

## KS5 Curriculum Plan 2024-2025

TOPIC	LP1	LP2	LP3	LP4	LP5	
	Chemistry	Chemistry / Physics	Physics	Biology	Review	
Year 12	<p>The electronic structure of atoms using the S,P,D,F orbitals; Explain how an ionic bond is formed; Explain how a covalent bond is formed; Describe how tetrahedral structure are formed due to covalent bonds; Explain how a metallic bond is formed; Understand why electronegativity of atoms is different due to their atomic structure; Summarise how intermolecular forces are formed, including hydrogen bonding, dipole-dipole forces, London dispersion forces; Know how to balance equations; Be able to calculate the masses of reactants needed using moles and molar masses; Be able to calculate the empirical formula of a compound using the Mr and molar mass.</p>	<p>Quantity calculations, The periodic table, Trends in atoms and ions, Reactions of metals, Reactivity series, Displacement reactions, Oxidation and reduction. Characteristics of waves, Diffraction and coherence. Explain emission spectra using quantum theory; Explain how a stationary wave is formed; Describe a stationary wave using the terms nodes, antinodes and resonance; Know and apply the wave speed equation to a range of situations; Describe and explain refraction of light waves; Describe and explain reflection of (light) waves; Describe and explain how total internal reflection occurs using the idea of critical angles, Explain how optical fibres use total internal reflection; Summarise the applications of optical fibres; Compare analogue and digital signals; Explain the conversion of analogue to digital signals; Discuss the use of electromagnetic waves in communication; Know the electromagnetic spectrum; Understand the regions of the electromagnetic spectrum. Compare light and electron microscopes Understand how to calculate magnification using image and actual size</p>	<p>Physics: Emission spectra, resonance and musical instruments, refraction, reflection, optical fibres, signals and electromagnetic spectrum. Explain emission spectra using quantum theory; Explain how a stationary wave is formed; Describe a stationary wave using the terms nodes, antinodes and resonance; Know and apply the wave speed equation to a range of situations; Describe and explain refraction of light waves; Describe and explain reflection of (light) waves; Describe and explain how total internal reflection occurs using the idea of critical angles, Explain how optical fibres use total internal reflection; Summarise the applications of optical fibres; Compare analogue and digital signals; Explain the conversion of analogue to digital signals; Discuss the use of electromagnetic waves in communication; Know the electromagnetic spectrum; Understand the regions of the electromagnetic spectrum. Biology: Microscopy and magnification. Compare light and electron microscopes Understand how to calculate magnification using image and actual size</p>	<p>Eukaryotic and prokaryotic cells, gram staining, specialised cells and tissues, structure and function of neurones. Know the organelles of eukaryotic cells (plant and animal cells) and describe the functions; Know the organelles of prokaryotic cells (bacteria) and describe the functions; Understand the gram staining technique and evaluate results from the investigation; Identify specialised cells and tissues; Explain the function of specialised cells and tissues; Describe the structure of neurones; Explain how an action potential is generated from a resting potential in terms of movement of ions; Understand saltatory conduction and express the importance of this; Summarise the structure and function of a synapse.</p>	<p>Review of work from LP1, LP2, LP3 and LP4 teacher 1 (External exam work) and teacher 2 (coursework). Knowledge review of all content from LP1, LP2, LP3 and LP4 teacher 1 and teacher 2.</p>	
	Skills	<p>Drawing diagrams of electron structure; Drawing diagrams of covalent, ionic and metallic bonds; Drawing diagrams of how hydrogen bonds, dipole-dipole and London dispersion forces are created; Balancing equations; Using balanced symbol equations and the periodic table to calculate moles, molar masses and molarities; Calculating empirical formula; Experimental techniques. Calculating reaction quantities and yield Reading and understanding the periodic table Investigating the reactivity of metals with oxygen, water and acids Predicting displacement reactions and testing predictions with investigations Using qualitative data to draw conclusions about reactions Applying and rearranging the equation <math>f = 1/T</math> Applying and rearranging the equation <math>v = f\lambda</math> Drawing a labelling a longitudinal and transverse wave Investigating diffraction with wave machines and diffraction gratings Drawing and explaining how a diffraction grating produces an interference pattern Applying and rearranging the equation <math>n\lambda = d \sin \theta</math> Applying and rearranging the equation <math>E = hf</math> to calculate the energy carried by each photon or the frequency of the radiation; Applying and rearranging the equation <math>v = \sqrt{T/u}</math> ; Drawing a labelled diagram of stationary waves produced by string and wind instruments at different harmonics; Investigating the effects of materials on the reflection and refraction of light waves; Applying and rearranging the equation <math>n = c/v = \sin i / \sin r</math> ; Application of knowledge to explain the uses of different signals in different applications; Apply and rearrange the equation <math>I = k/r^2</math> ;</p>				
