



# Curriculum Overview

ACADEMIC YEAR

2023/24

## **KS4 Science Curriculum Intent:**

At Kings we follow the National Curriculum for Science with the intention of:

- Developing a deeper scientific knowledge and conceptual understanding through the specific disciplines of Biology, Chemistry and Physics.
- Developing a deeper understanding of nature, processes and methods of Science through different types of enquiries that will enable students to answer specific questions about the world around them.
- Equipping students with the scientific skills required to understand the uses and implications of Science, today and in the future. We aim to produce scientific literate adults.
- Promote the core PRIDE values within lessons allowing students to develop skills to become positive, respectful citizens that have a high level of integrity.

At Kings we look to build on the unique work completed in our feeder schools where most students can experience science from Year 5 onwards. We understand that students come to us with many scientific skills already embedded and it is the intent of our curriculum to further enhance these skills through our programme of study. We aim to build on the curiosity for Science that our students display and their desire to understand the world around them by providing them with the knowledge, concepts, skills and positive attitudes in order to provide society with confident, independent, scientific literate individuals of the future.

It is the aim of our curriculum to inspire students to extend their scientific learning journey beyond KS4 and to take the opportunity for further study in Science at Kings and beyond.

## Science ‘What our lessons look like’:

In Science lessons at Kings, we endeavour to allow students every opportunity to become actively engaged in their learning. Science lessons will provide every opportunity for students to be ‘hands on’ when it comes to the concepts being covered. This is achieved through the innovative use of practical work, discussions and group work.

The spiral curriculum will allow students to gradually build on previous knowledge as they move through the different topics. Every opportunity will be taken in lessons to allow students to build skills based on retrieval and metacognition through specific tasks and directed questioning.

Throughout Science lessons every effort will be made to embed scientific skills (numeracy, language, experimental skills etc.) where appropriate so that students are able to gain mastery of these skills as they move through the course.

Lessons will allow students to work independently towards learning objectives. Students will receive individual feedback in relation to these learning objectives through the Faculty marking policy and indicated, where necessary, towards improvements of their work.

At all times, students will be encouraged to take PRIDE in their work, and where standards fall below expectations measures will be put in place to make sure that standards of work are upheld into the future.

## Science Skills:

Throughout the units of work outlined in the Science curriculum students are expected to develop mastery of scientific skills as well as the knowledge and understanding of key concepts.

Science skills to be incorporated include:

- **Experimental skills** – the planning and carrying out scientific investigations in order to achieve accurate and reliable results.
- **Analysis** – being able to analyse results gained from scientific investigations and use data to make valid conclusions that are backed up by the data available.
- **Evaluating** – the ability to look critically at evidence/data and suggest measurements that compromise the validity of the results. To be able to suggest improvements to the scientific methods that that improve the accuracy of results.
- **Scientific numeracy** – to incorporate Mathematical skills to analyse data in more detail.
- **Scientific language** – to be able to use Science specific language in the correct context.
- **Scientific context** – the ability to relate the concepts that are being covered to real life situations and being able to incorporate individual experiences into their learning.

## **KS4 Science Curriculum Implementation:**

The KS4 Science curriculum at Kings is based on a spiral curriculum. Students visit concepts in Year 9 and will then build on these concepts throughout Years 10 and 11.

Throughout Year 9, the KS3 Science curriculum is incorporated into the curriculum allowing students to progress seamlessly from KS3 to KS4. Where appropriate content from the 'separate' Science curriculum for each individual subject is also incorporated allowing all students access to additional material/concepts. Students are taught in mixed ability classes throughout Year 9.

In Year 10 students will be looking at some concepts for the first time but in many cases the spiral curriculum will continue to build on the concepts that were introduced in Year 9. Additional content from the 'separate' Science curriculum will again be incorporated into schemes of learning where appropriate. Students are taught in mixed ability classes throughout Year 10.

In Year 11 students are streamed based on their assessments throughout Years 9 and 10. Selected students are offered the chance here to study each of the separate Sciences. Units undertaken in Year 11 are ones that are considered to have the more demanding concepts and those topics that are heavy in 'triple' content.

