



Science

Developing strategic minds, explorative hands and inquisitive hearts.



What is the vision for Science?

Scientists of Lyng Hall break down the 'why?' behind what we see, hear and explore in the world around them. Science helps us to answer our biggest questions and to meet our most basic needs

We want to support students in doing this by providing them with opportunities to make connections, experiment, research and test both old and new theories.

The 3 main goals are:

1. Use and interpret science to explain the world around them
2. Evaluate and understand scientific theories and evidence
3. Investigate and generate scientific explanations

Why do students at Lyng Hall need to study Science?

Studying Science at Lyng Hall allows students to gain enthusiasm for the process of scientific discovery and understand how the world around us works. Students get the opportunity to build connections between the world they see and how it works. Science provides a large range of transferable skills such as communication, practical skills, data analysis and scientific literacy skills. To achieve this, we consider the depth and breadth of theoretical and experimental science.

What are the aims for your curriculum?

1. Pupils will make good progress and achieve target grades, analysed through progress check data reviews.
2. Departmental tracking of students to identify underperformance
3. Pupils will show a development of practical skills and deepen knowledge and understanding
4. Pupils have the opportunity to revisit units covered in previous lessons.
5. Practical hands-on work in Science lessons and Science clubs to inspire and engage students in the love of Science
6. Promotion of Science through visits and STEM activities



Science Curriculum Overview/Long Term Plan Outline of taught and assessed content

The table below outlines the whole curriculum overview for this subject area, and shows the journey that students take throughout Lyng Hall.

Key Stage 3

Year 7	Year 8	Year 9 "Preparing for triple Science" KS3 (6 lessons / fortnight)	Year 9 "Preparing for Synergy" KS3 Science (6 lessons / fortnight)	
Induction week-introduction to science	Breathing	Plant and Animal Cells	States of Matter	
Speed				
Cells		Periodic Table and Elements	States of Matter	Plant and Animal Cells
Particle Model				
Sound				
Half term				
Sound	Inheritance	Forces and Energy Changes	Sound Waves and Light Waves	
Interdependence	Chemical Energy		Atomic Structure	
Metals and Non-Metals	Work	Digestion	Digestion	
Current, Voltage and Resistance	Digestion			
Christmas Holiday				
Current, Voltage and Resistance	Digestion	The Cardiovascular System	The Cardiovascular System	
Variation	Climate		Atomic Structure	Forces and Energy Changes
Separating mixtures	Magnets and Electromagnets			



Half term			
Gravity	Respiration	Atomic Structure	The Earth's Atmosphere
Movement	Types of Reaction	Current, Voltage and Electricity	
Earth Structure			Pressure
Easter			
Light	Pressure	Current Voltage and Electricity	Healthy Lifestyles
Plant Reproduction	Photosynthesis		Magnetism and electromagnetism
Acids and Alkalis	Wave Effects and Wave Properties		The Periodic Table
Energy Costs and Energy Transfers	Earth's Resources	Healthy Lifestyles	
Half term			
Energy Costs and Energy Transfers	Evolution	Healthy Lifestyles	Photosynthesis
Human Reproduction	Heating and Cooling		
Universe	Catch Up and Summer Activities	Review whole year and End of KS3 Assessment Test	Review whole year and End of KS3 Assessment Test
Summer Activities			

