



# **St Augustine's Catholic High School & Sixth Form**

## **Curriculum Overview 2021 – 2022**

### **Biology Key Stage 5**



# Curriculum Overview

## Biology

### Autumn Term

	Y12	Y13
Autumn 1	<p><b>Content:</b></p> <p><b>SD</b>            Structure of eukaryotic cells            Structure of prokaryotic cells and of viruses            Methods of studying cells            All cells arise from other cells            Transport across cell membranes            Required practical 2- Mitosis</p> <p><b>DV</b>            Biological molecules            Monomers and polymers            Carbohydrates            Lipids            General properties of proteins            Many proteins are enzymes            Required practical 1- Enzymes</p>	<p><b>Content:</b></p> <p><b>WL</b>            Survival and response            Receptors            Control of heart rate            Nervous coordination            Nerve impulses            Synaptic transmission            Skeletal muscles are stimulated to contract by nerves and act as effectors            Required practical 10- choice chambers</p> <p><b>DV</b>            Photosynthesis            Respiration            Energy and ecosystems            Nutrient cycles</p>
	<p>Why am I learning this? (ie substantive content/link to previous work)</p> <p>These topics are the fundamental units of A level biology. They build on GCSE concepts and are required to increase the depth of prior knowledge and form the basic understanding of core biological principles.</p>	<p>Why am I learning this? (ie substantive content/link to previous work)</p> <p>This recaps the year 13 content covers at the end of year 12 so that no students are at a disadvantage. These topics also rely on previous year 12 learning.</p>
	<p><b>Assessment Focus</b>            Deep assessment: Assessment week with whole class feedback sheets.</p> <p>Formative / maintenance assessment: Cells end of topic test. Biological molecules end of topic test. Whole class feedback sheets. Fortnightly independent study log checks.</p>	<p><b>Assessment Focus</b>            Deep assessment: Assessment week in class with whole class feedback sheets.</p> <p>Formative / maintenance assessment:            Photosynthesis end of topic test. Respiration end of topic test, Energy and ecosystems end of topic test, Response to stimuli end of topic test and nervous coordination end of topic test. Whole class feedback sheets for every end of topic assessment. Fortnightly independent study log checks.</p>
Autumn 2	<p><b>Content: Students will initially finish any outstanding content from the previous half term if necessary.</b></p> <p><b>SD</b>            Transport across cell membranes            Required practical 3 and 4- Water potentials and cell permeability.            Cell recognition and the immune system            Organisms exchange substances with their environment            Surface area to volume ratio            Gas exchange            Digestion and absorption</p> <p><b>DV</b></p>	<p><b>Content:</b></p> <p><b>WL</b>            Homeostasis is the maintenance of a stable internal environment            Principles of homeostasis and negative feedback            Control of blood glucose concentration            Control of blood water potential            Required practical 11- Calibration curves</p> <p><b>DV</b>            Inheritance            Populations</p>

	<p>Nucleic acids are important information-carrying molecules  Structure of DNA and RNA  DNA replication  ATP  Water  Inorganic ions</p>	
	<p><b>Why am I learning this? (ie substantive content/link to previous work)</b></p> <p>Transport across membranes is finished off from the previous half term. This links to all many of the required practical that students need to do to develop their CPAC.</p> <p>Nucleic acids is the second half of biological molecules and this information is needed for students to understand genetics topics at the end of year 12.</p>	<p><b>Why am I learning this? (ie substantive content/link to previous work)</b></p> <p>Students use their understanding of transporting substances from year 12 to build on their understanding of homeostasis. Their prior understanding of genetics and natural selection is also built upon in the inheritance and populations module.</p>
	<p><b>Assessment Focus</b>  Deep assessment: Cell recognition and the immune system end of topic test. Transport across membranes end of topic test. Nucleic acids end of topic test.</p> <p><b>Maintenance assessment:</b> Fortnightly independent study log checks. Live marking in lessons using highlighters.</p>	<p><b>Assessment Focus</b>  Deep assessment: Assessment week with whole class feedback sheets.</p> <p><b>Maintenance assessment:</b> Inherited change end of topic test. Homeostasis end of topic test. Whole class feedback sheets for every end of topic assessment. Fortnightly independent study log checks.</p>
Termly themes	<p><b>Links to Gospel Values/vocations:</b>  New scientist webinar events and consortium events expose students to various vocations. Medical mavericks as experience for prospective medical students.</p> <p>Humility and gentleness- Students realising the complexities of the natural world and the development of methods of study.</p>	<p><b>Links to Gospel Values/vocations:</b>  New scientist webinar exposes students to vocations that are not typically science based such as science policy in law.</p> <p>Truth and Justice- Students learn about complications of genetic disorders and inheritance of conditions such as haemophilia. They also learn about the treatment of diabetes. This enables them to appreciate the aims of scientists and how science can bring about truth and justice to improve the quality of people's lives.</p>
	<p><b>Enrichment:</b>  RI Masterclasses  Consortium events in Natural sciences pathway.  Articles shared in teams for literature. Science Library. New scientist subscriptions. New Scientist live debate seminar.</p>	<p><b>Enrichment:</b>  New Scientist webinar debate held after school.  Access to New Scientist magazines and the Science library.</p>