## **KS4 Science Curriculum Impact:**

The impact of the Science curriculum first and foremost is that it enhances the students' experience of Science education. We want students to enjoy lessons and demonstrate that they can use Science with confidence going forward as part of their everyday lives.

Students will make sustained progress throughout the course and will develop into confident Science learners. Students will be able to form opinions based on their scientific knowledge and understanding and that this knowledge and understanding will also inform judgments into their futures.

The curriculum provides students with a logical path through the Science National Curriculum allowing them to build on previous knowledge and build up understanding in a sustainable way. The curriculum will also allow students to explore additional concepts to further enhance their Science experience.

By providing students with an enriching and well-resourced curriculum that strives to link the concepts taught in lessons to life outside the classroom, we aim to inspire the next generation of scientific thinkers that are able to make a future impact in the world of scientific discovery.

## Science KS4 Curriculum Overview, Year Nine:

### Biology Unit 1:

- Cells
- Organisation

### Biology Unit 2:

- Infection and Response
- Bioenergetics - Respiration

### Biology Unit 3:

- Ecology

### Chemistry Unit 1:

- Atoms
- Atmosphere

### Chemistry Unit 2:

- Acids and Bases
- Oil

### Chemistry Unit 3:

- Rates of Reaction
- Metals

### Physics Unit 1:

- Particles
- Energy

### Physics Unit 2:

- Electricity
- Waves

### Physics Unit 3:

- Forces
- Atomic Structure

# Year 9 Curriculum Rational:

## Biology

Biology in Year 9 starts with Cell theory as this underpins much of Biology. We also incorporate a little bit of a KS3 recap of some key ideas. We study Organisation including the anatomy of the digestive system, heart and lungs. These are topics that students can relate to easily and grasp. We then turn our attention to Infection and Response, which also builds on prior knowledge about cells. Bioenergetics introduces Respiration and its role in all living organisms. We finish the year with Ecology. We look at adaptations and competition, as well as sampling techniques. We also add a little bit of the easier Triple content.

## Chemistry

Chemistry in Year 9 starts with the concepts based around atoms and the periodic table as this forms the basis for much of the Chemistry going forward. The fundamentals of the Atmosphere topic are visited here as they require little prior knowledge. The major focus for the remainder of the year is the main topics of Acids and bases, Oil (Organic chemistry), Reaction which are looked at for the first time. Metals comes at the end of the year as it brings in concepts from a number of topics and does rely on topics visited earlier.

## Physics

Physics in Year 9 starts with the Particles and Energy. These two topics are fundamental building blocks for the rest of the GCSE course and contain some key vocabulary that should be mastered early. The approach to Energy is purely qualitative. Electricity and Waves are next, with a focus on the basics, such as properties of waves and the key vocabulary that describes them. Electricity starts from static and moves through to simple circuits with an emphasis on practical circuit building skills. The final unit covers Forces and Atomic structure. Forces develops skills such as drawing force diagrams, describing motion alongside distance-time graphs, all of which are needed to work with more difficult concepts later in the course. Atomic structure again begins with key vocabulary and is purely qualitative.