Key Stage 4 - Year 10

GCSE Chemistry (AQA)	GCSE Physics (AQA)	GCSE Biology (AQA)	Synergy Science (AQA Double Award)
4.3 Quantitative chemistry	4.1 Energy	4.3 Infection and Response	4.2 Ecosystems
	4.3 Particle model of matter		7.1 Forces and Motion
Half Term			
4.4 Chemical changes	4.3 Particle model of matter	4.4 Bioenergetics	6.2 Structure and bonding
	4.4 Atomic structure		7.2 Electricity
Christmas Holiday			
4.4 Chemical changes	4.4 Atomic structure	4.5 Homeostasis and response	3.3 Preventing Treating and Curing Disease
	4.5 Forces		5.2 Chemical Quantities
Half Term			
4.5 Energy changes	4.5 Forces	4.5 Homeostasis and response	3.2 Radiation and Risk
			7.3 Acids and Alkalis
Easter Holiday			
4.6 The rate and extent of chemical change	4.6 Waves	4.6 Inheritance, variation and evolution	4.3 Inheritance, Variation and Evolution
			8.1 Carbon Chemistry
Half Term			
4.7 Organic chemistry	4.6 Waves	4.6 Inheritance, variation and evolution	8.1 Carbon Chemistry
Revision, Mocks and Work Experience			



Key Stage 4 - Year 11

GCSE Chemistry (AQA)	GCSE Physics (AQA)	GCSE Biology (AQA)	Synergy Science (AQA Double Award)
4.8 Chemical Analysis	4.6 Waves	4.6 Inheritance, Variation and Evolution	5.2 Chemical Quantities
			7.4 Rate and extent of chemical change
Half Term			
4.9 Chemistry of the Atmosphere	4.7 Magnetism and Electromagnetism	4.6 Inheritance, Variation and Evolution	7.4 Rate and extent of chemical change
4.10 Using Resources		4.7 Ecology	7.5 Atoms into Ions
Christmas Holiday			
4.10 Using Resources	4.8 Space Physics	4.7 Ecology	8.2 Resources and Materials
4.5 Energy changes			
Half Term			
4.5 Energy changes	Revision	Revision	Revision
4.6 The rate and extent of chemical change			
Easter Holiday			
4.6 The rate and extent of chemical change	Revision	Revision	Revision
Revision			
Half Term			
Revision			



Key Stage 5 – Biology (Physics & Chemistry Coming September 2024..)

Tues PM (2)	MVT Fri am (3)
TEACHER TRAINING	INTRO TO COURSE
2.1.2 Biological Molecules (Glucose and Carbohydrates, PAG 5.2, Lipids PAG 9.2)	2.1.1 Cell Structure (Recap, ultrastructure and functions)
2.1.2 Biological Molecules (Amino Acids, Proteins PAG 9.1)	2.1.1 Comparing eukaryotes and prokaryotes, Intro to Microscopy (PAG 1.3)
2.1.2 Biological Molecules (Amino Acids, Proteins, Urine Analysis practical and PAG 6.1)	2.1.1 Microscopy PAG 1.2
2.1.2 Biological Molecules Review and Test	2.1.1 Cell Structure review and Test
2.1.3 Nucleotides and Nucleic Acids	2.1.4 Enzymes (structure, action, inhibition, cofactors etc)
2.1.3 Nucleotides and Nucleic Acids (DNA Precipitation)	2.1.4 Enzymes (factors affecting rate PAG4)
2.1.3 Nucleotides and Nucleic Acids (PAG 10.1)	2.1.4 Enzymes (factors affecting rate PAG 4)
HALF TERM	
2.1.3 Nucleotides Review and Test	2.1.4 Enzymes Review and Test
2.1.6 Cell Division, Diversity and Organisation (PAG 1.1 Mitosis)	2.1.5 Biological Membranes (PAG 8.3)
2.1.6 Cell Division, Diversity and Organisation	2.1.5 Biological Membranes (PAG 8.1)
2.1.6 Review and Test	2.1.5 Biological Membranes (PAG 5.1)
Module 2 revision	2.1.5 Biological Membranes Review and Test
Module 2 revision	Module 2 revision
Module 2 revision	END OF MODULE 2 Assessment
CHRISTMAS HOLIDAYS	
TEACHER TRAINING	4.1.1 Communicable diseases and defence - Types, transmission, Plant Defences
3.1.1 Exchange surfaces and Mammalian Ventilation PAG 1.3 Lung tissue	4.1.1. Non-specific Defence in animals
3.1.1 Insect and Bony Fish Ventilation PAG 2 Fish head dissection	4.1.1. PAG 1.2 Blood Smear, Specific Immune system
3.1.1 Insect and Bony Fish Ventilation PAG 2 Locust Dissection	4.1.1 Specific Immune Response in Animals (Memory Cells, Antibodies...)
3.1.1 Review and Test	4.1.1 Active/Passive Immunity, Natural/Artificial, Autoimmune diseases, Vaccinations, Antibiotics
HALF TERM	
3.1.2 Transport in animals, tissue fluid and Heart PAG 2.1	4.1.1 Review and Test
3.1.2 Cardiac cycle and Effect of Exercise (PAG11.1)	4.1.1 Review and Test
3.1.2 ECGs and Role of Haemoglobin and oxygen dissociation curves	4.2.1 Biodiversity - different levels of diversity, sampling PAG3
3.1.2 Review and Test	4.2.1 Sampling PAG 3
3.1.3 Plant Transport - need for transport in multicellular, structure and function of vascular system in herbaceous dicotyledonous plants	4.2.1 Simpson's Index and Genetic Biodiversity (incl. calculation)
EASTER HOLIDAYS	
3.1.3 Plant Transport PAG2/1 Xylem and Phloem - Examination and staining of plant tissues to show distribution, dissection of stems transverse and longitudinally	4.2.1 Factors affecting biodiversity



