

NCC Science Curriculum Provision

Vision & Rationale

We aim to foster the intellectual, social, creative, physical, moral and spiritual development of all our pupils. We will foster confident individuals and responsible citizens who display the following attributes:

TEAM PLAYERS

- Able to work cooperatively as part of a team.
- Able to work towards a shared goal.

ASPIRATIONAL LEARNERS

- Realistically ambitious.
- Confident and believe they can achieve.
- Have a personal vision for their own future.

SKILLFUL LEARNERS

- Competent in basic skills of literacy, numeracy and ICT.
- Have a range of transferable skills including independent study skills, organisation and communication.
- Critical thinkers.

RESPONSIBLE LEARNERS

- Supported, challenged and equipped for the future.
- Take responsibility for their actions, their education and for others.
- Are self-motivated and will persevere to reach personal goals and aspirations.

Reflective learners

- Enjoys creative, dynamic and reflective learning.
 - Able to learn from mistakes and experiences.
- Able to set SMART targets (SPECIFIC, MEASURABLE, ACHIEVABLE, REALISTIC/RELEVANT, TIME-RELATED)
- Able to stay calm and think things through.

STRATEGIC INTENT:

We aim to ensure that the curriculum is broad, balanced, relevant and personalised.

We intend to develop a curriculum which:

1. Delivers high quality of education.
2. Creates an aspirational high achievement culture.
3. Takes into account individual needs and styles.
4. Enables students to learn and make connections, using concrete, pictorial and abstract approach to learning.
5. Allows everyone to experience success and to develop scientific language and literacy throughout the curriculum.
6. Raises standards of attainment.
7. Create a culture capital and spiritual development in a caring supportive environment.
8. To equip students with scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics.

Curriculum Provision

Curriculum Design

A rich web of knowledge is what provides the capacity for pupils to learn even more and develop their understanding.

“This does not preclude the importance of skill. Knowledge and skill are intrinsically linked: skill is a performance built on what a person knows. That performance might be physical or cognitive, but skills matter and they cannot be separated from knowledge. They are, if you like, the ‘know-how’ in applying the ‘known’. Knowledge and the capacity it provides to apply skills and deepen understanding are, therefore, essential ingredients of successful curriculum design.”

A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world’s future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

• **The national curriculum for science aims to ensure that all pupils:**

- develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics (**Intent 1,5,6,8**)
- develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them (**Intent 1, 4,6**)
- are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future (**Intent 2,3,7**)

Wrap around curriculum:

Enrichment (Intent7)

An additional after school enrichment programme includes a range of activities, Science Club, after school study skills club. There is daily support for homework in the library. Extra Study Support is also in place especially for Year 10 and Year 11 depending on the individuals learning needs.

Year 7-11 DROP-DOWN Learning Days

DROP-DOWN Learning Days, when the normal lesson timetable is suspended, take place during the year. These days allow students to learn in different ways such as off site, with external providers and a range of students. These days cover Staying Safe, British Values, Study Skills, Pathways and work ready skills.

Pupil Premium, BCRB, Refugees and UASCs

Science fair competition and Biomedica meltdown competition.

Imperial College mentored projects- enrichment trips-enrichment days.

Deliver Science in the context of black Caribbean, African and other minority scientists and refer to the countries of origin in terms of resources, discoveries, diseases and climate.

Curriculum Pathway

Pathway	Year 7	Year 8	Year 9	Year 10	Year 11
A	KS3 Science		Year 9 curriculum: Bridging the Gap between KS3 and KS4	KS4 Combined Science Trilogy	Separate Sciences
B	Foundation Curriculum (phase 1)	KS3 Science and bridging the gap between KS3 and KS4		KS4 Combined Science	

Key stage 3 Curriculum:

Year 7 will consist of 2 pathways:

Phase 1: Foundation path

Phase 2: Mainstream path

These pathways are designed in order to support the different learning styles and needs of all students:

Phase 1

This phase is designed to support and bridge the gap between the concepts and ideas in KS2 and KS3. This phase consists of consolidating the concepts, processes and knowledge that should have been gained throughout KS2. This phase will be for students with huge gaps in their KS2 knowledge and understanding. Also, for students that score very low baseline grades. It aims to:

- Bridge the gap and consolidate the topics of KS2 while still teaching ideas and concepts of KS3
- Develop more literacy skills e.g. keywords, sentence structures (science has its own language!)
- Give students the chance to build on basic understanding therefore leading to analysis and evaluation skills.

Year 7 (phase 1) will continue to develop their scientific knowledge and understanding through year 8 before bridging the gap in year 9 between KS3 and KS4. This will be done at a foundation level in order to support the students with the learning and understanding they need prior to KS4.

Phase 2

This phase is designed for students who have a secure understanding of ks2 concepts and ideas as well as for those with appropriate baseline grades. The KS3 curriculum will build on their solid prior knowledge to allow for progression and also aim to focus on scientific enquiry and skills. This pathway aims to:

- Build on solid prior knowledge to allow for faster progression
- Focus on literacy skills and numeracy skills at a higher level
- Focus on scientific enquiry and skills

These students will continue to develop their scientific knowledge and understanding through year 8 before bridging the gap in year 9 between KS3 and KS4. This will be done at a higher level in order to facilitate support and provide challenge.

