The Nottingham Emmanuel School – Science Curriculum Map (2021-2022)

	AUT 1	AUT 2	SPR 1	SPR 2	SUM 1	SUM 2
Year 7	**Introduction to science** Safety rules Scientific equipment Following methods Writing a risk assessment Defining variables Drawing tables Making observations Identifying patterns Writing a conclusion **Cells – Cells** Animal and plant cells Specialised cells Microscopes Organs and organ systems The respiratory system Breathing	**Particles – States of matter** Solids, liquids and gases Changes of state Diffusion Conservation of mass Pressure Density Melting and boiling points **Earth** Gravity and Weight Earth and the moon Seasons, day and night **Beyond Earth** The solar system Size of the solar system Day, nights and years Stars and Galaxies Life cycle of stars Light years Light from the sun Reflection Refraction	**Cells – Respiration** Life processes Gas exchange Aerobic respiration Anaerobic respiration Anaerobic respiration in yeast **Developing theories** Scientific theories Limitations and applications Why models change	**Energy and Efficiency** Stores of energy Energy transfers Energy efficiency Non-renewable energy Renewable energy **Food and nutrition** Nutrients in food Balanced diets Deficiency diseases Diabetes	**Digestion** The digestive system Enzymes Digested food **Circulatory system** The circulatory system Blood Gas exchange **Metals and the Periodic table** Development of the periodic table Structure of the periodic table Metals and non-metals	**Communication – Sound and Light** The Electromagnetic Spectrum Colour spectrum Detection of Light What is sound Production of sound **Atomic structure, elements and compounds** Elements, compounds and mixtures Making compounds Atomic structure **Working Scientifically projects** Investigation skills Practical skills Evaluating methods
Year 8	**Inheritance – Reproduction** Sex cells Reproductive systems Puberty Fertilisation Pregnancy **COVID Recovery** **Working Scientifically projects** Investigation skills Practical skills Evaluating methods **Materials – Solutions** Particles Chemical symbols Properties of materials Separating techniques	**Electrical circuits** Circuit symbols and diagrams Electricity Conductors and insulators Measuring current Measuring potential difference Series circuits Parallel circuits Resistance **Inheritance - Variation** Classification Variation Theory of evolution Fossils Evidence of evolution	**Chemical reactions – Reactions** Defining reactions Chemical changes Fire Exothermic and endothermic reactions Types of reactions Reactivity series **Electricity in the home and magnetism** Power Plugs Magnets Magnetic fields Electromagnets Permanent and induced magnets	**Plants – Plants as organisms** Parts of a plant Structure of a leaf Respiration in plants Photosynthesis Plant tissues (xylem and phloem) **Chemical reactions – Acids and alkalis** Acids around us Testing for acids and alkalis Indicators Measuring pH Neutralisation reactions	**Forces introduction** Contact and non-contact forces Measuring forces Weight and mass Friction Stationary and moving objects Resultant forces Balanced forces **Farming** Advances in farming Plant hormones Pesticides and fertilises Battery farming	**Forces – Motion and speed** Speed Distance-time graphs Breaking, thinking and stopping distances Pressure **Heat transfers** Conduction Convection Radiation