## Spring Term

	Y12	Y13
Spring 1	<p><b>Content: Students will initially finish any outstanding content from the previous half term if necessary.</b></p> <p><b>SD</b>            Mass transport            Mass transport in animals            Mass transport in plants            Required practical 5- Dissection</p> <p><b>DV</b>            Genetic information, variation and relationships between organisms            DNA, genes and chromosomes            DNA and protein synthesis            Genetic diversity can arise as a result of mutation or during meiosis            Genetic diversity and adaptation            Species and taxonomy            Biodiversity within a community            Investigating diversity            Required practical 6- Antibiotic resistance</p>	<p><b>Content:</b></p> <p><b>WL:</b>            The Control of Gene Expression            Alteration of the sequence of bases in DNA can alter the structure of proteins            Most of a cell's DNA is not translated            Regulation of transcription and translation            Gene expression and cancer            Using genome projects            Recombinant DNA technology            Differences in DNA between individuals of the same species can be exploited for identification and diagnosis of heritable conditions            Genetic fingerprinting</p> <p><b>DV:</b>            Evolution may lead to speciation            Populations in ecosystems</p>
	<p><b>Why am I learning this? (ie substantive content/link to previous work)</b></p> <p>Mass transport requires a fundamental understanding of cell structure and transporting substances across cells which is covered in the previous topic in content and in practical activities.</p> <p>Students also learn the fundamental information about nucleic acids and are now able to learn about how DNA and RNA are used to make proteins in transcription and translation.</p>	<p><b>Why am I learning this? (ie substantive content/link to previous work)</b></p> <p>Students will work through the curriculum content so that their February mock examination period can include full A level standard papers.</p>
	<p><b>Assessment Focus</b>            Deep assessment: Exchange end of topic test. Mass transport end of topic test. DNA genes and protein synthesis. Genetic diversity and adaptation. Biodiversity</p> <p>Formative / maintenance assessment: Fortnightly independent study log checks. Live marking in lessons using highlighters.</p>	<p><b>Assessment Focus</b>            Deep assessment: Mock exam week in the hall. Whole class feedback sheets.</p> <p>Formative / maintenance assessment: Populations and evolution end of topic test, population in ecosystems end of topic test, Gene expression end of topic test, recombinant DNA technologies end of topic test.</p> <p>Whole class feedback sheets for every end of topic assessment. Fortnightly independent study log checks.</p>
Spring 2	<p><b>Content: Students will initially finish any outstanding content from the previous half term if necessary.</b></p> <p><b>SD</b>            Mass transport            Mass transport in animals            Mass transport in plants</p>	<p><b>Content: Students will use the spring 2 half term to complete revision of all year 12 and year 13 topics. This will consist of many walking talking mock paper and essay writing practice.</b></p> <p><b>All topics:</b>            Biological molecules            Cells            Exchange</p>

	<p><b>DV</b>  Genetic information, variation and relationships between organisms  DNA, genes and chromosomes  DNA and protein synthesis  Genetic diversity can arise as a result of mutation or during meiosis  Genetic diversity and adaptation  Species and taxonomy  Biodiversity within a community  Investigating diversity</p>	<p><b>Genetics and variation</b>  <b>Energy and ecosystems</b>  <b>Homeostasis</b>  <b>Populations and inheritance</b>  <b>Gene technologies</b></p>
	<p><b>Why am I learning this? (ie substantive content/link to previous work)</b></p> <p>Students will aim to finish the AS level content by Easter. This enables dynamic revision in preparation for the end of year 12 exams.</p>	<p><b>Why am I learning this? (ie substantive content/link to previous work)</b></p> <p>Students need to focus on their exam techniques and timings in preparation for their summer exams.</p>
	<p><b>Assessment Focus</b>  Deep assessment: Assessment week on a whole paper 1 (assessing all AS level content). Whole class feedback sheets.</p> <p><b>Maintenance assessment:</b> Fortnightly independent study log checks. Live marking in lessons using highlighters. Walking talking mocks in lessons.</p>	<p><b>Assessment Focus</b>  Deep assessment: In class testing using old exam papers. Timed and marked essay practice.</p> <p><b>Maintenance assessment:</b> Fortnightly independent study log checks. Live marking in lessons using highlighters. Walking talking mocks in lessons.</p>
Termly themes	<p><b>Links to Gospel Values/vocations:</b>  Students will appreciate that theories surrounding natural selection and mass transport are rooted in good evidence but that scientists must continue to work in these areas to develop and reflect on their ideas- service and sacrifice.</p>	<p><b>Links to Gospel Values/vocations:</b>  Service and sacrifice- Students will begin to increase their work rate and will need to demonstrate both service and sacrifice to reach their academic potentials.</p>
	<p><b>Enrichment:</b>  Biology Olympiad  Microbiology seminar</p>	<p><b>Enrichment:</b>  Access to scientific literature and science library.</p>