	Key Vocab	<p>Electron, energy level, electron configuration, spin, atom, periodic table, mass number, atomic number, ion, ionic bonding, electrostatic attraction, giant ionic lattice, covalent, tetrahedral, organic compound, metallic bonding, delocalised electrons, electronegativity, non-polar, polar, intermolecular, dipole, van-der Waals, London dispersion forces, hydrogen bond, mole, molar mass, empirical formula.</p>	<p>Reaction quantities, yield, titration, solution, standard solution, solute, solvent, stoichiometry, theoretical mass, reversible reaction, percentage yield, periodic table, period, group, atomic number, mass number, atomic radius, ionic radius, cations, anions, isoelectronic, electronegativity, first ionisation energy, periodicity, electron affinity, reactions, malleable, ductile, alkaline solution, oxidation, allotropes, amphoteric, oxides, hydroxide, hydrogen, salt, reduction, redox, half equation, oxidation state, redox reaction, catalysts, oxidation agents, oscillation, frequency, period, displacement, amplitude, wavelength, phase difference, wave speed, longitudinal, transverse, diffraction, transmission, interference, interference pattern, superposition, coherent, path difference, coherence length.</p>	<p>Quantum, quantum theory, photon, electron, emission spectra, electrons, Planck constant, energy level, ground state. Stationary wave, node, antinode, resonance, superposition, forcing frequency, natural frequency, wave speed, harmonic, fundamental harmonic, pressure node, refraction, refractive index, wave-front, normal line, angle of incidence, angle of refraction, reflection, internal reflection, total internal reflection, critical angle, optical fibres, signals, signal transmission, fibre optics, endoscope, analogue signal, digital signal, broadband, electromagnetic spectrum, inverse square law, light microscope, electron microscope, magnification, image size, actual size, organelles, resolution.</p>	<p>Eukaryotic cell, prokaryotic cell, ultrastructure, nucleus, nucleolus, cytoplasm, plasma membrane, rough endoplasmic reticulum, smooth endoplasmic reticulum, Golgi apparatus, vesicles, lysosomes, ribosomes, mitochondria, centrioles, exocytosis, cell wall, chloroplast, vacuole, tonoplast, amyloplast, plasmodesmata, pits, membrane-bound organelles, DNA, capsule, nucleoid, plasmid, complimentary base pairing, RNA, secrete, toxin, gram staining, gram positive, gram negative, antibiotics, crystal violet, safranin, palisade mesophyll cell, root hair cell, water potential, sperm cell, egg cell, gamete, red blood cell, haemoglobin, white blood cell, pathogen, squamous epithelial tissue, ciliated epithelial tissue, endothelial tissue, sarcolemma, myofibril, sarcomere, slow twitch, fast twitch, ATP, aerobic respiration, hydrolyse</p>	<p>Key vocabulary reviewed from LP1, LP2, LP3 and LP4 teacher 1 and teacher 2.</p>

		LP1	LP2	LP3	LP4	LP5
TOPIC		Enzymes in action	Plants and their environment	Understanding the interrelationship and nervous control of the cardiovascular and respiratory systems	Understand the role of hormones in the regulation and control of the reproductive system	
Year 13	Knowledge	<p>Understand protein structure down to the molecular structure. Use this knowledge to explain why active sites are specific. Explain collision theory and conditions which affect enzyme function. Understand that the formation of enzyme-substrate complexes causes the activation energy of a reaction to lower and as such, catalyse the reaction.</p> <p>Predict how different factors will affect the enzyme activity. Understand fermentation as an enzyme-controlled reaction and how it is used on an industrial scale.</p> <p>Know about diffusion and factors that affect diffusion of molecules. Use Brownian motion to explain observations in the diffusion of bromine.</p> <p>Use ideas about the arrangement of solids liquids and gases to explain diffusion and how a dynamic equilibrium is established.</p> <p>Plants and their environment</p> <p>Suggest factors that affect plant growth and/or distribution. Know about photosynthesis and the factors that affect the rate of reaction in this process.</p> <p>Understand how to sample a habitat to record abundance and distribution.</p>	<p>Suggest factors that affect plant growth and/or distribution. Know about photosynthesis and the factors that affect the rate of reaction in this process. Understand how to sample a habitat to record abundance and distribution.