Year 9	**Cell biology - Cells and Transport** Animal and plant cells Prokaryotes and eukaryotes Microscopy Specialised cells Diffusion Osmosis Active transport Exchanging materials **Energy – Conservation and dissipation of energy** Changes in energy stores Conservation and dissipation of energy Energy and work Power Gravitational potential energy Kinetic energy GPE to KE Elastic potential energy Power stations and energy resources **COVID recovery** The pace of content has been slightly reduced to allow for COVID recovery throughout the curriculum through SR practice and providing additional learning checks and build.	**Cell biology - Cellular division and stem cells** The cell cycle and mitosis Stem cells Cell specialisation and differentiation Treatments using stem cells **Atomic structure and the Periodic table** Atoms, elements and compounds Chemical equations Separating techniques Atomic structure	**Organisation – Digestive system** Organisation hierarchy The digestive system Enzymes Factors affecting enzymes Human digestive enzymes Food tests **Organisation – Human and plant systems** Blood Blood vessels Heart structure Problems with the heart **Bonding – Bonding and structures** States of matter Changing states Formation of ions Ionic bonding Ionic compounds Covalent boning	**Organisation – Human and plant systems** Risk factors for non-communicable diseases Lungs and gas exchange Tissues and organs in plants Plant transport systems **Periodic Table Revisited** Atomic structure History of the atom Metals and non-metals Groups of the periodic table **Bonding – Bonding and structures continued** Simple molecular substances Polymers and giant covalent structures Allotropes of carbon Metallic bonding **Triple only content** Transition metals Nanoparticles	**Electricity – Current, PD and resistance, series and parallel circuits** Symbols and current Current and charge Potential difference Resistance Length and resistance Ohm's law Non-Ohmic conductors LDRs ad thermistors Series and parallel circuits Resistors in circuits **Electricity – Domestic uses and safety** Mains electricity ACDC Electrical power The national grid **Triple only content** Static electricity Electric fields	**Targeted programme of in class intervention based on students' needs.** **Working scientifically focus and assessment review to build on and consolidate skills for Year 10.** **Triple only content** Giant metallic structures Nanoparticles Application of nanoparticles Transition elements

Year 10 Biology	**COVID RECOVERY** The cell cycle and mitosis Stem cells Cell specialisation and differentiation Treatments using stem cells Factors affecting enzymes Food tests Tissues and organs in plants Plant transport systems	**Infection and response – Communicable diseases** Health issues Communicable diseases Preventing transmission Viral, bacterial, fungal and Protista diseases Human defence systems **Triple only** Growing bacteria Plant diseases Plant disease detection Plant defences Production and use of monoclonal antibodies	**Preventing and treating diseases** Vaccination Antibiotics and painkillers Discovery and development of drugs Non-Communicable diseases Risk factors Cancer **Bioenergetics – Respiration** Aerobic respiration Anaerobic respiration in animals Anaerobic respiration in plants and yeast Responding to exercise Metabolism	**Bioenergetics – Photosynthesis** Photosynthesis Plant uses of glucose Rate of photosynthesis Maximising the rate of photosynthesis	**Biological responses – Homeostasis and Response** Homeostasis and the endocrine system Negative feedback (HT) Control of blood glucose Diabetes Hormones in reproduction Contraception Infertility treatments **Triple only** Control of body temperature Maintaining water, ion and nitrogen balance Kidney problems and treatments Plant hormones	**Biological responses – Homeostasis and Response** The human nervous system Reaction rates **Triple only** The brain The eye Problems with the eye Treatments with the eye
Year 10 Chemistry	**COVID RECOVERY** **Bonding – Bonding and structures** States of matter Changing states Formation of ions Ionic bonding Ionic compounds Covalent boning Simple molecular substances Polymers and giant covalent structures Allotropes of carbon Metallic bonding	**Quantitative chemistry** Conservation of mass Relative formula mass Concentration of solutions **Higher** Moles Amount of substances in equations Masses to balances equations Limiting reactants Equations and calculations **Triple only** Percentage yield Atom economy Using concentrations Volume of gases	**Chemical changes** Acids and alkalis Reactions of acids Making soluble salts Reactivity series Displacement reactions Extracting metals **Higher** Redox reactions Strong and weak acids **Triple only** Titrations Titration calculations	**Electrolysis and Energy changes** Electrolysis of metal ores Electrolysis of aqueous solutions Exothermic and endothermic reactions Reaction profiles **Higher** Representation of reactions at electrodes as half equations Bond energy calculations **Triple only** Chemical cells and batteries Fuel Cells	**Rate and extent of chemical change** Rate of reaction Factors affecting rates Surface area Temperature Concentration Catalyst Measuring rates from graphs Reversible reactions **Higher** Calculating rates using tangents Equilibrium Le Chatelier's principle	