## Summer Term

	Y12	Y13
Summer 1	<p>Content: Students will begin year 13 content.</p> <p>SD Survival and response Receptors</p> <p>DV Energy transfers in and between organisms Photosynthesis</p>	<p>Content: Students will use the summer term to complete revision of all year 12 and year 13 topics. This will consist of many walking talking mock paper and essay writing practice.</p> <p>All topics: Biological molecules Cells Exchange Genetics and variation Energy and ecosystems Homeostasis Populations and inheritance Gene technologies</p>
	<p>Why am I learning this? (<i>ie substantive content/link to previous work</i>)</p> <p>Students begin learning year 13 content to develop their ability to draw synoptic links between year 12 and year 13 content. This is necessary as their paper 3 examination in year 13 requires them to recall and links topics from the entire A level specification. Beginning year 13 content in year 12 also enable students to have additional time for dynamic revision at the end of year 13.</p>	<p>Why am I learning this? (<i>ie substantive content/link to previous work</i>)</p> <p>Students need to focus on their exam techniques and timings in preparation for their summer exams.</p>
	<p>Assessment Focus Deep assessment: Classroom based exam question practice.</p> <p>Formative / maintenance assessment: Fortnightly independent study log checks. Live marking in lessons using highlighters. Walking talking mocks in lessons.</p>	<p>Assessment Focus Deep assessment: In class testing using old exam papers. Timed and marked essay practice.</p> <p>Formative / maintenance assessment: Fortnightly independent study log checks. Live marking in lessons using highlighters. Walking talking mocks in lessons.</p>
Summer 2	<p>Content: Preparation for end of year 12 examinations.</p> <p>Biological molecules Cells Exchange Genetic variation</p>	<p>Content: Students will use the summer term to complete revision of all year 12 and year 13 topics. This will consist of many walking talking mock paper and essay writing practice.</p> <p>All topics: Biological molecules Cells Exchange Genetics and variation Energy and ecosystems Homeostasis Populations and inheritance Gene technologies</p>
	<p>Why am I learning this? (<i>ie substantive content/link to previous work</i>)</p> <p>Students are required to achieve a D grade in these examinations to continue study into year 13. Preparation is prioritised in lesson time to revisit AS content.</p>	<p>Why am I learning this? (<i>ie substantive content/link to previous work</i>)</p> <p>Students need to focus on their exam techniques and timings in preparation for their summer exams.</p>

	<p><b>Assessment Focus</b> Deep assessment: End of year examinations with whole class feedback sheets.</p> <p>Maintenance assessment: Fortnightly independent study log checks. Live marking in lessons using highlighters. Walking talking mocks in lessons.</p>	<p><b>Assessment Focus</b> Deep assessment:</p> <p>Maintenance assessment:</p>
Termly themes	<p><b>Links to Gospel Values/vocations:</b> Purity and holiness- Students need to reflect on their progress and ensure they are committing themselves to fulfilling their academic potential through revision.</p>	<p><b>Links to Gospel Values/vocations:</b> Faithfulness and integrity- Students will need to develop a sense of delayed gratification and realise that their demanding work will eventually pay off. They owe it to themselves to work hard to achieve.</p>
	<p><b>Enrichment:</b> Consortium events. Natural and life sciences team for additional supra-curricular materials. BLAST practical seminar</p>	<p><b>Enrichment:</b> Access to scientific literature and science library.</p>



## Curriculum Overview, KS5: Chemistry

### Autumn Term

	Y12	Y13
Autumn 1	<p><b>Content:</b> Organic: Introduction to organic chemistry Alkanes Physical: Atomic structure Amount of substance</p>	<p><b>Content:</b> Ensuring year 12 topics are completed. Organic: Amines Polymers Physical: Equilibrium constant Kp for homogeneous</p>

		systems Acids and bases
	<b>Why am I learning this? (ie substantive content/link to previous work)</b> <i>Introductory topics that cover the fundamental ideas in chemistry and build on GCSE concepts.</i>	<b>Why am I learning this? (ie substantive content/link to previous work)</b> <i>Introductory topics that cover the fundamental ideas in chemistry and build on AS concepts.</i> <i>In-depth understanding of pH of a wide variety of solutions.</i>
	<b>Assessment Focus</b> <b>Deep assessment:</b> Assessment week with whole class feedback sheets. End of topic tests with whole class feedback sheets. <b>Formative / maintenance assessment:</b> Independent study logs End of topic tests with whole class feedback sheets Low stake assessments with live feedback	<b>Assessment Focus</b> <b>Deep assessment:</b> Assessment week with whole class feedback sheets. End of topic tests with whole class feedback sheets. <b>Formative / maintenance assessment:</b> Independent study logs End of topic tests with whole class feedback sheets Low stake assessments with live feedback
Autumn 2	<b>Content:</b> Organic: Halogenoalkanes Alkenes Alcohols Physical: Amount of substance Bonding Inorganic: Periodicity	<b>Content:</b> Organic: Amino acids, proteins and DNA Organic Synthesis Physical: Electrode potentials and electrochemical cells Inorganic: Transition metals introduction
	<b>Why am I learning this? (ie substantive content/link to previous work)</b> <i>Introductory topics that cover the fundamental ideas in chemistry and build on GCSE concepts.</i> <i>Introducing the homologous groups in organic chemistry.</i> <i>Beginning to build practical skill by completing the first required practical activities.</i>	<b>Why am I learning this? (ie substantive content/link to previous work)</b> <i>Introduction to biochemistry which is particularly useful for students aspiring to do medicine.</i> <i>Application of chemistry concepts such as redox to real-life examples.</i>
	<b>Assessment Focus</b> <b>Deep assessment:</b> End of topic tests with whole class feedback sheets. <b>Formative / maintenance assessment:</b> Independent study logs End of topic tests with whole class feedback sheets Low stake assessments with live feedback	<b>Assessment Focus</b> <b>Deep assessment:</b> Mock week with whole class feedback sheets. End of topic tests with whole class feedback sheets. <b>Formative / maintenance assessment:</b> Independent study logs End of topic tests with whole class feedback sheets Low stake assessments with live feedback
Termly themes	<b>Links to Gospel Values/vocations:</b> Truth and Justice- Learning about the Ozone layer depletion in haloalkanes. Faithfulness and integrity- Transition from GCSE to A-level studies. Developing new skills such as: organisation, independent study and resilience. Linking each topic to relevant careers in introduction lessons. Class survey on careers choices.	<b>Links to Gospel Values/vocations:</b> Linking each topic to relevant careers in introduction lessons. Updated class survey on careers choices. Support with UCAS applications and personal statements. Humility and gentleness- DNA Purity and holiness- Acids and Bases (Buffers)
	<b>Enrichment:</b> Helping out with open evenings after school by doing demonstrations and answering parental questions about their course. Year 12 volunteers supporting younger students in lessons. Access to literature and science library.	<b>Enrichment:</b> Access to literature and science library.