</p> <p>Energy content of fuels</p> <p>Understand what a fuel is and the fuels we get from crude oil through fractional distillation.</p> <p>Know the link between the chemical structure of the molecules and the properties of the fuels.</p> <p>Understand that alcohols can be used as fuels and the toxicity and other hazards associated with fuels.</p> <p>Know the products of complete and incomplete combustion. Know the units of energy and how to calculate the heat energy released from fuels.</p> <p>Electrical circuits</p> <p>Know the circuits symbols of common components and how to draw them in a circuit.</p> <p>Know Ohm's Law and apply it to difference scenarios. Interpret Ohm's Law graphs for different devices. Calculate resistance around a circuit and electrical and mechanical power. Understand how fuses work.</p> <p>Explain the national grid and how inefficient the production and transport of electricity is.</p> <p>Understand how to calculate the amount of energy provided to blocks made of different materials.</p>	<p>Understand the need to respond to change. Understand nervous system organisation and function of each part. Understand the parasympathetic and sympathetic nervous systems and their effects.</p> <p>Know the structure and function of nerves cells. Identify different nerve cells from diagrams. Know how the myelin sheaf is formed and its function. Know how resting potential is maintained and how an action potential is generated as well as how these can be detected on a cathode ray oscilloscope and how to interpret these traces.</p> <p>Understand the terms repolarisation and depolarisation and what causes these effects in a nerve cell.</p> <p>Understand how an impulse travel along a nerve is one direction and mechanisms for maintaining this including the all of nothing principle. Know the importance of saltatory conduction in maintaining the speed of an impulse.</p> <p>Understand how a synapse works. Know some common neurotransmitters and how they work. How the nervous system responds to stimuli using set pathways including the reflex arc.</p> <p>Understand the structure and function of a neuromuscular junction. Understand how different receptors detect changes in stimuli. Apply this knowledge to understanding neurological disorders such as Parkinson's disease and motor neuron disease.</p>	<p>Know the structure and function of the female reproductive system.</p> <p>Know the structure and function of the male reproductive system.</p> <p>Know how gametes are formed in the testes and ovaries on a microscopic level, using the terms spermatogenesis and oogenesis.</p> <p>Explain how disorders in sperm production and ovulation can result in infertility.</p> <p>Express in detail the hormonal and physiological changes that occur in the menstrual cycle.</p> <p>Understand the processes that lead to conception including ejaculation, fertilisation and implantation.</p> <p>Explain how conception can be assisted using IVF. Use knowledge to explain how problems with conception can be caused by erectile dysfunction, anti-sperm antibodies, menopause, hypo or hyperthyroidism.</p> <p>Use knowledge to explain how various methods of contraception work including progesterone only and oestrogen and progesterone combination contraception.</p>	
	Skills	<p>Write coursework on the cardiovascular and respiratory systems which also conclude on how specific conditions are caused using this knowledge.</p> <p>Write coursework on homeostatic mechanisms in the human body and conclude on the conditions caused if this goes wrong, including causes of symptoms and treatments.</p> <p>Write coursework on the role of hormones in reproduction including conclusions on conditions which affect fertility and how these can be treated.</p>				
	Key Vocab	Enzymes, protein structure, molecular structure, active sites, specific, collision theory, enzyme function, enzyme-substrate complexes, activation energy, catalyse,	Energy, content, fuels, crude oil, fractional distillation, chemical structure, homologous series, properties, alcohols, toxicity, hazards, products, complete, incomplete, combustion, electrical circuits, circuits symbols, common components, Ohm's Law, devices, resistance, electrical power, mechanical power, fuses, national grid, inefficient, production, transport, electricity, specific heat capacity.	Interrelationship, nervous control, cardiovascular, respiratory system, nervous system, organisation, function, parasympathetic, sympathetic, nerves cells, myelin sheaf,	Hormones, regulation, reproductive system, structure, function, female reproductive system, ovaries, uterus, oviduct, cervix, vagina, male reproductive system, testes, urethra, vas deferens, prostate, gametes, microscopic, spermatogenesis, oogenesis, disorders in sperm production, ovulation, infertility, hormonal, physiological, menstrual cycle, conception, ejaculation, fertilisation, implantation, IVF, erectile dysfunction, anti-sperm antibodies, menopause, hypo or hyperthyroidism, contraception, progesterone, oestrogen, progesterone, combination contraception.	