Year 10 Physics	**Particle model** Changes of state and internal energy Thermal conductivity Specific heat capacity Specific latent heat Density Pressure and temperature in gasses **Triple only** Pressure and volume in gases	**Electricity – Current, PD and resistance, series and parallel circuits** Symbols and current Current and charge Potential difference Resistance Length and resistance Ohm's law Non-Ohmic conductors LDRs ad thermistors Series and parallel circuits Resistors in circuits	**Atomic Structure** The history of the atom Alpha, beta and gamma radiation Nuclear equations Half life Dangers of nuclear radiation	**Electricity – Domestic uses and safety** Mains electricity ACDC Electrical power The national grid **Triple only content** Static electricity Electric fields	**Waves and space** Waves Transverse and longitudinal waves Electromagnetic spectrum Uses and dangers of electromagnetic waves Black body radiators Light reflection Light refraction **Triple only** Seeing coloured light Lenses Sound Ultrasound Earthquake P and S waves Our place in the universe Stellar evolution Red shift The expanding universe	**Triple only** Dangers of radiation Uses of radiation Background Radiation Nuclear fission Nuclear fusion

Year 11 GCSE Biology	**COVID RECOVERY TRIPLE SCIENCE** Biology Paper 1 Triple only content **Triple only** Growing bacteria Plant diseases Plant disease detection Plant defences Production and use of monoclonal antibodies **Biological responses – Homeostasis and Response** Homeostasis and the endocrine system Negative feedback (HT) Control of blood glucose Diabetes Hormones in reproduction Contraception Infertility treatments	**Triple only** Control of body temperature Maintaining water, ion and nitrogen balance Kidney problems and treatments Plant hormones **Biological responses – Homeostasis and Response** The human nervous system Reaction rates **Triple only** The brain The eye Problems with the eye Treatments with the eye **Genetics, evolution and variation** Types of reproduction Meiosis Inheritance DNA and the genome Inheritance of diseases Genetic screening	**Triple only** Continuation of Aut 1 Reproduction further DNA structure Protein synthesis Gene expression and mutation **Genetics, evolution and variation** Variation Evolution by natural selection Evidence of evolution Fossils and extinction Selective breeding Genetic engineering Ethics of genetic technology Antibiotic resistance and MRSA **Triple only** The history of genetics Theories of evolution Accepting Darwin's ideas Evolution and speciation Cloning	**Continuation of Genetics, evolution and variation** **Ecology – Ecology, adapting and cycles** Importance of communities Biotic and abiotic factors Distribution and abundance Competition in plants and animals Adapting to survive Plant and animal adaptations Feeding relationships Materials cycling The carbon cycle Feeding relationships Material cycling The carbon cycle **Triple only** Rates of decomposition	**Ecology – Biodiversity** Human population Land and water pollution Air pollution Deforestation and peat destruction Global warming **Triple only** The impact of changes Trophic levels and biomass Biomass transfers Factors affecting food security Making food production efficient Sustainable food production **Bespoke personalised revision plan or Year 11 exams**	**Targeted programme of in class intervention based on students' needs.**

Year 11 Chemistry	**COVID RECOVERY TRIPLE SCIENCE** Chemistry Paper 1 Triple only content Transition metals Nanoparticles Percentage yield Atom economy Using concentrations Volume of gases Titrations Titration calculations Chemical cells and batteries Fuel Cells **Rate and extent of chemical change** Rate of reaction Factors affecting rates Surface area Temperature Concentration Catalyst	**Rate and extent of chemical change** Measuring rates from graphs Reversible reactions **Higher** Calculating rates using tangents Equilibrium Le Chatelier's principle **Organic chemistry** Alkanes and their properties Combustion and fractional distillation Cracking crude oil **Triple only** Alkenes Reactions of Alkenes Alcohols Carboxylic acids **Triple Higher** Condensation polymers Naturally occurring polymers	**Chemical analysis** Pure substances Formulations Chromatography Identification of common gases **Triple only** Identification of ions Flame emission spectroscopy **Using resources** Finite and renewable resources Reduce, reuse and recycle Life cycle assessments Potable water Waste water treatment **Higher** Extraction of metals from ores	**Triple only** Corrosion Alloys Properties and uses of materials Haber process Fertilisers **Chemistry of the atmosphere** The composition of the early atmosphere The evolution of the atmosphere Greenhouse gases Human activity Climate change Carbon footprint Atmospheric pollutants	**Targeted programme of in class intervention based on students' needs.**	
Year 11 Physics	**Forces and interactions** Scalar and vectors Mass and weight Resultant forces Resolving forces – Higher Hook's law Work done Energy transfers **Forces and interactions** **Triple only** Moments Levers and gears Pressure Pressure in liquids Atmospheric pressure	**Forces and Motion** Distance time graphs Stopping distance Velocity time graphs Terminal velocity Velocity and acceleration **Higher** Momentum Conservation of momentum **Triple only** Changes in momentum	**Magnetism and electromagnetism** Magnetic fields Magnetic fields of electrical currents The motor effect **Triple only** Electromagnets in devices The generator effect The alternating-current generator Transformers Transformers in action	**Space** Our place in the universe Stellar evolution Red shift The expanding universe	**Bespoke personalised revision plan or Year 11 exams**	