## Spring Term

	Y12	Y13
Spring 1	<p><b>Content:</b> Organic: Organic analysis Physical: Kinetics Energetics Redox Inorganic: Group 2, the alkaline earth metals</p>	<p><b>Content:</b> Organic: Structural determination Chromatography Inorganic: Transition metals Reactions of ions in aqueous solution</p>
	<p><b>Why am I learning this? (ie substantive content/link to previous work)</b> <i>Learning to apply the term 1 topics to a real-life laboratory situation. To gain an in-depth understanding of energy changes in reactions, redox and energy of particles in reactions. Building on GCSE and A-level periodicity by starting to look at group 2.</i></p>	<p><b>Why am I learning this? (ie substantive content/link to previous work)</b></p>
	<p><b>Assessment Focus</b> <b>Deep assessment:</b> End of topic tests with whole class feedback sheets. <b>Formative / maintenance assessment:</b> Independent study logs End of topic tests with whole class feedback sheets Low stake assessments with live feedback</p>	<p><b>Assessment Focus</b> <b>Deep assessment:</b> Mock week with whole class feedback sheets. End of topic tests with whole class feedback sheets. <b>Formative / maintenance assessment:</b> Independent study logs End of topic tests with whole class feedback sheets Low stake assessments with live feedback</p>
Spring 2	<p><b>Content:</b> Organic: Nomenclature and Isomerism Aldehydes and ketones Carboxylic acids and derivatives Physical: Chemical equilibria, Le Chatelier's principle and Kc Inorganic: Group 7(17), the halogens</p>	<p><b>Content:</b> <b>Revising A-level topics including demonstrations of required practicals missed during lockdown.</b></p>
	<p><b>Why am I learning this? (ie substantive content/link to previous work)</b> <i>Building on GCSE and A-level periodicity and consolidating redox. Starting to look at A2 topics with more complex functional groups and reaction mechanisms. Understanding equilibria quantitatively using algebra and qualitatively.</i></p>	<p><b>Why am I learning this? (ie substantive content/link to previous work)</b></p>
	<p><b>Assessment Focus</b> <b>Deep assessment:</b> Assessment week with whole class feedback sheets. End of topic tests with whole class feedback sheets. <b>Formative / maintenance assessment:</b> Independent study logs End of topic tests with whole class feedback sheets Low stake assessments with live feedback</p>	<p><b>Assessment Focus</b> <b>Deep assessment:</b> In class mock with whole class feedback sheets. End of topic tests with whole class feedback sheets. <b>Formative / maintenance assessment:</b> Independent study logs End of topic tests with whole class feedback sheets Low stake assessments with live feedback</p>
Termly themes	<p><b>Links to Gospel Values/vocations:</b> Tolerance and peace - halogens Truth and justice- Learning about thalidomide in nomenclature and isomerism. Linking each topic to relevant careers in introduction lessons.</p>	<p><b>Links to Gospel Values/vocations:</b> Linking each topic to relevant careers in introduction lessons. Faithfulness and integrity- resilience in revision and acting on feedback given.</p>

	<p><b>Enrichment:</b> Forensic masterclass after school. Olympiad Helping out in taster session for year 11 pupils. Access to literature and science library.</p>	<p><b>Enrichment:</b> Access to literature and science library.</p>
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## Summer Term

	Y12	Y13
Summer 1	<p><b>Content:</b>  <b>Reviewing all AS topics</b></p> <p>Organic:            Aromatic chemistry            Physical:            Thermodynamics            Rate equations</p>	<p><b>Content:</b>  <b>Revising A-level topics including demonstrations of required practicals missed during lockdown.</b></p>
	<p><b>Why am I learning this? (ie substantive content/link to previous work)</b></p>	<p><b>Why am I learning this? (ie substantive content/link to previous work)</b>            N/a</p>
	<p><b>Assessment Focus</b>  <b>Deep assessment:</b>            End of topic tests with whole class feedback sheets.  <b>Formative / maintenance assessment:</b>            Independent study logs            End of topic tests with whole class feedback sheets            Low stake assessments with live feedback</p>	<p><b>Assessment Focus N/a</b>  <b>Deep assessment:</b>    <b>Formative / maintenance assessment:</b></p>
Summer 2	<p><b>Content:</b>  <b>Reviewing all AS topics</b></p> <p>Organic:            Aromatic chemistry            Physical:            Thermodynamics            Rate equations</p>	<p><b>Content: N/a</b></p>
	<p><b>Why am I learning this? (ie substantive content/link to previous work)</b></p>	<p><b>Why am I learning this? (ie substantive content/link to previous work)</b>            N/a</p>
	<p><b>Assessment Focus</b>  <b>Deep assessment:</b>            Mock week with whole class feedback sheets.            End of topic tests with whole class feedback sheets.  <b>Formative / maintenance assessment:</b>            Independent study logs            End of topic tests with whole class feedback sheets            Low stake assessments with live feedback</p>	<p><b>Assessment Focus - N/a</b>  <b>Deep assessment:</b>    <b>Maintenance assessment:</b></p>
Termly themes	<p><b>Links to Gospel Values/vocations:</b>            Bond energies- Purity and holiness.            Linking each topic to relevant careers in introduction lessons.            Begin discussions with class teacher about next steps after 6<sup>th</sup> form.</p>	<p><b>Links to Gospel Values/vocations:</b>            Linking each topic to relevant careers in introduction lessons.            Faithfulness and integrity- resilience in revision and acting on feedback given.</p>
	<p><b>Enrichment:</b>            Practical skills masterclasses            Access to literature and science library.</p>	<p><b>Enrichment:</b>            Access to literature and science library.</p>