## Science KS4 Curriculum Overview, Year 10:

### Biology Unit 4:

- Homeostasis and Response
- Inheritance, Variation and Evolution

### Biology Unit 5:

- Cells
- Organisation

### Biology Unit 6

- Infection and Response
- Bioenergetics - Photosynthesis

### Chemistry Unit 4:

- Atoms and Bonding

### Chemistry Unit 5:

- Acids and Bases
- Chemical Analysis

### Chemistry Unit 6:

- Electrolysis
- Polymers

### Physics Unit 4:

- Space
- Forces

### Physics Unit 5:

- Electricity
- Mains electricity

### Physics Unit 6:

- Energy
- Magnetism

# Year 10 Curriculum Rational:

## Biology

Homeostasis and Response builds on the foundations of Cells from Year 9. Now students are familiar with the functioning of the body they begin to learn about the nervous and endocrine systems. Inheritance provides an introduction to DNA and the genome, and looks at the easier aspects of inheritance in preparation for Year 11. Next we revisit Cells and Organisation, looking at the more tricky and abstract concepts of magnification calculations, osmosis, enzymes and transpiration. This builds on the Year 9 work. Infection and Response looks at antibiotics and vaccination; again more tricky topics that build on Year 9, as well as Triple content including monoclonal antibodies. In Bioenergetics, after a quick review of Year 9 work on Respiration, the focus is on Photosynthesis. This features the trickier ideas including RP including limiting factors and the “inverse square” law.

## Chemistry

Atoms and Bonding builds the concepts covered at the start of Year 9. Content of this topic is fundamental for many of the remaining topics in Year 10 as they rely on the students' knowledge of chemical bonding. Acids and Bases are revisited and the topic on Chemical analysis is covered here. This topic is mostly 'triple' content but contains practical procedures that students will find interesting e.g., Flame tests. Electrolysis and Polymers needs students to have a sound knowledge of the concepts of chemical bonding covered earlier.

## Physics

Physics in Year 10 builds on the foundations from Year 9. Forces and motion is one of the largest topics, and now includes the more complex Mathematics that is needed to analyse more advanced problems. The standalone topic of Space is next, which is a popular topic and encourages student engagement. Electricity is taught in the following unit, covering more complex circuits and uses of electricity, including mains electricity. Energy is now revisited with a focus on Mathematical analysis of problems, building on the qualitative approach from Year 9. The final topic is Magnetism, which relies on an understanding of previous topics of Electricity and Forces.

## Combined Science KS4 Curriculum Overview, Year Eleven:

<p><b>Biology Unit 7:</b></p> <ul style="list-style-type: none"> <li>• Homeostasis and Response</li> <li>• Inheritance, variation and Evolution</li> </ul>	<p><b>PPE Assessment</b></p> <ul style="list-style-type: none"> <li>• Paper 1</li> </ul>	<p><b>Biology Unit 8</b></p> <ul style="list-style-type: none"> <li>• Ecology</li> </ul>	<p><b>PPE Assessment</b></p> <ul style="list-style-type: none"> <li>• Paper 2</li> </ul>
<p><b>Chemistry Unit 7:</b></p> <ul style="list-style-type: none"> <li>• Calculations</li> </ul>	<p><b>PPE Assessment</b></p> <ul style="list-style-type: none"> <li>• Paper 1</li> </ul>	<p><b>Chemistry Unit 8:</b></p> <ul style="list-style-type: none"> <li>• Rates and Equilibrium</li> <li>• Water</li> </ul>	<p><b>PPE Assessment</b></p> <ul style="list-style-type: none"> <li>• Paper 2</li> </ul>
<p><b>Physics Unit 7</b></p> <ul style="list-style-type: none"> <li>• Particles</li> <li>• Atomic structure</li> </ul>	<p><b>PPE Assessment</b></p> <ul style="list-style-type: none"> <li>• Paper 2</li> </ul>	<p><b>Physics Unit 8:</b></p> <ul style="list-style-type: none"> <li>• Magnetism</li> <li>• Waves</li> </ul>	<p><b>PPE Assessment</b></p> <ul style="list-style-type: none"> <li>• Paper 1</li> </ul>

# Year 11 Curriculum Rational:

## Biology

Topics that are taught in Year 11 include more Homeostasis and Responses, focusing on synapses and reproductive hormones; Inheritance, including meiosis, genetic crosses and genetic engineering. These topics involve application of Biological knowledge which has built up over the previous two years. There is also a large piece of Triple content, including the Brain and the Eye to keep the students engaged. Triple content continues in IVE with DNA, genetics and cloning. We finish with the remaining Ecology topics, looking at the importance of global issues such as biodiversity, sustainability and our role as responsible citizens. We will also look at the more extended answer questions in relation to these topics.