Year 11 Combined Science	**Biological responses – Homeostasis and Response** Homeostasis and the endocrine system Negative feedback (HT) Control of blood glucose Diabetes Hormones in reproduction Contraception Infertility treatments The human nervous system Reaction rates **Rate and extent of chemical change** Rate of reaction Factors affecting rates Surface area Temperature Concentration Catalyst Measuring rates from graphs Reversible reactions **Higher** Calculating rates using tangents Equilibrium Le Chatelier's principle **Forces and interactions** Scalar and vectors Mass and weight Resultant forces Resolving forces – Higher Hook's law Work done Energy transfers	**Genetics, evolution and variation** Types of reproduction Meiosis Inheritance DNA and the genome Inheritance of diseases Genetic screening Variation Evolution by natural selection Evidence of evolution Fossils and extinction Selective breeding Genetic engineering Ethics of genetic technology Antibiotic resistance and MRSA **Organic chemistry** Alkanes and their properties Combustion and fractional distillation Cracking crude oil Triple Higher Condensation polymers Naturally occurring polymers **Forces and Motion** Distance time graphs Stopping distance Velocity time graphs Terminal velocity Velocity and acceleration **Higher** Momentum Conservation of momentum	**Ecology – Ecology, adapting and cycles** Importance of communities Biotic and abiotic factors Distribution and abundance Competition in plants and animals Adapting to survive Plant and animal adaptations Feeding relationships Materials cycling The carbon cycle Feeding relationships Material cycling The carbon cycle **Chemical analysis** Pure substances Formulations Chromatography Identification of common gases **Magnetism and electromagnetism** Magnetic fields Magnetic fields of electrical currents The motor effect	**Ecology – Biodiversity** Human population Land and water pollution Air pollution Deforestation and peat destruction Global warming **Chemistry of the atmosphere** The composition of the early atmosphere The evolution of the atmosphere Greenhouse gases Human activity Climate change Carbon footprint Atmospheric pollutants **Using resources** Finite and renewable resources Reduce, reuse and recycle Life cycle assessments Potable water Waste water treatment **Higher** Extraction of metals from ores		

