THE BULWELL ACADEMY

Key Stage 4 Curriculum Information

CURRICULUM LEAD:
dean.grainger@bulwellacademy.org.uk

Year 10 Science Curriculum: 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 (GCSE Concepts) 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

SCIENCE

THE BULWELL ACADEMY

Key Stage 4 Curriculum Information

CURRICULUM LEAD:
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Year 10 Science Curriculum: Chemistry

	Autumn	Spring	Summer
Topic	**Chemical Changes (GCSE Concepts)** **Electrolysis** **Quantitative Analysis**	**Energy Changes** **The Rate and Extent of Chemical Change**	**Chemical Analysis**
Knowledge Covered	**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 • Electrolysis of molten ionic compounds • Using electrolysis to extract metals • Electrolysis of aqueous solutions • Half equations at the electrodes (Higher tier only) **Quantitative Analysis** • Conversion of mass and balanced chemical equation • Relative formula mass • Mass changes when a reactant or product is a gas • Chemical measurements	**Energy Changes** • Energy transfer during exothermic and endothermic reactions • Reaction profiles • The energy change of reactions (Higher tier only) **The Rate and Extent of Chemical Change** • Calculating rates of reactions • Factors which affect the rates of chemical reactions • Collision theory and activation energy • Catalysts • Reversible reactions • Energy changes and reversible reactions • Equilibrium • The effects of changing concentration, pressure, and temperature on equilibrium (Higher tier only)	**Chemical Analysis** • Pure substances • Formulations • Identification of common gases: hydrogen, oxygen, carbon dioxide, chlorine
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

SCIENCE

THE BULWELL ACADEMY

Key Stage 4 Curriculum Information

CURRICULUM LEAD:
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Year 10 Science Curriculum: Physics

	Autumn	Spring	Summer
Topic	**Energy (GCSE Concepts)** **Electricity**	**Atomic Structure (GCSE Concepts)** **Particle Model**	**Forces**
Knowledge Covered	**Energy (GCSE Concepts)** Students will be learning: • Energy transfers in a system **Electricity** • Current, potential difference and resistance • Series and parallel circuits • Domestic uses and safety • Energy transfers	**Atomic Structure (GCSE Concepts)** • Atoms and isotopes • Atoms and nuclear radiation **Particle Model** • Change of state and the particle model • Internal energy transfers • Particle model and pressure	**Forces** • Scalar and vector quantities • Contact and non-contact forces • Weight and gravitational fields • Resultant force • Free body diagrams
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

SCIENCE

THE BULWELL ACADEMY

Key Stage 4 Curriculum Information

CURRICULUM LEAD:
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Year 11 Science

Year 11 Science Curriculum: Biology

	Autumn	Spring	Summer
Topic	**Control – Homeostasis & Response** **Inheritance, Variation, Evolution**	**Intervention and Revision**	
Knowledge Covered	**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)	Question level analysis of mock exams used to design and deliver bespoke targeted intervention programme targeted to the need at academy, class and pupil level.	
	Inheritance, Variation, Evolution • Reproduction hormonal coordination in humans • Variation and evolution • The development of understanding of genetics and evolution	Intervention models and resources to be shared and reviewed annually.	
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		

THE BULWELL ACADEMY

Key Stage 4 Curriculum Information

CURRICULUM LEAD:
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Year 11 Science curriculum: Chemistry

	Autumn	Spring	Summer
Topic	**Earth's Atmosphere and Resources**	**Intervention and Revision**	
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	Question level analysis of mock exams used to design and deliver bespoke targeted intervention programme targeted to the need at academy, class and pupil level. Intervention models and resources to be shared and reviewed annually.	
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		

Year 11 Science

THE BULWELL ACADEMY

Key Stage 4 Curriculum Information

CURRICULUM LEAD:
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Year 11 Science curriculum: Physics

	Autumn	Spring	Summer
Topic	**Waves and Electromagnetism**	**Intervention & Revision**	
Knowledge Covered	**Waves** • Waves in air, fluids, and solids • Transverse and longitudinal waves • Properties of waves • Types, properties, and uses of electromagnetic waves	Question level analysis of mock exams used to design and deliver bespoke targeted intervention programme targeted to the need at academy, class and pupil level.	
	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)	Intervention models and resources to be shared and reviewed annually.	
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		

Year 11 Science