD of science and Key stage leaders can see disparity between teaching groups and those students with SEND, or disadvantaged within these groups. The sharing of good practice, and resources enhances the teaching and learning, which in turn benefits the students in all Key Stages.

Extra-curricular activities

Key Stage 3

Gifted & Talented students in year 8 are entered every year for the Salters Festival of Chemistry, in 2019 it was held at Imperial College, and our students won first prize.

The science clubs are popular and well attended:

- 1) STEM club- run by Y 8s for Y 7s to enjoy, e.g Mini projects each week including electricity, DT and science ideas.
- 2) Chemistry Club - Yrs 7-8. Teacher led lunchtime club with chemistry based experiments each week.

Key Stage 4

We are proud that during National Science Week, 150 years after the 1st Periodic table was developed by Dimitri Mendeleev, students in year nine, and ten were tasked with creating a mural of the periodic table. This mural was selected for display in a photographic competition organised by the Royal Society of Chemistry Kent, and was displayed in a Whitstable Art gallery. The periodic table is now constructed in the stairwell near the main building.

Engineering Club - Years 10-11 student led project work, the plan is to build skills and experiences to enhance Arkwright Scholarship applications. This involves some 'one off' activities open to wider year groups e.g 'I'm An Engineer Get Me Out of Here', an online forum first offered in 2021.

Key Stage 5

Year 12 IB students entered the Cambridge Chemistry Challenge in 2019, and of the 7 who entered, 2 won a silver award, and 3 won a copper award. In addition the Chemistry Olympiad is a competition that we have entered for a number of years, in the academic year 2019 two entered, and the two gained silver awards. In 2021 5 entered and 3 silver and 1 Bronze were awarded.

Sixth former students are regularly encouraged to attend workshops, lectures and summer schools through links in the newsletter.

Science Leaders & Prefects

Science leaders & prefects had reduced duties during the academic year 2019 -2020 but were still able to produce resources for home experiments that were delivered to KS3 students.

Science leaders' normal duty is to deliver science clubs at local primary schools, and to assist with KS3 science clubs. The Science prefects role is to mentor KS3 and KS4 students & and support them in intervention clinics.

STEM initiatives & Extra Curricular activities

The House STEM competition runs for four weeks in the Autumn term. Mixed gender teams design solutions to problems from a list of design briefs, such as building a prototype, the team present their ideas verbally, and design a poster to showcase their design.

On STEM Power Day all students in year 9 complete workshops run throughout the day by STEM ambassadors. Half of year 10 complete a mini IB 'group 4 project' with support of the ambassadors. Students are supported with applications for programs such as 'Women In STEM' initiative. In 2021, Y11 & Y12 students applied for, and were nominated by the STEM Coordinator for this program..

Physics in Action, and other science events, are now online and can be organised in school with minimal disruption. Therefore, students can enjoy talks by a wide range of STEM professionals.

Membership of the Royal Society allows us to apply for tickets to the prestigious Christmas Lectures. We were fortunate enough to win 8 tickets for the 2019 & 2021 lectures.

Senior Science Society have regular meetings on Monday lunchtimes in which they each deliver presentations on science in the news (copies of their presentations can be found on the SSS google classroom).

Chemistry students had the opportunity to have a virtual talk on chemistry careers during remote learning.

Students across the 3 key stages are encouraged to read, whether it be comprehension exercises, through text in text books, or articles in journals. Gifted & Talented students, particularly those in KS4 & 5 are encouraged to read or view current stories in the news, given reading material, from journals or websites, or non fiction novels. This enhances their experience of science in the news, and cutting edge science in an ever scientific changing world.