## Curriculum Overview, KS5: Physics

### Autumn Term

	Y12	Y13
Autumn 1	<p><b>Content:</b></p> <p><b>HU:</b></p> <ul style="list-style-type: none"> <li>Particles and radiation</li> <li>Particles</li> <li>Constituents of the atom</li> <li>Stable and unstable nuclei</li> <li>Particles, antiparticles and photons</li> <li>Particle interactions</li> <li>Classification of particles</li> </ul> <p><b>SV:</b></p> <ul style="list-style-type: none"> <li>Force, energy and momentum</li> <li>Scalars and vectors</li> <li>Moments</li> </ul>	<p><b>Content:</b></p> <p><b>HU:</b></p> <ul style="list-style-type: none"> <li>Nuclear physics</li> <li>Radioactivity</li> <li>Rutherford scattering</li> <li><math>\alpha</math>, <math>\beta</math> and <math>\gamma</math> radiation</li> <li>Nuclear instability</li> <li>Nuclear radius</li> </ul> <p><b>SV:</b></p> <ul style="list-style-type: none"> <li>Periodic motion</li> <li>Circular motion</li> <li>Simple harmonic motion (SHM)</li> <li>Simple harmonic systems</li> <li>Forced vibrations and resonance</li> </ul>
	<p><b>Why am I learning this? (ie substantive content/link to previous work)</b></p> <p>The Year 12 course starts with fundamental concepts in physics which reappear and link with subsequent knowledge gained throughout the course. The Particle Physics topic provides students with a core understanding of the structure of the atom and fundamental particles that make up all matter in the universe. This understanding is key to building knowledge as they move through the course.</p> <p>The Mechanics topic introduces the idea of interactions between objects and systems and develops maths skills needed in future topics. These are skills and knowledge which are developed further in Year 13.</p>	<p><b>Why am I learning this? (ie substantive content/link to previous work)</b></p> <p>Nuclear Physics builds on prior learning of the structure of the atom, fundamental particles and particle interactions studied in the Particle Physics topic in Year 12. The topic uses exponential equations which are covered in Year 12 maths.</p> <p>Further Mechanics builds on prior learning of Mechanics from Year 12. The mechanics of periodic and circular motion is fundamental physics which is required to understand the motion of objects in the later topic of fields.</p>

	<p><b>Assessment Focus</b>  <b>Deep assessment:</b> Assessment Week and Whole Class Feedback</p> <p><b>Formative / maintenance assessment:</b> End of Chapter Assessments and Whole Class Feedback. Independent Study Logs, Low Stakes Assessment starters</p>	<p><b>Assessment Focus</b>  <b>Deep assessment:</b> End of Chapter Assessments and Whole Class Feedback</p> <p><b>Formative / maintenance assessment:</b> Independent Study Logs, Low Stakes Assessment starters</p>
Autumn 2	<p><b>Content:</b>  <b>HU:</b>  Quarks and antiquarks  Applications of conservation laws  Electromagnetic radiation and quantum phenomena  The photoelectric effect  Collisions of electrons with atoms  Energy levels and photon emission  Wave-particle duality</p> <p><b>SV:</b>  Motion along a straight line  Projectile motion  Newton's laws of motion  Momentum</p>	<p><b>Content:</b>  <b>HU:</b>  Radioactive decay  Mass and energy  Induced fission  Safety aspects</p> <p><b>SV:</b>  Gravitational fields  Newton's law  Gravitational field strength  Gravitational potential  Orbits of planets and satellites  Electric fields  Coulomb's law  Electric field strength  Electric potential</p>
	<p><b>Why am I learning this? (ie substantive content/link to previous work)</b>  The Particle Physics topic moves onto a deeper more advanced understanding of the constituents of matter. Students have built up the essential base knowledge in the first half term to now be introduced to more abstract concepts in the field of Quantum Phenomena.</p> <p>The Mechanics topic further develops maths skills to a much higher level and students can quantify how objects move and interact. These are skills which are also covered in maths and developed further in Year 13.</p>	<p><b>Why am I learning this? (ie substantive content/link to previous work)</b>  Nuclear Physics builds on prior learning of the structure of the atom, fundamental particles and particle interactions studied in the Particle Physics topic in Year 12. The topic uses exponential equations which are covered in Year 12 maths.</p> <p>Understanding fields is an essential building block of understanding physics. Electric and gravitational fields have significant similarities and by learning them consecutively students have the opportunity to link their knowledge.</p>
	<p><b>Assessment Focus</b>  <b>Deep assessment:</b> End of Chapter Assessments and Whole Class Feedback</p> <p><b>Maintenance assessment:</b> Independent Study Logs, Low Stakes Assessment starters</p>	<p><b>Assessment Focus</b>  <b>Deep assessment:</b> Assessment Week and Whole Class Feedback</p> <p><b>Maintenance assessment:</b> End of Chapter Assessments and Whole Class Feedback, Independent Study Logs, Low Stakes Assessment starters</p>
Termly themes	<p><b>Links to Gospel Values/vocations:</b>  Structure of the Atom – Service and Sacrifice  The Photoelectric Effect – Service and Sacrifice  Newtons Laws of Motion – Service and Sacrifice  1-1 Guidance linked to future study and vocations</p>	<p><b>Links to Gospel Values/vocations:</b>  Nuclear Fission – Tolerance and Peace  Universal Field Laws Eg: Newtons Law – Service and Sacrifice  1-1 Guidance linked to future study and vocations</p>
	<p><b>Enrichment:</b>  Science Library  RI Masterclasses</p>	<p><b>Enrichment:</b>  Science Library</p>