	AUT 1	AUT 2	SPR 1	SPR 2	SUM 1	SUM 2
Year 12 Biology	**Cells** Structure of eukaryotic cells Structure of prokaryotic cells and viruses Methods of studying cells Optical microscopes Transmission electron Microscopes Scanning electron microscopes Magnification The cell cycle Mitosis **Biological molecules** Monomers and polymers Condensation and hydrolysis Reactions Carbohydrates Alpha and beta glucose The structure and function of Cellulose, glycogen, starch and lipids The structure and function of triglycerides and phospholipids	**Transport across membranes** Structure of the cell membrane Fluid mosaic model Transport across cell membranes Diffusion Facilitated diffusion Osmosis Active transport Co-transport **Cell recognition and the immune system** Defence Antibodies Vaccinations HIV **Biological molecules** Amino acids, protein and enzymes The induced fit model Competitive and von-Competitive Inhibitors Factors affecting enzyme rates The structure and functions of water Uses of ions The structure and function of ATP	**Organisms exchanging substances** Surface area to volume ratio Single celled organisms The tracheal system of insects Gills of fish The leaves of dicotyledonous plants Mammalian lungs Digestion and Absorption in Mammals **DNA, genes and protein synthesis** Nucleic acids DNA RNA Genes Chromosomes DNA semi-conservative replication Watson and Crick model Transcription Translation	**Mass transport in mammals** Haemoglobin and red blood cells Oxyhaemoglobin dissociation curves Blood circulation in a mammals The human heart The cardiac cycle Blood vessels and functions **Genetic diversity** Meiosis Allele Mutations and Effects Genetic Diversity **Biodiversity** Species and taxonomy Diversity within communities Species diversity and human activity Investigating diversity Quantitative investigations of variation	**Mass transport in plants** Xylem and transpiration Phloem and translocation Investigating mass transport **Focused revision** Exam practice Exam skills and techniques	**Populations in ecosystems** Ecosystems Variation in population size Competition Predation Investigating populations Succession Conservation of habitats

Year 13 Biology	**Photosynthesis** Site of photosynthesis Light dependent reaction Light independent reactions Investigating photosynthesis **Respiration** Glycolysis Link reaction Krebs cycle Oxidative phosphorylation Anaerobic respiration **Inheritance** Monohybrid inheritance Genetic crosses Dihybrid inheritance Codominance and multiple alleles Sex-linkage Autosomal linkage Epistasis Chi-squared test **COVID recovery** Content – no change CPAC – review of practicals to ensure students meet the CPAC criteria before the end of the year.	**Energy and ecosystems** Food chains Energy transfer Productivity Nitrogen cycle Phosphorus cycle Use of fertilisers Environmental issues **Populations and evolution** Population genetics Variation in phenotypes Natural selection Effects of selection on evolution Isolation and speciation **Mutations and gene expression** Gene mutations Stem cells and totipotency Regulation of transcription Regulation of translation	**Response to stimuli** Survival and response Plant growth factors Reflex arcs Receptors Control of heart rate **Nervous coordination** Neurones Nerve impulse Action potential Speed of an impulse **Mutations and gene expression continued** Epigenetic control of gene expression Gene expression and cancer Genome projects	**Synapses and Muscles** Structure of synapses Transmission across synapses Structure of skeletal muscle Contraction of skeletal muscle **Homeostasis** Principles of homeostasis Feedback mechanisms Regulation of blood glucose Diabetes and control **Gene projects and gene technology** Producing DNA fragments *in vivo* cloning *in vitro* cloning Locating genes Genetic screening and counselling Genetic fingerprinting	**Homeostasis - Osmoregulation** Control of blood water potential Role of nephron Osmoregulation Role of hormones in osmoregulation **Essay skills** Writing synoptic essays in Biology **Bespoke personalised revision plan for exams**	**Bespoke personalised revision plan for exams**

Year 12 Chemistry	**Lab skills** Health and safety Measuring/recording/reading Analysis of graphs Percentage uncertainty **Atomic structure** The Atom Atomic models Relative mass The mass spectrometer Using mass spectra Electronic structure Ionisation energies **Bonding** Ionic bonding Covalent bonding Charge clouds Shapes of molecules Polarisation Intermolecular forces Metallic bonding Properties of metals	**Amount of substance** The Mole Chemical equations Equations and calculations Ideal gas equation Formulas Titrations Water of crystallisation Chemical Yield Atom economy **Energetics** Enthalpy Bond enthalpies **Introduction** Formulas Functional groups Nomenclature Isomers E/Z isomers **Alkanes** Alkanes and petroleum Alkanes as fuels	**Energetics** Measuring enthalpy changes Hess's Law **Kinetics** Reactions Rates Catalysts Measuring reaction rates **Halogenoalkanes** Synthesis of chloroalkanes Halogenoalkanes Nucleophilic substitution Elimination reactions Alkenes Alkenes Reactions of alkenes Addition polymers	**Equilibria and Redox reactions** Reversible reactions Industrial processes The equilibrium constant Factors affecting the equilibrium constant Redox reactions Redox equations **Periodicity** The Periodic table Periodicity **Alcohols** Dehydrating alcohols Ethanol production Oxidising alcohols **Organic analysis** Tests for functional groups	**Bespoke personalised revision plan for Exams** **Group 2 and 7 elements** Group 2 – the alkaline earth metals Group 2 compounds Group 7 – the halogens Halide ions Test for ions **Organic analysis** Mass Spectrometry Infrared Spectroscopy	**Thermodynamics** Enthalpy changes Born-Haber Cycles Enthalpies of solution Entropy Free-energy change **Analysis** NMR spectroscopy ^{13}C NMR spectroscopy ^{1}H NMR spectroscopy