Key Stage 4 Curriculum

All students at NCC will continue to study all three sciences, i.e. a balanced science course, through to GCSE. It is envisaged that all pupils who are more science focused will study three separate sciences (Biology, Chemistry and Physics) in three, 60 minute periods per week, per subject, gaining three separate GCSE qualifications. This is certainly the best route for all who may eventually study one or more science subjects in the Sixth Form.

Combined Science Award (AQA Trilogy)

The combined science course is also offered for those whose interests or strengths lie away from the sciences. Based on three, 60 minute periods per fortnight, per subject, this will lead to a Science qualification that is equivalent to two full GCSEs. The syllabus is separated into discrete areas of Biology, Chemistry and Physics, all of which are taught by subject specialists from the Department.

Biology

Cell Biology, Organisation and Bioenergetics. Infection and Response. Homeostasis and Response. Inheritance, Variation and Evolution. Ecology

Chemistry

Atomic Structure and the Periodic Table. Bonding, Structure, and the Properties of Matter. Quantitative Chemistry, Chemical Changes and Energy Changes. The Rate and Extent of Chemical Change. Organic Chemistry, Chemical Analysis and Chemistry of the Atmosphere. Using Resources.

Physics

Forces, Waves, Magnetism and Electromagnetism. Energy, Electricity, Particle Model of Matter and Atomic Structure.

Examinations

There are six examinations: Two Biology, Two Chemistry and Two Physics. Each exam is 1 hour and 15 minutes long and worth 70 marks.

Separate Sciences Awards

Biology

This subject encourages pupils to ask questions about themselves and the world in which they live. Students will develop a concerned and informed awareness of relationships between living organisms, of Relationships between organisms and their environment, and the effect of human activities on these relationships. Above all, the aim is to promote a respect for all forms of life.

Summary of Content

Cell Biology, Organisation and Infection and Response. Bioenergetics, Homeostasis and Response. Inheritance, Variation and Evolution. Ecology

Practical Component

There will be ten required practicals conducted throughout the course to develop pupils' practical skills. Questions in the written exams will draw on the knowledge and understanding pupils have gained by Carrying out the practical activities. These questions will count for at least 15% of the overall marks for the qualification.

Examinations

There are two examinations, Paper 1 and Paper 2, each is 1 hour 45 minutes - 100 marks.

Teaching

This single subject is taught in three 60 minute periods per fortnight. It must be studied with single subject Chemistry and Physics leading to three full Science GCSEs.

Careers

Many higher education courses require a qualification at Key Stage 4 in Science, and Biology usually satisfies this requirement if grade 5 or better is obtained. This course will provide important foundation material supporting further study of Biology at A Level.

Separate Sciences Awards

Chemistry

Increasingly, modern chemistry is focusing on a detailed understanding of the processes at a molecular level, in living systems on the one hand and the structure and properties of exciting new materials on the other.

Knowledge of a wide range of everyday chemicals and materials used in the home, in agriculture and in industry is still required and plenty of practical experience is provided during the course.

Summary of Content

Atomic Structure and the Periodic Table. Bonding, Structure, and the Properties of Matter.

Quantitative Chemistry, Chemical Changes and Energy Changes. The Rate and Extent of Chemical Change.

Organic Chemistry, Chemical Analysis and Chemistry of the Atmosphere. Using Resources

Practical Component

There will be ten required practicals conducted throughout the course to develop pupils' practical skills.

Questions in the written exams will draw on the knowledge and understanding pupils have gained by carrying out the practical activities. These questions will count for at least 15% of the overall marks for the qualification.

Examinations

There are two examinations, Paper 1 and Paper 2, each is 1 hour 45 minutes - 100 marks.

Teaching

This single subject is taught in three 60 minute periods per fortnight. It must be studied with single subject Biology and Physics leading to three full Science GCSEs.

Careers

Chemistry occupies a central position between the physical and biological sciences, and is an essential requirement at A Level for many courses such as Medicine, Veterinary Science, Chemical Engineering and some life sciences.

Separate Sciences Awards

Physics

The new Physics GCSE is a fascinating introduction to the fundamental study of the universe, matter and interactions. It is easy to be left behind in a technological world that is changing fast. A grasp of basic Physics provides the necessary understanding that will enable active participation in this dynamic world. The AQA Physics course at NCC makes full use of the latest applications to make physics a highly up-to-date and more relevant subject.

Summary of Content

Forces, Energy and Waves.

Electricity, Magnetism and Electromagnetism. Particle Model of Matter, Atomic Structure.

Space Physics.

Examinations

There are two examinations, Paper 1 and Paper 2, each is 1 hour 45 minutes - 100 marks.

Teaching

This single subject is taught in three 60 minute periods per fortnight. It must be studied with single subject Biology and Chemistry leading to three full Science GCSEs.

Careers

This course enable pupils to gain a better understanding of our world and the laws of physics, while also providing a better preparation for A Level for those pupils who are considering this option.