## Spring Term

	Y12	Y13
Spring 1	<p><b>Content:</b></p> <p><b>HU:</b>            Progressive and stationary waves            Progressive waves            Longitudinal and transverse waves            Principle of superposition of waves and formation of stationary waves            Refraction, diffraction and interference</p> <p><b>SV:</b>            Work, energy and power            Conservation of energy            Bulk properties of solids            The Young modulus</p>	<p><b>Content:</b></p> <p><b>HU:</b>            Thermal physics            Thermal energy transfer            Ideal gases            Molecular kinetic theory model</p> <p><b>SV:</b>            Capacitance            Parallel plate capacitor            Energy stored by a capacitor            Capacitor charge and discharge            Magnetic flux density            Moving charges in a magnetic field            Magnetic flux and flux linkage            Electromagnetic induction            Alternating currents            The operation of a transformer</p>
	<p><b>Why am I learning this? (ie substantive content/link to previous work)</b>            The Waves topic is a fundamental part of physics and understanding how energy travels from one place to another without transferring matter. This then leads onto the Astrophysics topic which takes concepts studied in the Waves topic and allows students to apply them to everyday examples, such as telescopes. Students develop an understanding for how we can take our core knowledge of physical phenomena and apply it to understand the universe around us.</p> <p>The students continue to build on knowledge in the Mechanics topic to understand how energy cannot be created or destroyed and the movement of objects requires energy. The Materials topic studies how the materials an object is made from can affect its interactions and needs to be considered when selecting materials for building and engineering. There are strong links with the A-Level Technology specification.</p>	<p><b>Why am I learning this? (ie substantive content/link to previous work)</b>            The Thermal Physics topic is an essential part of understanding how matter behaves. There are strong links with the A-Level Chemistry specification. The topic involves a high maths demand.</p> <p>Capacitance involves exponential decay so students can make links with knowledge and skills learnt in the Nuclear Physics topic. The Magnetic Fields topic links with gravitational and electric fields but extends further to how fields can be utilised in particle accelerators, generators, motors and the national grid etc.</p> <p>These final topics involve some of the highest demand in terms of maths skills and physics concepts. At this stage in the course students have developed a greater capacity to understand physics.</p>
	<p><b>Assessment Focus</b></p> <p><b>Deep assessment:</b> End of Chapter Assessments and Whole Class Feedback</p> <p><b>Formative / maintenance assessment:</b> Independent Study Logs, Low Stakes Assessment starters</p>	<p><b>Assessment Focus</b></p> <p><b>Deep assessment:</b> Assessment Week and Whole Class Feedback</p> <p><b>Formative / maintenance assessment:</b> End of Chapter Assessments, Independent Study Logs, Low Stakes Assessment starters</p>
Spring 2	<p><b>Content:</b></p> <p><b>HU:</b>            Diffraction            Refraction at a plane surface            Telescopes            Astronomical telescope consisting of two converging lenses            Reflecting telescopes            Single dish radio telescopes, I-R, U-V and X-ray telescopes            Advantages of large diameter telescopes</p>	<p><b>Content:</b>            Revision of all previous topics, exam technique in preparation for end of year assessments.            Development of practical skills in preparation for Paper 3A.</p>

	<p><b>SV:</b> Current electricity Basics of electricity Current–voltage characteristics</p>	
	<p><b>Why am I learning this? (ie substantive content/link to previous work)</b> The Waves topic is a fundamental part of physics and understanding how energy travels from one place to another without transferring matter. This then leads onto the Astrophysics topic which takes concepts studied in the Waves topic and allows students to apply them to everyday examples, such as telescopes. Students develop an understanding for how we can take our core knowledge of physical phenomena and apply it to understand the universe around us.</p> <p>The Electricity topic is one of the highest demanding in terms of maths skills and physics concepts from Paper 1. At this stage in the course students have developed a greater ability to understand the physics required.</p>	<p><b>Why am I learning this? (ie substantive content/link to previous work)</b> Students’ memory of all prior learning needs to be strengthened so that they can easily link content and coherently explain all physics concepts.</p> <p>Students’ practical skills need to be developed to prepare them for university study, where they will be expected to complete practical work independently.</p>
	<p><b>Assessment Focus</b> <b>Deep assessment:</b> Assessment Week and Whole Class Feedback</p> <p><b>Maintenance assessment:</b> End of Chapter Assessments, Independent Study Logs, Low Stakes Assessment starters</p>	<p><b>Assessment Focus</b> <b>Deep assessment:</b> In-Class Mock Assessments</p> <p><b>Maintenance assessment:</b> Independent Study Logs, Low Stakes Assessments</p>
<b>Termly themes</b>	<p><b>Links to Gospel Values/vocations:</b> Development of Telescopes – Service and Sacrifice 1-1 Guidance linked to future study and vocations</p>	<p><b>Links to Gospel Values/vocations:</b> Transformers and the National Grid – Service and Sacrifice 1-1 Guidance linked to future study and vocations</p>
	<p><b>Enrichment:</b> Science Library RI Masterclasses</p>	<p><b>Enrichment:</b> Science Library</p>