Year 13 Chemistry	**Rate Equations and K_p** Monitoring reactions Reaction rates and graphs Rate equations The initial rate method Clock reactions Rate-concentration graphs The rate-determining step The Arrhenius Equation **Isomerism and carbonyl compounds** Optical isomerism Aldehydes and Ketones Hydroxynitriles Carboxylic acids and esters Reactions and Uses of Esters Acyl chlorides Acid anhydrides purifying organic compounds **COVID recovery** Content – no change CPAC – review of practicals to ensure students meet the CPAC criteria before the end of the year.	**Rate Equations and K_p** Gas Equilibria Changing gas equilibria **Electrode potentials** Standard electrode potentials Electrochemical series Electrochemical Cells **Aromatics compounds and amines** Aromatic compounds Reactions of aromatics Amines and Amides Reactions of Amines **Polymers** Condensation polymerisation Monomers and repeating units Disposing of polymers	**Acids, Bases and pH** Acids, Bases and K_w pH Calculations The Acid Dissociation Constant Titrations and pH curves Titration calculations Buffer action Calculating the pH of buffers **Amino Acids, Proteins & DNA** Amino Acids Proteins Enzymes DNA Cisplatin **Further Synthesis & Analysis** Organic synthesis Chromatography Gas Chromatography	**Inorganic Chemistry** Period 3 elements Period 3 oxides **Transition Metals** Complex ions Isomerism in Complex ions Formation of Coloured ions Ligand Substitution Reactions Variable Oxidation States Transition Metal Titrations Transition Metal Catalysts Metal-Aqua ions	**Bespoke personalised revision plan for exams**	**Bespoke personalised revision plan for exams**

Year 12 Physics	**Particle Physics** Atomic structure and nuclear stability Matter, antimatter and photons The particle Zoo Conservation Rules Quarks and anti quarks **Waves** progressive waves and wave speed transverse and longitudinal waves Superposition and interference Stationary waves Resonance	**Quantum Phenomena** The photo electric effect Energy levels in atoms Wave particle duality **Mechanics** Scalars and vectors Resultant forces Resolving forces Forces in equilibrium **Waves** Diffraction Young's slits experiment and two source interference Diffraction gratings Refractive index Critical angle and TIR	**Mechanics** Moments Uniform acceleration Displacement time graphs Velocity time graphs Acceleration time graphs SUVAT equations **Materials** Density Hook's law Stress and strain The Young's modulus Stress- strain and force extension graphs **Electricity** Circuit diagrams Current and potential difference IV graphs Resistivity Determining the resistivity of a wire	**Mechanics** Acceleration due to gravity and terminal velocity Projectile Motion – horizontally and at an angle Newton's Laws Conservation of momentum Force, momentum and Impulse Work and power Conservation of energy **Electricity** EMF and internal resistance The potential divider Power and electrical energy Conservations of energy and charge in circuits	**Bespoke personalised revision plan for exams**	**Astrophysics** Units and quantities used in astrophysics Stellar Magnitudes Stars as black body radiators Stellar spectral classes The Hertzsprung Russell Diagram and stellar evolution Supernovae, neutron stars and black holes Lenses Optical telescopes Non optical telescopes Comparing telescopes The Doppler effect and red shift The Big Bang Theory Detection of Binary stars, quasars and exoplanets
Year 13 Physics	**Gravitational Fields** Newton's Law of Gravitation Gravitational field strength Gravitational potential Orbits of planets and satellites **Further Mechanics** Circular Motion Centripetal force and acceleration Simple Harmonic Motion SHM in a mass – spring system SHM in a simple pendulum Free and forces vibrations and resonance **COVID recovery** Content – no change CPAC – review of practicals to ensure students meet the CPAC criteria before the end of the year.	**Electric Fields** Coulomb's Law Electric field strength Electric potential **Capacitors** Capacitance Energy stored in a capacitor Dielectrics Charging and discharging capacitors **Thermal Physics** Thermal energy transfer Gas Laws Ideal Gas Equation Kinetic Theory of Gases	**Magnetic Fields** Magnetic flux density Moving charges in a magnetic field **Electromagnetic Induction** Electromagnetic induction Magnetic flux and flux linkage Faraday's law and Lenz's law **Nuclear Physics** Rutherford Scattering Measuring nuclear radii Alpha, beta and gamma radiation Radioactive decay	**Electromagnetic Induction** Alternating current Transformers **Nuclear Physics** Nuclear instability Mass defect and binding energy Energy in nuclear fission and nuclear fusion reactions Thermal Nuclear Reactors	**Bespoke personalised revision plan for exams**	**Bespoke personalised revision plan for Exams**