## Chemistry

Topics that are taught in Year 11 are those that contain the largest proportion of 'triple' content allowing this to be taught separately to students following the separate Science course. The exception to this is the unit Water which looks at the content of the Using Resources topic. Content here is very much standalone but some of the concepts and processes outlined are abstract. The Calculations unit is deemed as containing the most difficult concepts so is taught in Year 11 and more time is dedicated to allowing students to cement these concepts.

## Physics

Physics in Year 11 begins by going back to Particles, which is one of the most fundamental topics to understanding Physics, but it now looks at more difficult areas, such as pressure and gas laws, bringing in harder Mathematics, and looking to explain phenomena, rather than just describing. Atomic structure now looks at nuclear decay equations and triple content such as fusion and fission. Magnetism and Waves are the final topics and they include triple content, such as lenses and ray diagrams, building on the basics of wave behaviour which were explored in Year 9.

## KS4 Biology Curriculum Map:

Unit 1	Unit 2	Unit 3	Unit 4
<p><b>Cells</b> Animal and plant cells, specialised cells and differentiation, microscopy and magnification, RP microscopy, exchange surfaces and diffusion</p> <p><b>Organisation</b> Organisational hierarchy, plant tissues and organs, human digestive system, RP food tests, blood, heart and blood vessels, lungs, health and lifestyle</p>	<p><b>Infection and Response</b> Different causes of illness, bacterial, viral, fungal and protist. Uses and dangers of microorganisms. Communicable disease. Barriers to infection. Data interpretation. Drug testing and trials. Recognise, draw and interpret images of cells. Use prefixes milli, micro. Handling a microscope. Sampling and growth of microbes in culture.</p> <p><b>Bioenergetics</b> Photosynthesis. Factors affecting the rate of photosynthesis. Leaf structure and tissues. Investigate the effect of light intensity on the rate of Photosynthesis</p>	<p><b>Ecology</b> Competition, Biotic and Abiotic factors, Adaptations, Food chains, Measuring the distribution of organisms (Quadrats and Transects).</p>	<p><b>Homeostasis</b> Homeostasis; Sense organs; The Nervous system; The Reflex arc; RP7 Reaction Time; The Human Endocrine System.</p> <p><b>Inheritance, Variation and Evolution</b> Types of reproduction; DNA structure; The Human Genome; Variation-Voyage on the Beagle; Do tall people have big feet?; Selective breeding; Extinction; Fossils; Classification.</p>
Unit 5	Unit 6	Unit 7	Unit 8
<p><b>Cells</b> Eukaryotes and Prokaryotes, magnification-standard form, chromosomes, mitosis and the cell cycle, stem cells, osmosis, RP osmosis, active transport</p> <p><b>Organisation</b> Enzymes and digestion, factors affecting enzymes- temp/pH, RP enzymes, heart disease, cancer, transpiration</p>	<p><b>Infection and response</b> Defence against disease. Immune response. Vaccination. Antibiotics and antibiotic resistance. Development of new antibiotics.</p> <p><b>Bioenergetics</b> Aerobic respiration, Anaerobic respiration, muscle fatigue. Effect of exercise. Anaerobic respiration in plants and fungi, fermentation.</p>	<p><b>Homeostasis and response</b> The nervous system recap; Synapses; Blood sugar; Diabetes; Reproductive hormones; Contraception; Infertility; Negative feedback.</p> <p><b>Inheritance, Variation and Evolution</b> Meiosis; Inheritance; Inherited disorders; Genetic engineering; Evolution; Antibiotic resistance and evolution.</p>	<p><b>Ecology</b> Nutrient cycling, Deforestation, Waste management, Global warming, Maintaining Biodiversity.</p>