## Summer Term

	Y12	Y13
Summer 1	<p><b>Content:</b>  <b>HU:</b>            Classification of stars            Classification by luminosity            Absolute magnitude, M            Classification by temperature, black-body radiation            Principles of the use of stellar spectral classes            The Hertzsprung-Russell (HR) diagram            Supernovae, neutron stars and black holes</p> <p><b>SV:</b>            Resistivity            Potential divider            Electromotive force and internal resistance</p>	<p><b>Content:</b>            Revision of all previous topics, exam technique in preparation for end of year assessments.            Development of practical skills in preparation for Paper 3A.</p>
	<p><b>Why am I learning this? (ie substantive content/link to previous work)</b>            Students build on from their knowledge of telescopes taught at the start of the Astrophysics topic and study how we can analyse and link the data we gather into studying, identifying and classifying objects in the universe such as stars, supernovae, neutron stars, blackholes etc. The topic involves a high demand on maths in the use of exponential equations which students also cover in Year 12 maths.</p> <p>The Electricity topic continues to use high demanding maths skills and develops abstract physics concepts in electromotive force and internal resistance. At this stage in the course students have developed a greater ability to understand the physics required.</p>	<p><b>Why am I learning this? (ie substantive content/link to previous work)</b>            Students' memory of all prior learning needs to be strengthened so that they can easily link content and coherently explain all physics concepts.</p> <p>Students' practical skills need to be developed to prepare them for university study, where they will be expected to complete practical work independently.</p>
	<p><b>Assessment Focus</b>  <b>Deep assessment:</b> End of Chapter Assessments and Whole Class Feedback</p> <p><b>Formative / maintenance assessment:</b> End of Chapter Assessments, Independent Study Logs, Low Stakes Assessment starters</p>	<p><b>Assessment Focus</b>  <b>Deep assessment:</b> Final Exams</p> <p><b>Formative / maintenance assessment:</b> Independent Study Logs, Low Stakes Assessments</p>
Summer 2	<p><b>Content:</b>  <b>HU:</b>            Doppler effect            Hubble's law            Quasars            Detection of exoplanets</p> <p><b>SV:</b>            Periodic motion            Circular motion</p>	<p><b>Content:</b>            NA</p>
	<p><b>Why am I learning this? (ie substantive content/link to previous work)</b>            The later part of the Astrophysics topic links prior learning and knowledge from the Waves topic with the Doppler effect and how we know the universe is expanding. It continues to build on knowledge gained of the universe and allows students to study some of the current areas of Astrophysics research such as the search for exoplanets.</p>	<p><b>Why am I learning this? (ie substantive content/link to previous work)</b>            NA</p>



	Further Mechanics builds on prior learning of Mechanics from the start of Year 12. The mechanics of periodic and circular motion is fundamental physics which is required to understand the motion of objects in the later topic of fields in Year 13.	
	<b>Assessment Focus</b> <b>Deep assessment:</b> End of Year 12 Assessments and Whole Class Feedback  <b>Maintenance assessment:</b> End of Chapter Assessments, Independent Study Logs, Low Stakes Assessment starters	<b>Assessment Focus</b> <b>Deep assessment:</b> NA  <b>Maintenance assessment:</b> NA
<b>Termly themes</b>	<b>Links to Gospel Values/vocations:</b> Cosmology – Service and Sacrifice Hubble’s Law– Service and Sacrifice 1-1 Guidance linked to future study and vocations	<b>Links to Gospel Values/vocations:</b> 1-1 Guidance linked to future study and vocations
	<b>Enrichment:</b> Science Library RI Masterclasses	<b>Enrichment:</b> Science Library



## Curriculum Overview, KS5: Applied science

### Autumn Term

	Y12	Y13
Autumn 1	<b>Content:</b> Unit 1 - Principles of Applications of Science	<b>Content:</b> Unit 8 - Physiology of Human Body Systems
	<b>Why am I learning this? (ie substantive content/link to previous work)</b>  They will learn fundamental scientific knowledge and understanding in the three disciplines of	<b>Why am I learning this? (ie substantive content/link to previous work)</b>  In Year 13 students will continue to develop their skills in assignment writing and analysis and undertake 3 assignments based around the human

