THE BULWELL ACADEMY

Key Stage 4 Curriculum Information

SCIENCE LEAD:
jim.brownlow@bulwellacademy.org.uk

Year 10 Science Curriculum: AQA Combined Science - Biology

	Autumn	Spring	Summer
Topic	**Organisation (GCSE Concepts)** **Infection & Response GCSE Concepts**	**Organisation of Animals and Plants (GCSE concepts)** **Bioenergetics & Respiration**	**Ecology** **Bioenergetics** **Photosynthesis**
Knowledge Covered	**Cell Biology (GCSE concepts)** Eukaryotes and prokaryotes Cell differentiation Microscopy Mitosis and the cell cycle Stem cells Diffusion Osmosis Active transport	**Organisation of animals and plants (GCSE concepts)** Principles of organisation Animal tissues, organs, organ systems, Cell specialisation Plant tissues, organs and systems	**Ecology** Communities Abiotic factors and biotic factors Adaptations Organisation of an ecosystem How materials are cycles Biodiversity Waste management Land use, deforestation, global warming Maintaining biodiversity
	Infection and Response Students will be learning: Vaccination Antibiotics and painkillers Discovery and development of drugs	**Bioenergetics; Respiration** Students will be learning: Aerobic respiration Anaerobic respiration Effects of exercise on respiration Anaerobic respiration in yeast and bacteria	**Bioenergetics; Photosynthesis** Students will be learning: Photosynthesis Factors affecting the rate of photosynthesis Uses of glucose Mineral ions needed by plants
Online Resources	• Interactive cells and games, workshops and visits also included: https://www.centreofthecell.org/ • Resources and workshops: medicalmavericks.co.uk/for-teachers medicalmavericks.co.uk/posters/secondary-posters Diffusion sim: phet.colorado.edu/sims/html/diffusion/latest/diffusion_en.html	• Aerobic respiration revision video: youtube.com/watch?v=HZtXLhm7ISA • Free science lessons: Bioenergetics playlist - youtube.com/playlist?list=PL9IouNCPbCxXVpEqkFRN5Jq8ZZTBBRWUz • **NATIONAL SCIENCE WEEK**	• Predator prey interactive sim: phschool.com/atschool/phbio/active_art/predator_prey_simulation/index.html • Ecology concept sims: uen.org/core/science/studentactivities/biology.shtml

Published: September 2023

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Year 10 Science Curriculum: AQA Combined Science - Chemistry

	Autumn	Spring	Summer
Topic	**Atomic Structure** **The periodic table** **Structure and Bonding**	**Chemical Changes** **Quantitative Chemistry**	**Energy Changes** **Rates of chemical change** **Organic Chemistry**
Knowledge Covered	**Atomic Structure** Development of atomic model Structure of atom Electronic structure **The periodic table** Development of the periodic table Groups 1, 7 and 0 Properties of groups	**Chemical Changes (GCSE concepts)** Redox reactions (Higher tier only) Neutralisation of acids and salt production Soluble salts The pH scale and neutralisation Strong and weak acids (Higher tier only) Electrolysis Electrolysis of molten ionic compounds Using electrolysis to extract metals Electrolysis of aqueous solutions Half equations at the electrodes (Higher tier only)	**Energy Changes** Energy transfer during exothermic and endothermic reactions Reaction profiles The energy change of reactions (Higher tier only) **The Rate of Chemical Change** Collision theory and activation energy Calculating rates of reactions Factors which affect the rates of chemical reactions and equilibrium Reversible reactions and equilibrium
	Structure and Bonding Ionic, covalent and metallic structures Ionic, covalent and metallic bonding Simple and giant molecular substance Gian macromolecular substances	**Quantitative Analysis** Conversion of mass and balanced chemical equation Relative formula mass Mass changes when a reactant or product is a gas Chemical measurements	**Organic Chemistry** Crude Oil, hydrocarbons and alkanes Fractional distillation and petrochemicals Properties of hydrocarbons Cracking and Alkenes
Online Resources	**Electrolysis, Quantitative Analysis:** Interactive electrolysis with predictions media.pearsoncmg.com/bc/bc_0media_chem/chem_sim/html5/Electro/Electro.php media.pearsoncmg.com/bc/bc_0media_chem/chem_sim/html5/Electro/Electro.php **Balancing equations:** phet.colorado.edu/en/simulation/balancing-chemical-equations **Free Science Lessons Quantitative chemistry playlist:** youtube.com/playlist?list=PL9IouNCPbCxUhxxFUbR4SNfwmaRB8mYX3	**Energy Changes, Rate and Equilibrium Simulations for rates of reaction:** web.archive.org/web/20160305171658/http://freezeray.com/chemistry.htm **Free Science Lessons Energy Changes playlist:** youtube.com/playlist?list=PL9IouNCPbCxX74bPfz0TGVVmyGYgMarWu **NATIONAL SCIENCE WEEK**	**Organic Chemistry** Balancing equations: https://phet.colorado.edu/en/simulation/balancing-chemical-equations **Combustion and moles:** media.pearsoncmg.com/bc/bc_0media_chem/chem_sim/html5/stoich/Stoich.php