## KS4 Chemistry Curriculum Map:

Unit 1	Unit 2	Unit 3	Unit 4
<p><b>Atoms</b> Areas of the periodic table, Chemical formula, Development of the PT, General structure of the atom, Size of atoms, electronic configuration, Ideas regarding atomic structure, Group 0, Chemical reactions and conservation of mass, Mrs and % element in a compound</p> <p><b>Atmosphere</b> Composition of the Atmosphere, Evolution of the Atmosphere</p>	<p><b>Acids and Bases</b> Indicators, Acid definition, Neutralisation, Reaction of acids with Metals, carbonates, oxides, and hydroxides, making a soluble salt required practical</p> <p><b>Oil</b> Hydrocarbons, Fractional distillation, Alkanes structure and properties, Alkenes structure and properties, Combustion of hydrocarbons, Global warming, Acid rain, Global dimming, Alternative fuels, Carbon footprints</p>	<p><b>Rates of Reaction</b> Methods of measuring rates, Effect of concentration on rate, Effect of catalysts on rate, Effect of temperature on rate, Effect of surface area on rate, Reversible reactions</p> <p><b>Metals</b> Properties of metals, Reaction of metals with water, Group 1 metals, Displacement reactions, Metal extracting (smelting), Alloys, Copper extraction (Bioleaching/Phytomining), Metal extraction (Electrolysis)</p>	<p><b>Atoms and Bonding</b> Ionic bonding and properties of ionic substances, Covalent bonding and properties of covalent substances, Metallic bonding and properties of metallic substances, Group 1, Group 7, Nanoscience</p>
Unit 5	Unit 6	Unit 7	Unit 8
<p><b>Acids and Bases</b> Ionic equation for neutralisation, Weak and strong acids, Word equations for reactions of acids with metals, carbonates, hydroxides and oxides, Naming the salts produced in different neutralisation reactions.</p> <p><b>Chemical Analysis</b> Chromatography, Formulations, Purity, testing for positive and negative ions. Instrumental analysis.</p>	<p><b>Electrolysis</b> Cell diagrams, products of electrolysis, ionic equations, oxidation and reduction, Electroplating, Aluminium extraction, Half equations.</p> <p><b>Polymers</b> Hydrocarbons, Fractional distillation, Alkanes, Alkenes, Cracking, Monomers and Polymers, HDP and LDP, Life cycle assessments</p>	<p><b>Rates and Equilibrium</b> Factors affecting Rates of reaction, measuring rates of reactions, Endo and Exothermic reactions, Dynamic equilibrium, Le Chateliers principal. Haber process.</p> <p><b>Water</b> Potable water, Different types of water, Sources of water, Desalination of water.</p>	<p><b>Calculations</b> Mrs, % Mass. Definition of Atomic mass, Moles, Balancing equations, % yields, Concentrations</p>

## KS4 Physics Curriculum Map:

Unit 1	Unit 2	Unit 3	Unit 4
<p><b>Particles</b> Kinetic theory, changes of state, density (RP5), conduction and convection</p> <p><b>Energy</b> Energy stores in a system, Energy transfers, Work done, Power.</p>	<p><b>Electricity</b> Circuit symbols and diagrams, Current and charge, Potential difference, Resistance and Ohm's Law (RP3), Series and parallel circuits (RP3).</p> <p><b>Waves</b> Transverse and longitudinal waves, properties of waves, wave behaviour (RP8)</p>	<p><b>Forces</b> Contact and non-contact forces, Weight mass and gravity, Forces and Elasticity (RP6). Speed and motion in one dimension, speed of sound, distance time graphs, stopping distances.</p> <p><b>Atomic structure</b> Atomic structure, development of atomic model, Rutherford's gold leaf experiment.</p>	<p><b>Forces</b> Scalar and vector quantities, Resultant forces, Scale drawing and calculation to determine resultant forces, Newton's Laws of motion to explain how objects behave when forces act upon them (RP7), Inertia as a concept and how it affects momentum, conservation of momentum. Displacement and velocity as vector quantities, Acceleration as rate of change of velocity, Drawing and interpreting velocity-time graphs.</p> <p><b>Space</b> Life cycle of stars, solar system and orbits, red shift and big bang.</p>
Unit 5	Unit 6	Unit 7	Unit 8
<p><b>Electricity</b> Series and parallel circuits, Resistance and IV characteristics (RP4), AC supply, Wiring a plug, Energy resources, National Grid.</p>	<p><b>Energy</b> Conservation of energy, Efficiency, Reducing heat loss by conduction (RP2), Kinetic energy, gravitational potential energy and elastic potential energy calculations.</p> <p><b>Magnetism</b> Magnetic materials, permanent and electromagnets, magnetic fields.</p>	<p><b>Particles</b> Pressure, Specific heat capacity (RP1), Internal energy, Specific latent heat.</p> <p><b>Atomic structure</b> Atomic structure, Decay and nuclear decay equations, Half-life, Contamination and irradiation.</p>	<p><b>Waves</b> Refraction, electromagnetic spectrum, applications of electromagnetic waves.</p> <p><b>Magnetism</b> Motor effect, electric motors and loudspeakers.</p>

