

Science Curriculum Intent at Francis Barber PRU School

Science curriculum course intent

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KS3 statements

The students pursuing Science at FB PRU School will be participating in a vibrant focus and robust curriculum which will excite and engage, encourage participation and making science relevant and transparent.

The approach to teaching science

Science demands versatile teachers and imaginative approaches to bring it to life for pupils and give them thorough understanding of the subject.

Pupils need to recognise, describe, use and apply key scientific ideas to explain abstract phenomena even when they appear in unfamiliar contexts. Delving into key ideas can stimulate pupils' curiosity and help them to make connections between different areas of science.

Scientific enquiry generally links direct practical experience with key scientific ideas.

In the most effective practice, the principles of scientific enquiry are not left to special 'investigative science' lessons. They are integrated into most lessons, even those that involve little or no practical work. Teachers capitalise on chances in any lesson to encourage pupils to reflect, however briefly, on the evidence that supports scientific interpretations. For example, they ask pupils: 'How do you think they might have measured that?' or: 'How could you check those figures?'

• Pupils' experience of scientific enquiry

Pupils can carry out systematic investigations working on their own and with others. They can use knowledge and understanding to plan how to carry out a fair test and can read accurately the data presented in simple tables and graphs. They use a wide range of reference sources in their work including simple keys. Pupils can talk with confidence about their work and its significance, and communicate ideas using scientific language, conventional diagrams, charts and graphs. They can identify simple patterns in results and point out results that do not appear to fit the pattern. Pupils draw conclusions which match the data they have collected and begin to use this evidence to support further predictions. They know that scientists have combined evidence from observation and measurement with creative thinking to suggest new ideas and explanations for phenomena.

In Year 7, scientific enquiry should introduce pupils to:

- historical examples of the early work of scientists, including how collected evidence and creative thinking were used to draw conclusions and develop scientific ideas;
- the use of scientific knowledge to plan, obtain and present evidence during a scientific enquiry;
- the safety procedures and precautions that are needed when handling hazardous substances which they are likely to encounter in practical situations;
- the selection and appropriate use of equipment to observe and measure;
- describing and explaining what their results show when drawing conclusions;
- evaluating the strength of evidence.

Once these aspects have been established challenge pupils to apply their developing skills in different types of scientific enquiry. This will include increasingly complex investigative work.

Teach pupils how to:

- consider how early scientific ideas do not match present-day evidence and how they have changed over time;
- consider some of the positive and negative effects of scientific and technological developments;
- identify different strategies for solving problems;
- use first-hand experience, secondary sources of information and ICT to help refine predictions;
- collect evidence in situations where variables can and cannot be readily controlled or where a suitable control is not obvious;
- use qualitative and quantitative approaches where appropriate;
- interpret data from tables and graphs using scientific knowledge and understanding;
- make predictions of additional readings from data they have collected;
- provide explanations and justifications when they describe patterns and relationships in data from their own and others' investigations;
- improve a scientific enquiry by obtaining more accurate, consistent and reliable evidence to support conclusions;
- identify limitations of data in conclusions and make evaluations.

NC - <https://www.gov.uk/government/publications/national-curriculum-in-england-science-programmes-of-study/national-curriculum-in-england-science-programmes-of-study>

Key Stage 4 Science – Curriculum intent

Simply put, students who undertake Science at Francis Barber PRU will pursue the course with the following intent; **Develop successful learners who are able to apply scientific knowledge and understanding correctly to both familiar and unfamiliar contexts in the world.** Enable learners to understand how science fits into society and thereby encourage them to make a positive contribution to their local and wider community. The curriculum ensures that no student is left out or left behind on their Scientific Journey.

At KS4 the students pursue a double award GCSE course. The study OCR 21st Century BJ260. The course is taught over two (2) years, Years 10 and 11. (3 x 45 minutes lessons per week).

This course is a very robust and dynamic course, all encompassing in the three disciplines of Science subjects; Biology, Chemistry and Physics.

Students will have the opportunity to learn Science and scientific theories and its applications to a very high level at GCSE. They will study Science in a differentiated, practical rich curriculum, giving them first-hand experiences to the theories that they are learning in class and putting them into practice, where applicable. If they have missed any sections in their Science learning they will have the opportunities to bridge that gap in their learning and knowledge at Francis Barber PRU. We will foster independent learning while having fun doing and enjoying the Science course, linking Science to the real world.