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Year 10 Science Curriculum: AQA Combined Science - Physics

	Autumn	Spring	Summer
Topic	**Energy** **Electricity**	**Atomic Structure** **Particle Model**	**Forces** **Forces & Motion**
Knowledge Covered	**Energy** Students will be learning: Energy stores & pathways Energy transfers **Electricity** Current, potential difference and resistance Series and parallel circuits Domestic uses and safety Electrical Power and Energy transfers	**Atomic Structure** Atomic structure and isotopes Nuclear radiation – Alpha, Beta & Gamma radiation Nuclear Decay equations **Particle Model** Particle model and changes of state Particle model and pressure Internal energy transfers	**Forces** Scalar and vector quantities Contact and non-contact forces Weight and gravitational fields Resultant force Free body diagrams **Forces & Motion** Newtons Laws Momentum Distance – time graphs Velocity – time graphs
Online Resources	• **IOP electricity resources:** spark.iop.org/domains/electricity-and-magnetism • **Electricity misconceptions from IOP:** spark.iop.org/misconceptions?f%5B0%5D=search__misconceptions__domain%3A446 • **Free Science lessons playlist for electricity:** youtube.com/playlist?list=PL9IouNCPbCxXc2NQoIZN7-3jIKN7vW-Sq	• **Atomic Structure:** Alpha decay sim phet.colorado.edu/en/simulation/legacy/alpha-decay • **Beta decay sim:** phet.colorado.edu/en/simulation/legacy/beta-decay • **NATIONAL SCIENCE WEEK**	• **Forces:** Stopping Distances RAC rac.co.uk/drive/advice/learning-to-drive/stopping-distances/ • **Moments:** phet.colorado.edu/sims/html/forces-and-motion-basics/latest/forces-and-motion-basics_en.html • **Forces and motion:** phet.colorado.edu/sims/html/forces-and-motion-basics/latest/forces-and-motion-basics_en.html • **Momentum:** phet.colorado.edu/en/simulation/legacy/collision-lab

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Year 11 Science Curriculum: AQA Combined Science - Biology