## Separate Science Curriculum Map (Year 11 only):

	Autumn Term	Spring term
Biology	TBC	TBC
Chemistry	<p><b>Calculations</b>            Mrs, % Mass. Definition of Atomic mass, Moles, Balancing equations, % yields, Concentrations, Titrations, % Yield, Atom economy            Transition metals            Enthalpy, calorimetry, Fuel cells.            Alcohols, Carboxylic acids, Esters, Addition/Condensation polymerisation.            Amino acids, DNA</p>	<p><b>Rates and Equilibrium</b>            Factors affecting Rates of reaction, measuring rates of reactions, Endo and Exothermic reactions, Dynamic equilibrium, Le Chateliers principal. Haber process.  <b>Water</b>            Potable water, Different types of water, Sources of water, Desalination of water.            Flame tests, hydroxide tests, instrumental methods, Ceramics, Glass            NPK fertilizers</p>
Physics	<p><b>Particles</b> including gas pressure.  <b>Atomic structure</b> including radioactive decay, fission and fusion.</p>	<p><b>Electromagnetism</b> including electromagnetic devices, induction and transformers.  <b>Waves</b> including lenses, visible light and black bodies.</p>



## KS4 Science Assessment Map:

Year 9	Biology Units 1-3	Chemistry Units 1-3	Physics Units 1-3
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In Year 9 students will carry out a total of nine end of unit assessments. These will comprise past exam questions and will contain questions of varying difficulty. The aim of each assessment will also be to access scientific skills and to cover each Assessment objective AO1 – AO3. Individual student results are entered into a central database. This database is used to generate DIRT activities for each assessment as well as accurately predicting current working grades.

Year 10	Biology Units 4-6	Chemistry Units 4-6	Physics Units 4-6
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In Year 10 students will carry out a total of nine end of unit assessments. These will comprise past exam questions and will contain questions of varying difficulty. The aim of each assessment will also be to access scientific skills and to cover each Assessment objective AO1 – AO3. Individual student results are entered into a central database. This database is used to generate DIRT activities for each assessment as well as accurately predicting current working grades.

Year 11	November PPEs	March PPEs
	<ul style="list-style-type: none"> <li>• Biology Paper 1</li> <li>• Chemistry Paper 1</li> <li>• Physics Paper 1</li> </ul>	<ul style="list-style-type: none"> <li>• Biology Paper 2</li> <li>• Chemistry Paper 2</li> <li>• Physics Paper 2</li> </ul>

Assessment in year 11 focuses on pre public examinations (PPEs). These take place in November and March.

## **KS4 Science Marking Policy:**

### **End of Unit Assessments:**

In Years 9 and 10 students will complete nine units of work, three in each subject (Biology, Chemistry and Physics). At the end of each unit there is an assessment that is marked by the teacher and students are given feedback in the form of designated DIRT activities.

Marks from the assessments are collated and used to accurately predict grades for individual students that can then be used in data captures.

### **Formative Assessments:**

Within each unit there are designated 'Formative assessment' tasks that students complete independently in class. These are marked by the teacher using marking stickers and appropriate DIRT provided to allow students to improve their work. It is expected that formative assessment will take place at regular intervals as pupils move through each unit of work.