	Biology, Chemistry and Physics which they will be examined on in the summer term.	body, along with projects, practical observation and time-constrained assessments.
	<p><b>Assessment Focus</b>            Deep assessment: - Mock exam at the end of the unit – December of each academic year</p> <p>Formative / maintenance assessment: Low stakes assessments through the specialisms and assessed on key points within each specialism</p>	<p><b>Assessment Focus</b>            Deep assessment: Formal internally assessed assignment</p> <p>Formative / maintenance assessment: First and final submission of the submitted assignments</p>
Autumn 2	Content: Unit 1 - Principles of Applications of Science	Content: Unit 8 - Physiology of Human Body Systems
	<p>Why am I learning this? (<i>ie substantive content/link to previous work</i>)</p> <p>Continuation of unit 1 delivery from the previous half term. The unit must be completed by the end of December</p>	<p>Why am I learning this? (<i>ie substantive content/link to previous work</i>)</p> <p>Continuation of unit 8 delivery from the previous half term. The unit must be completed by the end of December</p>
	<p><b>Assessment Focus</b>            Deep assessment: Mock papers on unit 1 (Biology, Chemistry and Physics)</p> <p>Maintenance assessment: Low stakes assessments</p>	<p><b>Assessment Focus</b>            Deep assessment: Formal internally assessed assignment</p> <p>Formative / maintenance assessment: First and final submission of the submitted assignments</p>
Termly themes	Links to Gospel Values/vocations: Service and sacrifice – Research technicians in labs	Links to Gospel Values/vocations: Service and sacrifice – Doctors and nurses in the NHS
	Enrichment: Guest speaker from a research lab in the local area	Enrichment: Video clips surgical procedures from the NHS and other medical bodies.

## Spring Term

	Y12	Y13
Spring 1	Content: Unit 2 - Practical Scientific Procedures and Techniques	Content: Unit 3 - Scientific Investigation Skills
	Why am I learning this? ( <i>ie substantive content/link to previous work</i> )  Students will learn practical techniques used in industry and be assessed on their competency in the laboratory as well as their understanding of the scientific technique by a range of assignments, marked internally.	Why am I learning this? ( <i>ie substantive content/link to previous work</i> )  Students develop their scientific skill repertoire and these will be assessed in externally set assessment tasks which are carried out over a 3 week period. Learners will produce evidence in a variety of different forms and including, written reports, graphs, along with projects, practical observation and time-constrained assessments.
	Assessment Focus Deep assessment: Formal internally assessed assignment  Formative / maintenance assessment: First and final submission of the submitted assignments	Assessment Focus Deep assessment: Y13 mock paper on unit 3 in the spring term  Formative / maintenance assessment: Mini investigations and skills assessments that are linked to an investigation
Spring 2	Content: Unit 2 - Practical Scientific Procedures and Techniques	Content: Unit 3 - Scientific Investigation Skills
	Why am I learning this? ( <i>ie substantive content/link to previous work</i> )  Students will continue to learn practical techniques used in industry and be assessed on their competency in the laboratory as well as their understanding of the scientific technique by a range of assignments, marked internally.	Why am I learning this? ( <i>ie substantive content/link to previous work</i> )  Students will continue to develop their scientific skill repertoire and these will be assessed in externally set assessment tasks which are carried out over a 3 week period. Learners will produce evidence in a variety of different forms and including, written reports, graphs, along with projects, practical observation and time-constrained assessments.
	Assessment Focus Deep assessment: Formal internally assessed assignment  Formative / maintenance assessment: First and final submission of the submitted assignments	Assessment Focus Deep assessment: Additional Y13 mock paper on unit 3  Formative / maintenance assessment: Mini investigations and skills assessments that are linked to an investigation
Termly themes	Links to Gospel Values/vocations: Service and sacrifice – Police force working on cases that use chromatography analysis skills to determine outcomes	Links to Gospel Values/vocations: Service and sacrifice – Research technicians in labs
	Enrichment: Past student external speaker on careers in the NHS	Enrichment: Access to literature and science library

## Summer Term

	Y12	Y13
Summer 1	<p><b>Content: Revisit unit 1</b></p> <p>Why am I learning this? (<i>ie substantive content/link to previous work</i>)  <b>Revision for the unit 1 externally set papers this half term</b></p>	<p><b>Content: Unit 3 - Scientific Investigation Skills</b></p> <p>Why am I learning this? (<i>ie substantive content/link to previous work</i>)  <b>Revision for the unit 3 externally set paper this half term</b></p>
	<p><b>Assessment Focus</b>            Deep assessment: External exams</p> <p>Formative / maintenance assessment: Sample papers and skills in readiness for the exams</p>	<p><b>Assessment Focus</b>            Deep assessment: External exam</p> <p>Formative / maintenance assessment: Sample papers and investigations in readiness for the exam</p>
Summer 2	<p><b>Content: Unit 2 - Practical Scientific Procedures and Techniques</b></p> <p>Why am I learning this? (<i>ie substantive content/link to previous work</i>)</p> <p>Students will continue to learn practical techniques used in industry and be assessed on their competency in the laboratory as well as their understanding of the scientific technique by a range of assignments, marked internally.</p>	<p><b>Content: N/A</b></p> <p>Why am I learning this? (<i>ie substantive content/link to previous work</i>)</p> <p>N/A</p>
	<p><b>Assessment Focus</b>            Deep assessment: Formal internally assessed assignment</p> <p>Formative / maintenance assessment: First and final submission of the submitted assignments</p>	<p><b>Assessment Focus</b>            Deep assessment: N/A</p> <p>Maintenance assessment: N/A</p>
Termly themes	<p><b>Links to Gospel Values/vocations:</b> Linking each topic to relevant careers in introduction lessons.            Faithfulness and integrity- resilience in revision and acting on feedback given.</p>	<p><b>Links to Gospel Values/vocations:</b> Linking each topic to relevant careers in introduction lessons.            Faithfulness and integrity- resilience in revision and acting on feedback given.</p>
	<p><b>Enrichment: access to literature and science library</b></p>	<p><b>Enrichment: Access to literature and science library</b></p>