3.1.3 Plant Transport Transpiration PAG5/11 Potometres and different conditions	4.2.1 Maintaining Biodiversity
3.1.3 Adaptations of plants to water availability, Translocation	4.2.1 Review and Test
3.1.3 Review and Test	BANK HOLIDAY
Revision	4.2.2 Classification - Taxonomy, Binomial, Domains, Phylogeny
Revision	4.2.2 Evolutions and Natural Selection
Revision	4.2.2 Variation and Adaptations
	HALF TERM
Revision	4.2.2 Evolution effect on populations over time
Revision	4.2.2 Revision and Test
Revision	Revision
	MOCKS
Module 5	Module 6
Module 5	Module 6
Module 5	Module 6
	SUMMER HOLIDAYS

Curriculum Breakdown

Why is it taught in the order that it is?

Key stage 3

The curriculum narrative builds upon the work carried out at KS2 and follows the national curriculum. The paragraphs below give a summary of journey through the curriculum for each year group within KS3 and suggests how understanding by the end of that year sets pupils up well for the next.

Year 7

- Students are taught approximately 3 topics per half term as this allows them to slowly build knowledge of all 3 sciences. We start with core knowledge including cells, atoms and energy. From this we can build students' knowledge and confidence in Science.
- We build on KS2 knowledge, focussing on developing scientific language and practical skills.
- Without building a solid core knowledge students will struggle to make progress in future years.

Year 8

- Students continue to be taught approximately 3 topics per half term as this allows them to slowly build knowledge of all 3 sciences. We build on knowledge from year 7 developing both scientific knowledge and practical skills.
- Interleaving topics gives students the opportunity to recap and consolidate knowledge from both year 8 and 7 topics

Year 9

- Year 9 will act as a transition year, whilst also continuing the national curriculum for KS3 Sciences. It will allow us to ensure students have both the scientific skills and maths skills needed to succeed at GCSE in Separate Sciences and Synergy Science. Students will have the opportunity to explore some topics that they would otherwise miss unless doing triple science. Many of the foundations for GCSE are delivered here in greater depth such as cell structure, atomic structure and Electricity.

Key stage 4

The curriculum narrative builds upon the work carried out in Key Stage 3 and follows the subject# specification. Most students will study the AQA Synergy Science pathway. Our rationale for this is to ensure that we teach Science in a way that promotes, highlights and encourages the many cross disciplinary links between Science topics. We feel that teaching a double science qualification this way avoids the teaching of three Separate Sciences as distinct entities. For example, students can learn about atomic structure with its links to both Chemistry and Physics rather than as a piecemeal approach over 2 years. Chemical reactions and Kinetic theory can be taught alongside biological reactions to highlight the links.