### **Self/Peer Assessment:**

In most lessons students will be provided with opportunities to self-assess their own work or peer assess the work of others. This is done using red pen with students correcting misconceptions or adding to their work.

## KS5 Biology Curriculum Overview:

Year 12		
Autumn Term	Spring Term	Summer Term
Biological Molecules Cells	Exchange Genetic information, variation and relationships between organisms	Exchange and Genetic information cont; Revision Exams Preparation for Year 13
Year 13		
Energy transfers Organisms and response	Genetics, populations, evolution and ecosystems Control of gene expression	Revision Exam

## KS5 Chemistry Curriculum Overview:

Year 12		
Autumn Term	Spring Term	Summer Term
<p><b>Atomic structure:</b> Atoms, Mass spectrometry, electronic structure and ionisation energies.</p> <p><b>Amount of substance:</b> The mole, chemical equations, titrations, formulas, chemical yield and atom economy. <b>Introduction to Organic Chemistry:</b> Formulas, functional groups, nomenclature, mechanisms, isomers</p> <p><b>Alkanes and haloalkanes:</b> Alkanes and petroleum, alkanes, Halogenalkanes, Nucleophilic substitution and Elimination reactions.</p>	<p><b>Bonding:</b> Ionic and Covalent bonding, shapes of molecules, intermolecular forces, Metallic bonding and metallic properties.</p> <p><b>Energetics:</b> Enthalpy changes, Bond enthalpies, Hess's law. Alkenes and Alcohols:</p> <p><b>Reactions</b> of Alkenes, Addition polymers, Dehydrating alcohols, Ethanol production and oxidation of alcohols.</p> <p><b>Organic analysis:</b> Tests for functional groups, Mass and infrared spectroscopy</p>	<p><b>Kinetics:</b> Reaction rates, Catalysts and measuring rates. <b>Equilibrium and redox reactions:</b> Reversible reactions, industrial process, equilibrium constants, Redox reactions and equation.</p> <p><b>Periodicity:</b> The Periodic table. Periodicity.</p> <p><b>Group 2 and Group 7 elements:</b> Group 2 metals and Group 2 compounds, Group 7, halide ions and test for ions.</p>
Year 13		
<p><b>Thermodynamics:</b> Enthalpy changes, Born-Haber cycles, Enthalpies of solution, Entropy and free energy change. Rate Equations and Kp: Reaction rates and graphs, rate equation, Rateconcentration graphs. Rate determining step. Arrhenius equation, Gas equilibria.</p> <p>Acids and bases: Acids, bases and Kw, pH calculations, Titrations and pH curves, titration calculations, Buffer action and calculating the pH of buffers. Isomerisation and carbonyl compounds: Optical isomers, Aldehydes and Ketones, Carboxylic acids and Esters, Acyl chlorides, Purifying organic compounds.</p> <p>Aromatic compounds and amines: Reactions of Aromatics, Amines and amides, reactions of Amines</p>	<p><b>Electrode potentials:</b> Standard electrode potentials, electrochemical series, electrochemical cells.</p> <p>Polymers: Condensation polymers, monomers and repeating units, disposal of polymers</p> <p>Amino acids, proteins and DNA: Amino acids, proteins, enzymes, DNA</p> <p>Further synthesis and analysis: Organic synthesis, NMR spectroscopy, chromatography.</p>	<p>Transition metals: Complex ions, isomerism in complex ions, formation of coloured ions, ligand substitution reactions, variable oxidation states, transition metal titrations, metal-aqua ions</p>

## KS5 Physics Curriculum Overview:

Year 12		
Autumn Term	Spring Term	Summer Term
Measurements and their errors Electricity (RP5, RP6) Particles and Quantum phenomena	Waves (RP1, RP2) Mechanics (RP3) Materials (RP4)	Mechanics Further Mechanics (Circular motion and SHM) (RP7) Capacitors (RP9)
Year 13		
Capacitors Gravitational fields Electric fields Magnetic fields (RP10, RP11)	Magnetic Fields Nuclear Physics (RP12) Thermal Physics (RP8) Turning points in Physics	Revision