	Autumn	Spring	Summer
Topic	**Organisation of plants** **Bioenergetics: Respiration & Photosynthesis**	**Inheritance** **Ecology**	
Knowledge Covered	**Organisation of plants** Plant tissues, organs and systems **Bioenergetics: Respiration** Aerobic and Anaerobic respiration **Bioenergetics: Photosynthesis** Factors affecting photosynthesis	**Inheritance, Variation, Evolution** Reproduction hormonal coordination in humans Variation and evolution The development of understanding of genetics and evolution	**External Examinations**
	Control- Homeostasis and response Homeostasis The human nervous system Hormonal coordination in humans The use of hormones to treat infertility (Higher tier only) Feedback systems (Higher tier only)	**Ecology** Communities Abiotic factors and biotic factors Adaptations Organisation of an ecosystem How materials are cycles Biodiversity Waste management Land use, deforestation, global warming Maintaining biodiversity	
Online Resources	• **Homeostasis and response:** Endocrine system game/sim: biomanbio.com/HTML5GamesandLabs/Physiogames/endocrine_edhtml5page.html • **Inheritance, variation and evolution:** Interactive models to show case variation and evolution: bioogysimulations.com/simulations • **Free Science lesson inheritance playlist:** youtube.com/playlist?list=PL9IouNCPbCxWt28Bifo2jK9xn-ym956sf • Predator prey interactive sim: phschool.com/atschool/phbio/active_art/predator_prey_simulation/index.html • Ecology concept sims: uen.org/core/science/studentactivities/biology.shtml		

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Year 11 Science curriculum: AQA Combined Science - Chemistry

	Autumn	Spring	Summer
Topic	**Earth's Atmosphere & Resources and Organic Chemistry**	**Chemical Analysis & Using resources**	
Knowledge Covered	**Chemistry of the Atmosphere** Students will be learning: The composition and evolution of the Earth's atmosphere Carbon dioxide and methane as greenhouse gases Human activities and the impact of global climate change Common atmospheric pollutants and their sources	**Chemical analysis** Pure substances Formulations Chromatography Identifying common gases such as hydrogen, oxygen, carbon dioxide and chlorine **Using resources** Sustainable development Potable water Waste water treatment Reducing waste materials	**External Examinations**
Online Resources	• **Earth's atmosphere and resources:** LCA and other topics revision notes: savemyexams.co.uk/gcse-chemistry-aqa-new/revision-notes/using-resources/life-cycle-analysis-recycling/life-cycle-assessment/ • **National geographic clip on water treatment:** youtube.com/watch?v=YW6GBciRHLg • **Visit opportunity:** visit a local water treatment plant. • **Chemistry:** Free Science lessons playlist: youtube.com/watch?v=3oJxWwcnfJY&list=PL9IouNCPbCxXlBeaxebOG5yf_pGrxzOyR • **Videos of gas tests** youtube.com/watch?v=P_gPlbExHv0		

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Year 11 Science curriculum: AQA Combined Science - Physics

	Autumn	Spring	Summer
Topic	**Forces** **Forces & Motion**	**Waves** **Electromagnetism**	
Knowledge Covered	**Forces** Scalar and vector quantities Contact and non-contact forces Weight and gravitational fields Resultant force Free body diagrams	**Waves** Waves in air, fluids, and solids Transverse and longitudinal waves Properties of waves Types, properties, and uses of electromagnetic waves	**External Examinations**
	Forces & Motion Newtons Laws Momentum Distance – time graphs Velocity – time graphs	**Electromagnetism** Permanent and induced magnetism, magnetic forces and fields The motor effect Electromagnetism Fleming's left-hand rule (Higher tier only) Electric motors (Higher tier only)	
Online Resources	• **Waves Interactive: Waves on a string:** phet.colorado.edu/sims/html/wave-on-a-string/latest/wave-on-a-string_en.html • **Interactive ripple tank + sound and light waves:** phet.colorado.edu/sims/html/wave-interference/latest/wave-interference_en.html • **What is a wave? Basics:** pbslearningmedia.org/resource/lsps07.sci.phys.energy.waves/what-is-a-wave/ • **Magnetism and electromagnetism - Induction simulation:** phet.colorado.edu/sims/html/faradays-law/latest/faradays-law_en.html • **Electric bell diagram:** web.archive.org/web/20160306083431/http://freezeray.com/flashFiles/electricBell.htm • **IOP electricity & magnetism resources:** spark.iop.org/domains/electricity-and-magnetism • **Electricity& magnetism misconceptions from IOP:** spark.iop.org/misconceptions?f%5B0%5D=search__misconceptions__domain%3A446		

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