Curriculum Milestone Aims

What are the aims of specific stages of the curriculum?

KS3:

Year 7: By the end of Year 7 students will be able to show knowledge of;

1. Cells
2. Particles
3. Forces
4. Reproduction
5. Atoms, elements and compounds
6. Space
7. Interdependence
8. Mixtures
9. Energy Transfers

Students will also demonstrate safe practical procedures in the lab.

Year 8: By the end of Year 8 students will be able to show knowledge of;

1. Tissues and organs
2. Acids and alkalis
3. Movement and pressure
4. Respiration and photosynthesis
5. Changing substances
6. Magnetism
7. Life diversity
8. Earth systems
9. Electric circuits - resistance
10. Nutrition
11. Light

Students need to demonstrate investigation and practical skills

Year 9: By the end of Year 9 students will be able to show knowledge of

1. Light
2. Human interaction
3. Using resources
4. Sound and waves

Students should leave year 9 with the core scientific knowledge and maths skills needed to succeed at GCSE



KS4:

Year 10: By the end of Year 10 students will be able to show knowledge of

1. cells and reproduction
2. Disease and bioenergetics
3. Atoms, bonding and moles
4. Chemical reactions and energy changes
5. Energy and energy resources
6. Particles at work

Year 11: By the end of Year 11 students will be able to show knowledge of

1. Biological response
2. Genetics and reproduction
3. Ecology
4. Rates, equilibrium and organic chemistry
5. Analysis and the Earth's resources
6. Forces in action
7. Waves, electromagnetism and space



Literacy in Science

The Science Department have worked extremely hard to create and provide learning environments that support and develop key literacy skills. With live word walls, literacy mats and tiered language in every classroom, students are updated and supported each lesson to build their vocabulary and understanding with scientific language and terminology in the world around them. In class books there are vocab checklists, knowledge organisers, wordsearch activities, gap fill and many more to support students all the way through to their final exams and answering higher mark questions. Teachers use additional texts and key language as part of their teaching practice to support learners to develop their oracy, reading and writing skills.

Command Words	Meanings – (what you are expected to do when these words appear in questions in exam)
Calculate	Use numbers given in the question to work out the answer.
Choose	Select from a range of alternatives.
Compare	Describe the similarities and/or differences between things, not just write about one.
Complete	Answers should be written in the space provided, for example, on a diagram, in spaces in a sentence or in a table
Define	Specify the meaning of something.
Describe	Recall some facts, events or process in an accurate way.
Design	Set out how something will be done.
Determine	Use given data or information to obtain an answer
Draw	To produce, or add to, a diagram. Estimate Assign an approximate value.
Estimate	Assign an approximate value.
Evaluate	Use the information supplied as well as their knowledge and understanding to consider evidence for and against.
Explain	Make something clear, or state the reasons for something happening. Use BECAUSE in your answer
Justify	Use evidence from the information supplied to support an answer.

Check the command word for exam questions

Key Lab Rules:

- Always make sure long hair is tied back.
- Always wear safety goggles when experimenting.
- Listen to all instructions
- No eating or drinking in the lab.
- No running in the lab.
- Make sure bags and coats are put away so no one can trip over them.
- Always stand up when experimenting.
- Be sensible at all times.

Table of units

1 000 = 10³ = one thousand million
 1 000 000 = 10⁶ = one million
 1 000 000 000 = 10⁹ = one thousand million
 1 000 000 000 000 = 10¹² = one trillion

Each prefix can go before any SI unit. For example:

1 000 = 10³ = 1 kilohertz = 1 × 10³ Hz
 1 000 000 = 10⁶ = 1 megawatt = 1 × 10⁶ W
 1 000 000 000 = 10⁹ = 1 gigabyte = 1 × 10⁹ B
 1 000 000 000 000 = 10¹² = 1 terabyte = 1 × 10¹² B

Periodic Table of the Elements