Year 12 BTEC L3 Applied Science	**Structure and Bonding** Electronic structure of atoms Ionic bonding Covalent bonding Metallic bonding Intermolecular forces Balanced equations Quantitative chemistry Reacting quantities Percentage yield **Uses of Substances and their properties** The periodic table Physical properties of elements Chemical properties of elements Oxidation and reduction Uses and applications of substances	**Cell structure and function** Ultrastructure of cells Function of organelles Plant and animal cells Gram positive and negative bacteria Magnification **Cell specialisation** Epithelial tissue Endothelial tissue Muscular tissue Nervous tissue **Waves in communication** Features of waves Wave concepts Wave equations Application of stationary waves Musical instruments Calculating wave speed Fibre optics Electromagnetic waves	**Titration and colorimetry** pH meters and probes Using balances and weighing Using volumetric glassware Preparation of solutions Calculating concentrations Using colorimeters **Chromatography** Chromatography techniques Applications of chromatography Interpreting chromatograms	**Personal development** Personal responsibility Interpersonal skills Professional practice **Calorimetry** Thermometers Cooling curves	**Preparation for examinations, revision and completion of coursework**	**Practical skills** Planning a scientific investigation Selecting appropriate equipment Health and safety Variables Collecting data Analysing data Qualitative and quantitative data Processing data Drawing conclusions Evaluating data Evaluations
Year 13 BTEC L3 Applied Science	**Enzymes in action** Protein structure Biological catalysts in reactions Factors affecting activity **Diffusion of molecules** Factors affecting activity rate of diffusion Arrangement of molecules Movement of molecules **Plants and their environment** Factors affecting growth Sampling techniques Sampling sizes	**Energy contents of fuels** Fuels Hazards with fuels Units of energy **Electrical circuits** Electrical symbols Equations Energy usage Calculating heat energy	**Principles of inheritance** Principles of classical genetics Mendel's law f inheritance Phenotypic ratios Punnett squares Genetic diagrams Chi squared tests Gene disorders Incomplete dominance Sex linkage **Gene expression and protein synthesis** Nucleic acids DNA replication mRNA, tRNA, sRNA and siRNA	**DNA Technologies** DNA extractions Gel electrophoresis DNA amplification Transformation of cells Uses of genetic engineering **Gene expression and protein synthesis continued** The genetic code Transcription Translation Mutations	**Cell division** Human chromosomes Formation of chromosomes Structure of chromosomes Cell cycle Mitosis Production of gametes Sex determination **Preparation for examinations, revision and completion of coursework**	**Preparation for examinations, revision and completion of coursework**