At the end of year 11, students will sit 4 terminal examination in all three disciplines with the fourth examination paper, being a combination of all three disciplines (practical focused).

Also;

Deeper understanding of the scope Science covers and the role of the Curriculum

Science Curriculum Intent Learning is at the heart of everything we do. We believe that our students deserve a broad and aspirational science curriculum rich in skills and knowledge, igniting curiosity in our learners. Preparing them for further education and employment. The journey begins in KS3, where the curriculum is designed to provide the building blocks of the GCSE curriculum. Pupils will develop their investigation skills, gain an understanding of key scientific language, and practice the mathematical skills they require to thrive in the more complex investigations and analyses they will come across in GCSE. We aim for our students to be successful in their examinations and equipped to understand how to use data and evidence to draw conclusions and challenge ideas, expand their problem-solving skills, make independent decisions and to reflect on these decisions to improve their future and the future of others. The aforementioned journey is mapped using the KS3 national curriculum and KS4 adhering to the OCR Combined Science BJ260 Specification, (which we believe is one of the best foundation for A-Level and builds a greater understanding of science moving forward into the wider world).

The science scheme of work is regularly updated to ensure we are bringing in real-world content to keep the science relevant and engaging. They also reflect diversification in science as our body of knowledge is drawn from scientists working across the world. We have endeavoured to positively celebrate Women in STEAM and the impact they have had on the scientific community. We incorporate a science careers programme within our schemes of learning, and welcome outside speakers from various science backgrounds (eg. architecture, construction, motor mechanics, health services, forensics etc.). We focus on scientists from diverse backgrounds coming into the school and inspiring pupils to continue studying science as they progress into higher education. In the classroom, each of our lessons involves regular recall and retrieval, especially at the start, ensures pupils are retaining key concepts that have been developed in previous lessons, topics and years. This approach also enables teachers to identify and address misconceptions. Additionally, in KS4 there is one lesson per fortnight, in the main, dedicated to revising complex content from previous topics in the OCR 21st Century GCSE curriculum.

We also have targeted intervention for pupils with SEND and/or PP, both in and outside of the classroom. This is also the case for those most disadvantaged during the COVID 19 pandemic by being prevented from participating in home learning. As well as this, we have cross-curricular links with Maths and English as pupils must be able to record, interpret and display data as well as write and evaluate methods for investigations. There are also links to other subjects such as; Physical Education, History and Geography within the curriculum. The links between the separate sciences of Biology, Chemistry, and Physics in KS4 are made overtly clear during the teaching programme. The recent reintroduction of mixed ability in year 9 and KS4 has had a positive impact on pupil progression and engagement as well as the learning environment of each classroom. The Science department has an outreach program with local primary schools, this enables pupils to make a successful transition from KS2 into KS3 and give them a positive start. However, it is not just theory that we carry out in science. As mentioned before, science does not begin and end in the classroom.

Throughout the science curriculum the pupils are provided with lots of opportunity for hands-on activities to apply to real world situations, such as practical investigations, simulations, demonstrations, models, and excursions. This varied approach to teaching and learning enables pupils to not only visualise the science behind every day occurrences but breeds curiosity, encouraging them to look deeper into the 'how?' and 'why?'. Throughout the science curriculum the

lessons provide challenge which is gradually increased as topics are revisited in later years; the pupils prior knowledge is consistently being built upon. Within this approach, there are numerous opportunities for pupils to be creative and develop their understanding with the support of a teacher. No matter what the pupils' aspirations or targets, our approach **ensures nobody is left out**. Key concepts within the curriculum:

Biology – cells, bioenergetics, response, reproduction and genetics, ecology.

Chemistry- Atoms, chemical reactions/patterns, rates of reactions, earth resources, chemical analysis.

Physics – forces, energy, matter, motion, waves.

Table format

Year Group	Year Group Investigative skills	Maths skills
Yr7 (KS3)	Describing patterns	Means, anomalies, ranges
Yr 8 (KS3)	Key terminology/language	Significant figures, decimals
Yr 9 (KS3)	Variables and methods	Graphing
KS4 (Yr 10 and Yr 11)	Methods and evaluations	Algebra, balancing equations, data interpretations